Integrating Knowledge through Communication:
An Analysis of Expert-Decision Maker Interactions

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Abstract

This thesis sheds light on the communication processes through which experts and decision makers integrate their domain specific knowledge in decision making. Understanding knowledge integration as a communicative process, the study analyzes the communicative challenges that are present when communicating expert knowledge across its disciplinary boundaries and discusses practices to overcome them. We particularly focus on face-to-face conversations as this communicative form is central to decision making and knowledge processes and outline the role of visual boundary objects. On the basis of an interdisciplinary conceptual part – including literature on knowledge integration, sense-making, communication, and decision making – we develop a phase framework for the knowledge communication between experts and decision makers and a framework for the management of conversations from a knowledge perspective. The two frameworks are used to analyze the knowledge communication in three case studies: the knowledge communication between IT-analysts and managers, between facility management consultants and their clients, and between policy analysts and public policy makers. The major communicative challenges that we found recurrently in these cases were: lacking common ground, lacking big picture, and the non constructive handling of conflict. To deal with these challenges, experts and decision makers recurrently engage in the combined practices of boundary spanning (primarily: face-to-face conversations) and in the use of boundary objects (primarily: visualizations). In an integrative attempt, we present a model for knowledge integration and discuss a first empirical validation through the analysis of a classroom experiment that is based on a hidden profile situation. We show that the use of visual boundary objects has a moderating effect on the model. Next to discovering and describing many context-rich problems and practices in knowledge communication, the thesis further develops the key notions of boundary objects and boundary spanning for the context of knowledge management.

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Chapter 1

Introduction

Outline

1   Introduction to the Object of Study

In the last decades knowledge has become ever more specialized and distributed. The distribution of expertise has profound implications for the coordination and integration mechanisms across knowledge boundaries (Brusoni et al., 2001; Carlile, 2004; Grant, 1996). One area, where the specialization of expertise and the concurrent need for knowledge integration have progressed is decision making. Ever more often, decision makers find themselves in an 'authority-expertise chasm' (Eppler, 2004), a situation in which they have the functional power to take decisions, but lack the sufficient expertise to fully understand the issue of decision. Decision makers gather specialists from various domains pertinent to the decision to take in order to cope with the growing complexity (Sutcliffe, 2005) of (organizational) problems and solutions and to deal with the ambiguities and uncertainties (Callon *et al.*, 2001; Weick, 1995) they perceive in fast changing market environments (Eisenhardt, 1989). This thesis focuses on how experts communicate their specialized knowledge to decision makers and how the latter integrate it in their decision making. These interactions can be direct such as co-located face-to-face conversations, events, or presentations and they can be indirect and take place in the form of reports, websites, and standard forms. We discuss crucial communication challenges that arise when aiming at integrating specialized knowledge in decision making and present practices to overcome them. Particular focus is directed towards face-to-face conversations and collaborative visual boundary objects.

The growing role of expert advice in decision making can be observed in manifold contexts. In the political arena, for example, the Swiss public administration, which itself provides expertise to the public policy makers, assigned 6100 mandates to external experts in 2004 alone, for which it spent 490 million Swiss Francs (307 million Euro) (Geschäftsprüfungskommission der Schweiz, 2006). In the private sector, management consultancies, for example, steadily have become ever more important actors in supporting the strategic decisions of companies (Wright, 2002). In Switzerland, management consultancies increased their total revenues in the last twenty years (from 1984 to 2005) by 340 percent (with a total revenue of 1.1 billion Swiss Francs in 2005) (ASCO, 2006).

The increased demand for expert knowledge can be explained by the variety of functions and roles attributed to experts within decision making. In the first place, referring to experts allows decision makers to absorb the uncertainty of the environment. By trusting in

the (scientific) 'truth' of experts' statements, decision makers can reduce the complexity of the decision to take (see also: Luhmann, 2000). The experts gain this trust because they are vested with a symbolic power (Bourdieu, 2001), for which their analysis becomes an official opinion that is believed to transcend individual interests (Henry, 2002). The decision makers can refer to this objectivized truth to legitimize decisions (Evers & Menkhoff, 2003) and to – in part - give away their own responsibility in case a decision leads to unpredicted, negative consequences.

Apart from these situations, where it can be doubted that decision makers actually aim to integrate the experts' knowledge in their decision making, there are many instances in which decision makers call in experts because they have a primary interest in incorporating the experts' specialized knowledge in their decision making. They aim to inquire into cause-and-effect relationships that underlie the issue of decision, they want to explore possible courses of action, to assess the risks associated with them, and to better understand the decisions' implications (Haas, 1992). In other words, decision makers and experts aim to develop a shared understanding of the issue of decision, on the basis of which the former can take their decisions.

However, the development of a shared understanding between experts and decision makers (and across knowledge boundaries in general) is a challenging undertaking and there are specific requirements for a communication apt to integrate knowledge in decision making. First, the communication is challenged by the fact that experts and decision makers have expertise in different fields, talk different languages (Bechky, 2003), interpret same events differently, have local meanings of the same goals (Dougherty, 1992), lack common ground (Alavi & Tiwana, 2002; Bechky, 2003), and are immersed in specific practices (Scarbrough *et al.*, 2004; Wenger, 1998). These differences demarcate 'knowledge boundaries' (Carlile, 2002, 2004) that lie across areas of specialization and make the communication and integration of knowledge difficult.

A second challenge is to find forms of communication in which the complexity of the issue can be adequately represented, which means that the communication is both reasonably accurate and simple enough to be meaningful across knowledge boundaries. Knowledge integration requires the synthesis of individuals' disparate specialized knowledge into situation-specific systemic knowledge (Alavi & Tiwana, 2002: 1031). The aim is thereby not to level the existing knowledge gap between experts and decision makers. In fact, unlike a logic of knowledge 'transfer' (Szulanski, 2000), the aim of knowledge inte-

gration is to maintain or even foster a functional degree of specialization, while being able to combine and apply this highly specialized knowledge into joint actions and decisions (Eisenhardt & Santos, 2000). As a consequence, knowledge integration requires synthetic modes of communication that yet can represent, in an adequate manner, the complexity of the issue of decision. For the integration of knowledge in decision making, the request to communicate this 'in-between-complexity' adds to the challenge of translating meaning across knowledge boundaries.

Finally, challenges in the knowledge communication are bound also to the relational dimension. The experts' knowledge can represent a threat to the authority (Black *et al.*, 2004) of decision makers such that the latter decide to discount the knowledge provided by the experts. Discarding knowledge is particularly probable when the consideration of a certain insight of an expert would imply changes in current power structures (e.g. the department of one decision maker would loose in importance) (Carlile, 2004). Micropolitics of knowledge – that is coalitions among subgroups (Lazega, 1992: 14) of decision makers – facilitate specific knowledge claims in certain situations, while inhibiting them in others. In this way, the implications of the integration of specific expertise signify changes in power structures, which often leads to resistances to these changes.

One mode of communication, which is of particular importance in the study of the knowledge communication between experts and decision makers are *co-located face-to-face conversations* and thus represent a first focal point of this thesis. Face-to-face conversations not only represent the "prototypical case" of how people develop, share, and integrate knowledge in social interaction (Berger & Luckmann, 1966: 28). It is also the mode of communication by which experts and decision makers frequently interact and which is particularly apt to address the challenges present in the integration of knowledge in decision making. In the political context, for example, public policy makers invite domain experts to expose their views and arguments in 'hearings', where after a brief presentation by the experts, decision makers can ask specific questions and engage in a more interactive form of communication. In the private sector, managers that seek insights from experts such as engineers, IT-specialists, insurance underwriters, or financial risk analysts, do not limit their interactions to written requests, reports, and lengthy recommendations, but engage extensively in face-to-face conversations, for example by participating in meetings, workshops, and presentations and by leading informal talks during breaks or lunches.

Co-located conversations are especially suited to meet the above mentioned challenges of knowledge integration as they allow for the co-construction of meaning and for a

collaborative sense-making (Weick, 1979). Because of the physical co-presence of inter-locutors, conversation partners have the opportunity to flexibly adapt their language and the complexity of discourse to the characteristics of their vis-à-vis. They can continuously readjust their mode of communication while receiving verbal, para-verbal (e.g. tone of voice), non-verbal (body language) feedback by their communication partners (Krauss & Fussell, 1991). In addition, and as argued Clark and Brennan, the construction of common ground among interlocutors is particularly favored in face-to-face conversations (thanks to co-presence, visibility, contemporality, etc.) (Clark & Brennan, 1991). Finally, conversations are important for the integration of knowledge because, in conversations, experts and decision makers can nurture well-working interpersonal relations, an aspect which is central to social knowledge processes (von Krogh, 1998). In conversations, people create a shared experience (Dixon, 1997) and gradually build trust among them (Harkins, 1999).

Although conversations are the preferred mode of how experts and decision makers engage in collective sense-making and how knowledge is integrated in decision making, *conversations are also problematic* for the effective integration of knowledge. Conversations are ephemeral as contributions vanish the moment they are pronounced. For this reason, conversations lack persistence (they are neither traceable nor correctible) (Bregman & Haythornthwaite, 2001) and the process that led to reach a certain decision can be retraced only with difficulties. Conversations are essentially temporal, both in terms of the progression of the single speech acts and also in their wider context within a community or organization (Flores *et al.*, 1988). This limits the combination, comparison, and evaluation of large amounts of information items, all activities central to decision making in complex environments. Finally, conversation partners do not benefit from the knowledge integration potential inherent in conversations as their conversations are often characterized by suboptimal communicative patterns, such as unequal turn-taking (Ellinor & Gerard, 1998), inattentive listening (Isaacs, 1999; McCambridge, 2003; Ross, 1994; Topp, 2000), overhasty interpretations, defensive arguing (Argyris, 1996), and the like.

In view of the centrality, but also limitations of conversations, the role of *collaborative visual boundary objects* in supporting co-located face-to-face conversations is a particularly intriguing argument and a second focus of this thesis. Boundary objects are artefacts, which inhabit several intersecting social worlds and are meaningful across these various contexts (Carlile, 2002: 452; Star & Griesemer, 1989). Although the people of each social context attribute different meanings to the artefact, it nevertheless provides a structure that is common to all these contexts. This common structure allows for a means of

translating and transforming knowledge so that common understandings can be developed across knowledge boundaries and different interests can be negotiated and aligned. In the literature, it has been discussed that visuals, such as Gantt charts, workflow matrices, computer simulations, or geographical maps, can take over the function of boundary objects (Carlile, 2002; Star & Griesemer, 1989), yet there are few investigations on their role in supporting collocated face-to-face conversations (for an example, see: Fischer, 2001). We will argue that visuals, which are used during face-to-face conversations, can take over the function of boundary objects and offer various advantages in overcoming knowledge boundaries. First, they provide a shared resource to which conversation partners can refer and thus more easily create common ground (Carlile, 2002). They can make abstract thought more tangible (it gains a visual reality) and by encouraging analogical reasoning (for example through visual metaphors) conversation partners can build on the already existing common ground among them and extend it to novel areas (Inns, 2002; Kraut *et al.*, 2003). In addition, the semantics and syntax of visuals are looser defined than those of verbal language (i.e. conventions of visual signs in terms of their signified or meaning are less strict). By using these more flexible, rough, visual approximations it is possible to express something that is difficult to put in words (i.e. implicit knowledge). As the visual is used in combination with talk, the discussion about its meaning can surface potential misunderstanding or ambiguities. This clarification process leads to a gradual development of common ground. Finally, we will also argue that images have an integrative capacity, as the various elements of which they are composed are visually related to one another. In this way, visuals help to maintain the big picture of a complex issue (Dimond & Beaumont, 1974; Kosslyn, 1978; Maruyama, 1986).

With these two main focuses – co-located face-to-face conversations and collaborative visual boundary objects - we aim to outline in the following thesis how the integration of knowledge takes place between experts and decision makers within their communications.

2   Motivation and Relevance

There are multiple reasons why we believe it is relevant to study the communication and integration of knowledge between experts and decision makers. On a substantial level, we have already argued that the role of experts is steadily increasing within decision making since decisions have to be taken on ever more complex issues and in ever more uncer-

tain, ambiguous, and fast moving environments. With the progressing specialization of expertise and the concurrent need for knowledge integration also in decision making, we have to understand how these coordination and integration mechanisms unfold, what the challenges to the integration are and what practices are used to address this task effectively.

Other motivations for the investigation are more conceptual in nature. First, with the present thesis, we aim to contribute to a *communication perspective* (Baecker, 1999; Eppler, 2004; Heaton & Taylor, 2002; Reinhardt & Eppler, 2004; Reinmann & Mandl, 2004) on issues of knowledge management. Such a perspective is important if we conceive knowledge not as a static object or unit, but rather as a dynamic, context dependent process and action (Cook & Brown, 1999). A dynamic view of knowledge emphasizes that knowledge is created, shared, and integrated in social interactions (Nonaka & Takeuchi, 1995). In such a perspective, the study of co-located face-to-face conversations is a central concern as they represent a proto-typical form of the interactions within which social knowledge processes take place (Berger & Luckmann, 1966). In the knowledge management literature, knowledge is often viewed as an *object* (for an overview, see: Alavi & Leidner, 2001) that can be embedded and stored, for example, in individual members, in roles, and organizational structures (Walsh & Ungson, 1991). Knowledge as an object can be possessed and transferred to new potential owners by moving the 'knowledge reservoirs' from one context to another, and it can be finally *applied in action* (Argote & Ingram, 2000). Opposite and complementary to this view (but not excluding it) is the idea of knowledge as a *part of action*, as an activity of *knowing*[1]. Knowing as action is understood as a situated interaction of the knower(s) with the world "using knowledge as a tool" (Cook & Brown, 1999: 388). Focusing on this situated dimension of knowledge and knowing, the question for social knowledge processes, such as knowledge integration, is not so much how knowledge or knowing can be transferred, distributed, or disseminated, but more how it can be "generated in" other contexts, groups, or organizations (Cook & Brown, 1999: 398). The *communication, and in particular, the face-to-face conversations represent the direct context* of these "generations" and are a major means of how people engage in knowing, sense-making, and knowledge integration (Alavi & Leidner, 2001; Kurtz & Snowden, 2003). A conversations is not "limited to a merely additive back and forth exchange of information" or of knowledge. "It can also afford the generation of new

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[1] To express this distinction and to stress the emphasis on an activity (see: Weick, 1979 on the distinction between organization and organizing), the title of this thesis is 'integrating knowledge' and not 'knowledge integration'.

knowledge, since each remark can yield new meaning as it is resituated in the evolving context of the conversation" (Cook & Brown, 1999: 393). In this way, we understand knowledge processes to be processes of communication. As a consequence, by studying patterns of communications in the forms of communicational practices and challenges, we sharpen the understanding of the way people create and integrate knowledge. The expert-decision maker interaction represents a rich context, in which we can conduct investigations towards this more conceptual aim.

The study of the processes of communication through which decision makers aim to integrate expert knowledge in decision making is further relevant because it aims to contribute to a better understanding *why it is difficult to manage even explicit knowledge* (Carlile, 2002; Heaton & Taylor, 2002). It has been argued that a major inhibitor of knowledge sharing is the lacking motivation of the people knowing (Bock & Young-Gul, 2002; Gupta & Govindarajan, 2000; Osterloh & Frey, 2000). In view of formal and informal organizational structures (e.g. functional divisions, retribution systems, career paths), processes (e.g. evaluation processes of individual employees and not teams; time management in projects), and cultures (e.g. competitive vs. collaborative spirit), employees are often poorly motivated to share knowledge with their colleagues. Yet, in the expert-decision maker situation, both experts and decision makers are motivated to share and communicate their knowledge with each other. Decision makers deliberately refer to experts and pay them for their services. At the same time, experts' primary role is to advise and provide their expertise to decision makers. However, the knowledge integration process remains challenging. Previous research has shown that this is true, first, for the qualities of the knowledge – e.g. its tacit dimension (Nonaka, 1994; Polanyi, 1966; von Krogh *et al.*, 2000) – second, for the characteristics of the person to whom the knowledge aims to be conveyed – e.g. the person's absorptive capacity (Szulanski, 1996) – and, third, for a specific organizational context in which knowledge integration takes place– e.g. inflexibility of organizational ties (Alavi & Tiwana, 2002). We add to these argumentations that knowledge integration is inherently difficult also for the process of communication within which it takes place. Thus, with this thesis, we aim to provide empirical support for the claim that the integration of knowledge is a difficult endeavor because of the characteristics of the communication process in which the knowledge integration unfolds.

A final minor conceptual motivation for the proposed object of study is that we aim to contribute to the body of *research on communication in decision making* (DeSanctis, 1987; Hirokawa & Salazar, 1999; Hollingshead, 2001; Poole & Hirokawa, 1996; Stasser

& Stewart, 1992). In the decision making literature, the effectiveness with which information is handled has been questioned very prominently on a cognitive level (Kahneman & Tversky, 1979; Simon, 1955, 1960) for that a decision maker uses specific heuristics and biases (e.g. framing (Tversky & Kahneman, 1981), availability heuristic (Tversky & Kahneman, 1973)) to choose and elaborate the limited information he/she receives from the environment. While the primary focus of such studies was on the individual decision maker and on choice, in more recent years, it has been shown that the effective use of information in decision making is also challenged because of the communication process that takes place between various decision makers (Dennis, 1996; Stasser & Stewart, 1992; Wittenbaum *et al.*, 2004). Stasser et al. could show, for example, that there is a tendency to address mostly information items that are already shared among communication partners whereas those information items, which are uniquely held by single interlocutors, are not shared even if this information would be central for the decision to take (Stasser & Stewart, 1992; Stasser *et al.*, 2000). With this thesis, we would like to add to this literature by studying the expert-decision maker interaction. We will focus on how knowledge is co-constructed in communication (not the mere exchange of information items) and how the challenges related to this communication obstruct the effective integration of domain specific expertise in decision making.

3 Research Questions

In view of the outlined object of study and the motivations that stand behind it, we organize the present investigations around a few key questions that are represented in synthesis in Figure 1.

The main research question we would like to answer with this thesis is: *Which communicative challenges have to be overcome when experts and decision makers attempt to integrate their knowledge in decision making and what practices do they have in place to address these challenges?* In order to answer this question, we deem it necessary to qualify it in two sub-questions. One question aims to approach the communicative challenges and practices of the knowledge integration between experts and decision makers from a process view, the other is more structural and aims to identify challenges and practices that are not specific to a single phase in the overall communication process between experts and decision makers, but that manifest themselves throughout the process within the single interactions between experts and decision makers.
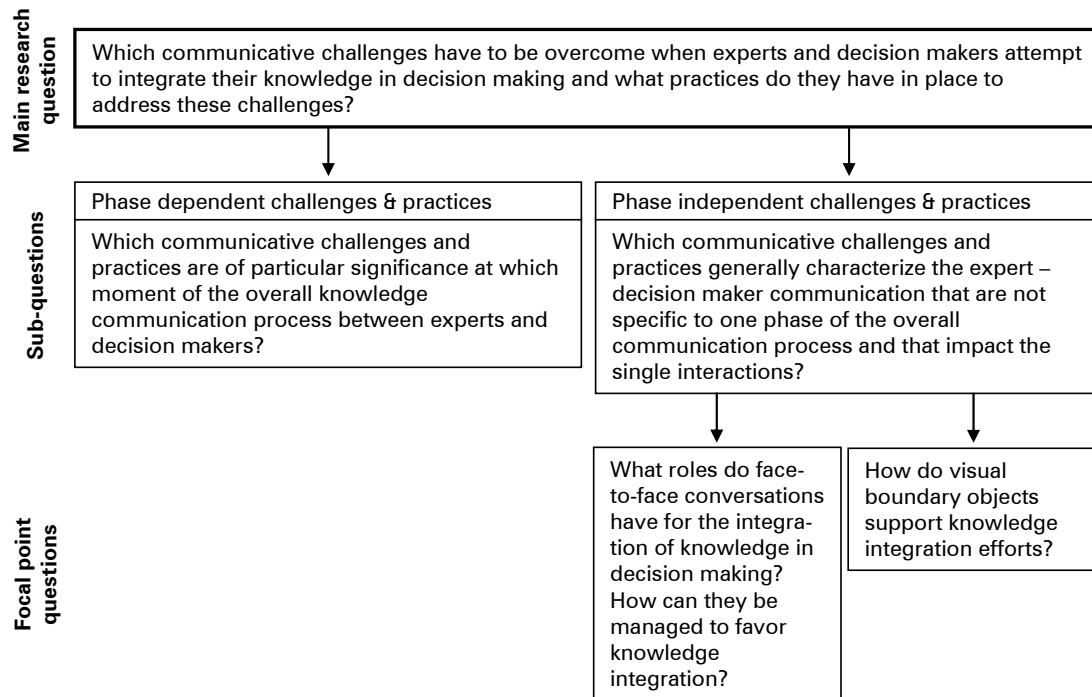
Figure 1: Main Research Question, Sub-questions, and Two Focal Point Questions

Based on the premise that experts do not convey their insights and expertise in a one-time contact, but rather interact repeatedly with decision makers along their decision making process, we ask: *Which communicative challenges and practices are of particular significance at which moment of the overall knowledge communication process?* The overall communication process between experts and decision makers can take place over several weeks or months, starts with the identification of the experts on behalf of the decision makers and ends with the actual integration and application of the expert knowledge in the decision making. We aim to find out whether there are challenges in the communication that are specific to the various phases of this overall communication process. The challenges are likely to differ already for the fact that the knowledge asymmetry varies according to the subject under discussion (Bromme et al. 2004) and to the phase of the interaction. In the moment, for instance, when the decision makers brief the experts upon the decision that has to be taken, they know much more about the context of the decision than the experts, but might have difficulties in framing the demand in such a way that the experts then can work on it. Later on, when the experts have conducted their analysis and convey their insights to decision makers, the knowledge asymmetry is inversed. We believe that applying a process perspective permits more precision in the analysis of the challenges and practices in communication and thus constitutes one lens of our analysis of the knowledge communication between experts and decision makers.

With the second sub-question – *Which communicative challenges and practices generally characterize the expert – decision maker communication that are not specific to one phase of the overall communication process and that impact the single interactions?* - we aim to analyze whether there are challenges and practices in the communication that can be observed throughout the single phases of the overall communication process and that more generally characterize the expert-decision maker interaction. Such challenges are more basically related to the situation of the knowledge and power asymmetry that exists between experts and decision makers and to the activity of integrating expert knowledge in decision making. These general challenges manifest themselves (explicitly or less visibly) in the single interactions between experts and decision makers. For example, for the fact that the expert has in-depth knowledge on a rather narrow area of expertise, he is likely to give recommendations on a level of detail, which is inadequate to the requirements of the decision makers as well as to their level of expertise. This aspect might be challenging across the single phases of the macro communication process between experts and decision makers and can be observed within their single interactions.

The division of the main research question into these two sub-questions reflects the idea that the management of a process, of an activity or of an objective involves the management of such on a macro level (how should the activity/objective be coordinated among other activities/objectives?) as well as on a micro level (how could the activity/objective be structured into sub-activities and organized and coordinated in time?) (Pettigrew *et al.*, 2006; Zan *et al.*, 1993). In an analogue manner, if we aim to understand which communicational challenges and practices characterize the experts - decision maker interaction (not at least also to give some prescriptive indications of how experts and decision makers could manage their communication), we have to take into account both the overall communication process that unfolds over a period of several weeks or months (overall-process) and the single interaction (micro-process), which takes place, for example in the case a co-located face-to-face conversation, in a time period of 30 minutes. We ask, on the one hand, how does the overall communication process between experts and decision makers unfold in time and how is the single interaction characterized (*micro*-interaction patterns)?

Finally, as exposed in the introduction to the object of study, we aim to analyze the knowledge communication between experts and decision makers with two specific focuses: co-located face-to-face conversations, and collaborative, visual boundary objects. In particular, we ask: *What roles do face-to-face conversations have for the integration of knowledge in decision making* and, second, *how do visual boundary objects support inte-*

gration efforts? The two questions are interlinked in so far as we believe that while the characteristics of both forms of communication are of particular value for the expert – decision maker situation, they also mutually complement each other. On a more general level, Wenger argued that for the co-construction of meaning, the duality of 'participation' and 'reification' is central (Wenger, 1998). While conversations can be viewed as an instance of participation, visual boundary objects represent a type of reification. Reification is a process in which we give a referable form (e.g. through objects, designations) to the fluidness of our experience. Around these reifications we can organize our co-constructions of meanings. Participation, on the other hand, designates the involvement as a person and gives the possibility of mutual recognition and of elaborating coordinated meanings. It stresses the importance of the relational, the informal, and accounts for the tacit dimension of knowledge. According to Wenger "reification always rests on participation: what is said, represented, or otherwise brought into focus always assumes a history of participation as a context for its interpretation. In turn, participation always organizes itself around reification because it always involves artefacts, words, and concepts that allow it to proceed" (Wenger, 1998: 67). In this way, the two focal questions we propose aim to investigate into the role of the interplay between conversations (participation) and visuals (reification) for the integration of knowledge in decision making.

4 Methods

We inquire into the above outlined object of study and guiding research questions with a mixed method research design and triangulate qualitative (multiple case studies) and quantitative (class room experiments) methods (Creswell, 2003; Jick, 1979) (see: Figure 2). More specifically, we use a "sequential exploratory strategy", which develops in two phases starting with qualitative data and analysis and later moving to more quantitative analysis (Creswell, 2003: 215). Using such a design, the focus of the study lies on the qualitative data in order to explore a phenomenon. We integrate the various data during data interpretation. Empirical data is used to enrich conceptual descriptions and less so to provide validations of conceptual claims.

On the conceptual side, we use an interdisciplinary approach by integrating selected contributions from knowledge management (e.g. Brown & Duguid, 2001; Carlile, 2004; Nonaka & Takeuchi, 1995; Scarbrough et al., 2004), sense-making (e.g. Weick, 1995; e.g. Weick *et al.*, 2005), decision making (e.g. Eisenhardt & Bourgeois III, 1988; Mintzberg *et*

al., 1976), communication studies (e.g. Clark & Brennan, 1991; Grice, 1975; Schwartz-man, 1989; Watzlawick *et al.*, 1967), socio-psychology (e.g. De Dreu & Weingart, 2003; Stasser & Stewart, 1992), and sociology (e.g. Berger & Luckmann, 1966; Giddens, 1984; Goffman, 1967). Risking a too syncretic view, we gain focus in having a bias towards contributions that implicitly or explicitly share a social constructivist understanding of knowledge. For the more specific literature reviews, in particular the ones on knowledge integration and conversation management, we used explicit selection criteria to further gain consistency in our choices.

Empirically, we address the main research question, its sub-questions, as well as both focal point questions first from an explorative standpoint. We thereby particularly focus on the macro and contextual aspects of the knowledge communication between experts and decision makers. We attempt to engage in mid-range theorizing on the basis of case studies (Eisenhardt, 1989) and present a cross-case analysis of three explorative cases. The case studies are based on semi-structured interviews and on the qualitative analysis of communication documents (articles, reports, website, etc.). We consolidate the manifold findings from the explorative case study work by drawing on the literature and propose more refined hypotheses particularly with regard to the second sub-question (micro challenges and practices of the single expert-decision maker interaction) and the second focal-point question (role of visual boundary objects) (see: Figures 1 & 2). We then conduct a comparative classroom experiment (using a between-subjects single factor group design) and analyze quantitative data of a post-test questionnaire with the structural equation modeling approach (Gefen, 2000; Kline, 1998).
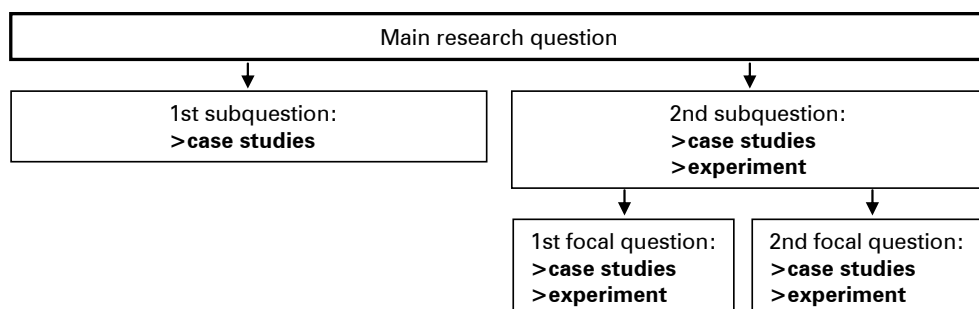
Figure 2: Triangulation of Methods in Addressing Research Questions

For a more detailed description of the specific methods we employed for the case studies and the experiment, we refer to the specific sections at the outset of the Chapters 3 and 5.

With the research design we use, the objective is not to 'validate' conceptual ideas and frameworks with empirical data in order to generalize them to a population. Rather, as mentions Yin: "case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes. In this sense, the case study, like the experiment, does not represent a "sample", and in doing a case study, your goal will be to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalization)" (Yin, 2003: 10). The interplay between observations based on empirical data and the deliberations out of theory serve to develop thicker descriptions of a phenomenon. On the one hand, the three conceptual frameworks we present serve to alter our perspectives and observations on the phenomenon of knowledge integration in decision making. On the other, the insights from the empirical observations help to refine and sharpen our conceptual descriptions. This is true both for the case study work and also for the experiment. We approached the case study work with almost no theoretical concepts in mind, only knew our object of study, and a few guiding questions. Advancing in the case-study work, we discovered interesting recurring themes, went back to theoretical readings and refined our thinking. In this way, we experienced a sort of inspiring interactive dance between empirical and theoretical observations. En-route, even the most core ideas of the work changed. For example, we moved from an idea of 'knowledge transfer' to one of 'knowledge integration', from a focus on outcome to one on process (with regard to knowledge integration), and shifted from a more functional perspective of communication for knowledge processes to one where communication is constitutive for knowledge integration. While this sort of approach is well accepted for qualitative case study work (Eisenhardt, 1989; Yin, 1993; Yin, 2003), it is less common for quantitative empirical endeavors. Yet, also with regard to the classroom experiment, we forcibly – but luckily – had to proceed in a similar way. While the first statistical tests of the data disconfirmed several of our initial hypotheses, we explored data further, went back to the literature, and iteratively refined our thinking. One example is the development of the claims on the relationship between conflict and knowledge integration. The statistical approach of structure equation modeling revealed to be a useful formal structure to engage in such refinements and readjustments in thinking. In this way, we engaged, to some extent, in a use of experimental studies as proposed by Karl Weick (1977). He argued that an understanding of the work with experiments that is less oriented on control and precision, but more on enhanced 'requisite variety', redundancy, and creative chaos, could be of great value. Experiments, in this form, give the possibility to think in novel and more concrete ways: "Perhaps if we could simply improve the tangibility of the problems we think about and the trappings we work with, the quality of our thinking would improve" (Weick, 1977:

126). In this sense, both the qualitative case study work and the classroom experiment serve to the further refinement of conceptual ideas.

5 Procedure and Structure

This PhD thesis is an integral part of a larger research project on the "knowledge communication between domain experts and decision makers in the realm of management" (see: www.knowledge-communication.org). Under the guidance of Professor Martin J. Eppler, two researchers worked for two, respectively three years on the project. In its realm, we conducted ten case studies, developed a visualization software for the support of face-to-face conversations, and conducted an experiment. The present thesis presents selected findings of this project, yet, as we hope, forms an integrative whole in itself.

We structure the thesis in the following chapters:

This *first chapter* provides an *introduction* to knowledge integration in decision making, argues for the importance of the object of study, presents research questions, and the overall research design.

In the *second conceptual chapter*, we argue for a communicative perspective on knowledge integration in decision making and review the literature, not only on knowledge integration, but also on the management of conversations from a knowledge perspective. We develop two frameworks for the analysis of the knowledge communication between experts and decision makers who attempt to integrate knowledge in decision making. The first framework allows for a diachronic analysis of the more macro communicative challenges and practices present in the knowledge communication process (an analysis of the communicative challenges along the *process* of the knowledge communication). We then address the question of the role of face-to-face conversations in knowledge integration and discuss the issue of how conversations can be managed on a micro-level. We provide an overview on the state of the art on the literature on conversation management and propose an integrative framework for the management of conversations from a knowledge perspective. With this second framework, we are able to study the phase unspecific, more micro challenges and practices of the knowledge communication. We use both frameworks as analytical lenses for the study of the three case studies discussed in Chapter 3.

In *Chapter 3*, we aim to further develop a communication theory on knowledge integration by presenting the cross-case analysis of three explorative case studies on the knowledge communication between experts and decision makers. Referring the reader to the Appendices 1, 3, and 5 for the description of the single cases, the cross-case analysis outlines both process-specific and unspecific challenges and practices of the knowledge communication as it can be observed across the various real-life contexts. Particular attention is given to the discussion of the roles of face-to-face conversations and visual boundary objects for the integration of knowledge across knowledge boundaries.

In *Chapter 4*, we synthesize the theoretically and empirically elaborated concepts on knowledge integration by proposing a reflective communication model of knowledge integration in decision making. The model is based on the findings of the cross-case analysis of Chapter 3, in which it turned out that three communicational challenges in particular have to be overcome in order to successfully integrate knowledge. These challenges are: the lack of the big picture, relational tensions, and the lack of a sufficient common ground. We add to these three elements further insights from the literature discussed in Chapter 2 (balanced participation, moderate content conflict) to complement the model for knowledge integration. After the discussion of the model for knowledge integration, we refine our thinking on one additional finding of the case studies: the role of visual boundary objects. We apply the concept to the support of face-to-face conversations and propose five specific hypotheses for the (moderating) effect of the use of collaborative visual tools on the model of knowledge integration.

Chapter 5 presents a first evaluation of the model for knowledge integration and of the proposed moderation hypotheses presented in Chapter 4. With a comparative experimental study, we examine if some challenges of knowledge integration process become more (less) important when supporting face-to-face conversations through collaborative visual boundary objects.

Chapter 6 concludes the thesis in a final discussion on the major findings and on the contributions to research and practice. We further outline limitations of the present work and propose suggestions for future research.

The *references* and an *extensive appendix*, in which, among others, the reader can find the full description of the case studies, can be found at the end of the thesis.

Chapter 2

A Communicative Approach to the Study of Knowledge Integration in Decision Making - Background and Frameworks

Outline

1   The Process of Knowledge Integration

Differentiation and the consequent need for integration and coordination is a classical theme in organizational studies (Galbraith, 1995; Lawrence & Lorsch, 1967). With the more recent discussion on expertise and knowledge as key resources of organizations (Grant, 1996b), the discourse on specialization and integration is led more specifically with regard to knowledge. Grant describes this idea as follows:

> "If knowledge is a critical input into all production processes, if efficiency requires that it is created and stored by individuals in specialized form, and if production requires the application of many types of specialized knowledge, then the primary role of the firm is the *integration of knowledge*" (Grant, 1996a: 377).

Organizations that aim to create complex products or services, solve multifaceted problems, and make decisions in uncertain environments, need to manage and facilitate the *collaboration* of people with *different* expertise and specializations. In view of the centrality of knowledge integration for the organizational activity, a still rather small but growing community of scholars started to focus on this particular knowledge process (Alavi & Tiwana, 2002; Bechky, 2003; Carlile, 2004; Carlile & Rebentisch, 2003; Dougherty, 1992; Eisenhardt & Santos, 2000; Grant, 1996a). Knowledge integration has been understood on an *individual* and on a *social level*.

On an *individual level*, knowledge integration is conceived as a learning process in which an individual incorporates new information into existing knowledge structures and creates a robust and usable understanding (Linn et al., 2004). The 'old' knowledge is not simply replaced by other ideas, neither is the new idea simply assimilated in the existing knowledge structure. Instead, knowledge integration takes place through a processes of interlinking, contextualizing, comparing, interpreting, and evaluating (Linn et al., 2003). All these processes are understood cognitively and researchers are interested in instructional designs that can enhance them (Davis, 2003: 23).

On the other hand, knowledge integration is discussed on a *social level*, in particular in relation to organizations (Alavi & Tiwana, 2002; Grant, 1996a; Huang & Newell, 2003; Okhuysen & Eisenhardt, 2002). On a social level, knowledge integration is understood as the process of incorporating different domain specific knowledge into systemic group knowledge and of applying it in action such as tasks or decision making. Knowledge integration lives up to the simultaneous need for a specialization of knowledge and for coordination among specialized knowledge areas. Given our object of study – the knowl-

edge communication between experts and decision makers - we focus, in the following, on this social conceptualization of knowledge integration.

The process of knowledge integration is distinguished from the one of knowledge transfer. The aim of knowledge integration is not to minimize specialization and divergence through the exchange of knowledge, but to maintain or even foster specialization, yet being able to incorporate the specialized knowledge into joint actions and decisions. The expert-novice interaction, for example, aims at leveling the novice's knowledge at the height of the expert's and comes closer to an idea of knowledge transfer or knowledge sharing. Instead, for the expert - decision maker interaction, the specialization is functional and the aim is at no time to dissolve it, which is why this situation is more accurately conceived as one of knowledge integration. Relationships that may have begun as ones of knowledge transfer become ones of knowledge integration in the moment when specialization among alliance partners arise (Eisenhardt & Santos, 2000).

Carlile and Rebentisch are more elaborate about this distinction and say that models of knowledge integration are preferable to ones of transfer not only if the various sources of specialized knowledge highly *depend* on each other, but also if the amount of *novelty* arisen in the environment between the moments when knowledge is stored and retrieved (fast changing versus stable environments) is considerably high. They claim that when novelty and dependence are high, transfer models are insufficient because they do not envision transformation processes (Carlile & Rebentisch, 2003). From this point, knowledge transfer models can be criticized more generally to be founded on a mechanical understanding of knowledge processes and on a conception of knowledge as an *object* rather than as an activity and practice (Cook & Brown, 1999). Knowledge is situated (Bechky, 2003) and bound to practice (Brown & Duguid, 2001) and cannot be transferred, distributed, or disseminated, but has to be "generated in" other contexts, groups, or organizations (Cook & Brown, 1999: 398). Knowledge always has to be actively constructed in a new context, it has to be transformed (Bechky, 2003; Carlile, 2004). Unlike knowledge transfer, the term 'knowledge integration' better accounts for the transformations involved in the interactions between people using "knowledge as a tool" (Cook & Brown, 1999: 388). With this, the focus on knowledge integration (as opposed to knowledge transfer) implies that the widespread *object-view* of knowledge (Argote & Ingram, 2000; Walsh & Ungson, 1991) is replaced by a conceptualization of knowledge as a *part of action*, an *activity of knowing*. Although we believe it is important to explicitly distinguish between knowledge transfer and knowledge integration, not all authors who researched in this area do so, but quite

freely interchange the concepts of knowledge transfer, sharing, and integration. This is why in the following review on the existing work on knowledge integration, we also included some studies that do not explicitly refer to the term as such (e.g. Hargadon & Sutton, 1997). For an inclusion criteria we have chosen studies that discuss the knowledge process in a situation where different sources of specialized knowledge highly *depend* on each other to be able to carry out their tasks and where the context involves a considerable amount of *novelty* and uncertainty (Carlile & Rebentisch, 2003).

The integration of knowledge from various specialized areas is conceived by scholars as a challenging process. The main challenge is given by the fact that the specialization of knowledge creates '*knowledge boundaries*' where knowledge differences across the boundaries are not only a question of degree, but of kind (Carlile, 2002). People across a knowledge boundary do not only know things with different depth (specialization), they know different things, and most of all, they know the same things differently (differences in perspectives) (Dougherty, 1992). Similarly, Brown and Duguid found that knowledge is sticky across practice boundaries, but flows within one community of practice (Brown & Duguid, 2001). Scarbrough et al. hence stated that "knowledge integration within a project involves overcoming barriers to the flow and transfer of knowledge arising from pre-existing divisions of practice among team members"(Scarbrough et al., 2004: 1582). To overcome knowledge boundaries, knowledge has to be translated and transformed, shared meanings elaborated, and different interests that arise from the different perspectives have to be negotiated (Carlile, 2004).

In view of this general challenge that is intrinsically bound to the situation of knowledge integration, researchers have analyzed what further challenges exist and what facilitates the integration of knowledge. They have done so typically on three different levels of analysis: 1.knowledge integration within a *group* (Alavi & Tiwana, 2002; Okhuysen & Eisenhardt, 2002; Piontkowski & Keil, 2004; Piontkowski et al., 2004); 2. *within an organization* (across occupational groups, departments, geographical locations, etc.) (Bechky, 2003; Carlile, 2004; Carlile & Rebentisch, 2003; De Boer et al., 1999; Eisenhardt & Santos, 2000; Grant, 1996a; Huang & Newell, 2003; Ravasi & Verona, 2001); and 3. *across organizations* (within networks of organizations) (Grant, 1996a; Hargadon & Sutton, 1997; Swan & Scarbrough, 2005). A general overview on the research on knowledge integration can be found in Table 1.

	Group	Organization	Network of Organizations
Focus of Research	Analyze the micro communicative process within which individuals pool individual knowledge and recombine it to create group-level knowledge and to apply it in decision making	Analyze the organizational barriers and enablers to knowledge integration on a level of organizational processes, structures, routines, and culture	Inquire into the mechanisms that meaningfully combine specialized knowledge of different organizations or industries within an organization or a network of organizations to allow for innovation and high flexibility.
Knowledge Integration Settings	• (experimental settings) of groups interacting (Okhuysen & Eisenhardt, 2002; Piontkowski et al., 2004) • virtual teams (Alavi & Tiwana, 2002)	• across occupational groups (Bechky, 2003; Swan & Scarbrough, 2005) • across functions (Carlile, 2002) • across departments (Dougherty, 1992) • across geographical locations (Swan & Scarbrough, 2005) • in mergers (De Boer et al., 1999) • between projects and organization as a whole (Scarbrough *et al.*, 2004)	• across organizations in formal and informal inter-firm networks (Grant, 1996a; Hargadon & Sutton, 1997; Swan & Scarbrough, 2005)
Factors Constituting or Influencing on Knowledge Integration	• micro-interaction patterns (can be structured by media and formal interventions) (Okhuysen & Eisenhardt, 2002) • transactive memory (Alavi & Tiwana, 2002; Piontkowski et al., 2004) • common ground (e.g shared contextual knowledge) (Alavi & Tiwana, 2002) • organizational ties and forms (e.g. self-managing teams) (Alavi & Tiwana, 2002) • knowledge management systems (Alavi & Tiwana, 2002)	• level of common knowledge/ground (amount and type of difference between knowledge sources) (Bechky, 2003; Grant, 1996a) • amount of dependence between sources of knowledge (Carlile, 2004) • type of task (Grant, 1996a; Scarbrough et al., 2004) • prior learnings (Scarbrough et al., 2004) • novelty & variability (Carlile & Rebentisch, 2003; Grant, 1996a) • coordination mechanisms (Bechky, 2003) • organizational structure (De Boer et al., 1999; Grant, 1996a; Ravasi & Verona, 2001) • type and extent of knowledge boundaries (Carlile, 2002) • use of boundary objects to transform local meanings (Carlile, 2002; Star & Griesemer, 1989) • engage in boundary-spanning practices (Bechky, 2003; Grant, 1996a)	• attributes of networks and forms of relationships (strong ties, interpersonal links, relational contracts) (Grant, 1996a; Hargadon & Sutton, 1997) • importance attributed to technology (Swan & Scarbrough, 2005) • organizational structure and routines (e.g. disconnected domains, continuously forming and disbanding teams, reward system) (Hargadon & Sutton, 1997)

| **Main Au-thors** | (Alavi & Tiwana, 2002; Ok-huysen & Eisenhardt, 2002; Piontkowski & Keil, 2004; Piontkowski et al., 2004) | (Bechky, 2003; Carlile, 2002; Carlile & Rebentisch, 2003; De Boer et al., 1999; Dough-erty, 1992; Eisenhardt & Santos, 2000; Grant, 1996a; Huang & Newell, 2003; Ravasi & Verona, 2001; Scar-brough et al., 2004; Swan & Scarbrough, 2005) | (Grant, 1996a; Hargadon & Sutton, 1997; Swan & Scar-brough, 2005) |

Table 1: Three Units of Analysis for Knowledge Integration Understood on a Social Level

On a *group unit of analysis* knowledge integration is defined as "the synthesis of individual's specialized knowledge into situation-specific systemic knowledge" (Alavi & Tiwana, 2002: 1030). Scholars aim to understand how knowledge is integrated in and through communication and examine interaction patterns and media (e.g. online, face-to-face, knowledge management systems) (Alavi & Tiwana, 2002; Okhuysen & Eisenhardt, 2002; Piontkowski & Keil, 2004). Okhuysen and Eisenhardt (2002), for example, found that providing simple formal structures for group communications creates a second agenda and by interrupting conversations in their natural flow, they help interaction partners to reflect on the own knowledge integration process and on how to improve it.

On an *organizational* level, the literature focuses not only on how to integrate knowledge through communication, but analyzes other forms like integration through routines, giving direction, or installing self-contained tasks (Grant, 1996a; Huang & Newell, 2003). Authors discussed the role of organizational structure for knowledge integration and argued that divisional or matrix forms (De Boer et al., 1999) and loose couplings among units and structural ambiguity (multipolarity, fluidiy, and interconnectedness) (Ravasi & Verona, 2001) favor knowledge integration. Scarbrough et al. (2004) discussed knowledge integration in projects and showed that a structural autonomy of projects pro-motes knowledge integration. Grant (1996a) defined knowledge integration as the incor-poration of the individuals' specialized (mainly tacit) knowledge into tasks and organiza-tional action and discussed its role for strategy, as did also Eisenhardt and Santos (2000). One important characteristic of knowledge integration is that it provides flexibility, in so far as new knowledge can be accessed and existing knowledge can be reconfigured to cre-ate new knowledge. Grant deemphasizes the importance of communication and envisions major integration capacity in routines and directions.

Another important group of scholars (Bechky, 2003; Carlile, 2002, 2004; Carlile & Rebentisch, 2003; Dougherty, 1992; Scarbrough et al., 2004; Star & Griesemer, 1989), who also conceive knowledge integration on the organizational level, instead stress aspects

of communication and coordination and inquire into how people can create a shared
meaning and negotiate interests across knowledge boundaries. They analyze knowledge
integration efforts across functional divisions (Carlile, 2004), between occupational groups
(Star, 1989) or between projects and the organization as a whole (Scarbrough et al., 2004).
Dougherty, for example, showed how different 'thought worlds' that subsist across organ-
izational departments (between manufacturing and planning) become engrained in routines
and impede shared understandings. She argued that collaborative mechanisms (e.g. inter-
disciplinary responsibility for focus groups) are necessary in an organizational context to
allow for the overcoming of barriers to integration (Dougherty, 1992). Bechky discussed
the problem of common ground and showed how it can be elaborated across knowledge
boundaries (e.g. through tangible definitions: physical objects embedded in the loci of prac-
tice of the addressee). In view of the embedded nature of knowledge, knowledge integra-
tion requires a transformation process of meaning (Bechky, 2003) and of interests (Carlile,
2002: 452), which is why it is fundamental to engage in boundary spanning activities (e.g.
position knowledge brokers, i.e. people who move between two knowledge domains and
like to engage in processes of translation, coordination, and alignment between perspec-
tives) (Bechky, 2003; Grant, 1996a; Wenger, 1998) and the use of boundary objects
(Carlile, 2002; Lyons et al., 2004). Boundary objects (documents, forms, methods, objects,
etc.) provide individuals and groups at both sides of a knowledge boundary a common
structure, which is flexible enough to adapt to the specific needs of the local contexts, but
provides a common means of translation (Star & Griesemer, 1989). Next to the focus on
how to create shared meanings across knowledge boundaries, a specialization of knowl-
edge and the need for integrating it in coordinated action also leads to conflicts of interests
and to issues of politics. Carlile states on regard, that in these situations, knowledge is "at
stake" for that the "knowledge developed in one domain generates negative consequences
in another" (Carlile, 2004: 559). Swan and Scarbrough found that while power on re-
sources played a relatively small importance for the successful integration of knowledge,
"politics of process (how people form and co-ordinate networks) and politics of meaning
(how networks coalesce around particular interpretations) were highly important (Swan &
Scarbrough, 2005: 939).

Finally, there are few contributions dealing with knowledge-integration on an *inter-
organizational level*. For an organization to be innovative, the integration of external
knowledge is fundamental (Swan & Scarbrough, 2005). Depending on the type of knowl-
edge to be integrated, but also on the speed, with which such knowledge has to be inte-
grated, the couplings between organizations must be of a different nature. Grant argued

that while market contracts might work if the knowledge is embedded in the product itself, networks with close relationships are useful if knowledge is ambiguous, uncertain, and tacit. Further, if companies gain important advantages from the speed of integration (dynamic environments), knowledge integration is preferred to happen in networks rather than through vertical integration (Grant, 1996a). Swan and Scarbrough (2005) finally claimed that if knowledge is particularly diverse among the various organizations (difference between knowledge sources), close ties and informal interactions are particularly important to establish the sufficient common ground. Hargadon and Sutton (1997) finally found that for an organization to be able to integrate knowledge from different industries, the organizational structure has to provide relatively disconnected domains where employees constantly form and disband teams, where they are exposed to a wide range of projects, and where a culture of information sharing is fostered for example through reward systems.

In view of this panorama of research on knowledge integration and in view of our object of study, we *define knowledge integration as the communication process by which people with differing specialized knowledge (i.e. skills, perspectives, priorities, experiences) engage in joint sense making and deliberation to co-create new and shared meanings and to embed this inter-personal knowledge in decision making.*

This definition has two implications. First knowledge integration is understood as a *communicative process*. Berger and Luckman argued that "all human 'knowledge' is developed, transmitted and maintained in social situations" and that scholars should gain a better understanding of the process, by which this is done (Berger & Luckmann, 1966: 3). Similarly, Nonaka and Takeuchi state that "both information and knowledge are context-specific and relational in that they depend on the situation and are created dynamically in social interaction among people" (Nonaka & Takeuchi, 1995: 55). From these considerations, we can understand that social interactions and, in particular, face-to-face interactions that are a "prototypical case of social interaction" (Berger & Luckmann, 1966: 28) are constitutive of knowledge processes (Nonaka & Takeuchi, 1995). In a broad understanding of communication as the form of social interaction, we can understand knowledge processes to be communicative processes. The definition proposed for knowledge integration reflects this understanding.

The second implication of this definition is that knowledge integration is understood as a *two phase process*. The *first phase* is the integration of the various specialized individual knowledge into some form of social knowledge. In this phase, people bring in their

different points of view and their specific perspectives. They try to understand which of these elements are important and how they relate to each other. From these often divergent views, they try to develop a shared understanding. The co-construction of such a form of group knowledge always entails new insights and is more than the simple aggregation of the different specialized forms of knowledge. In *the second phase*, the group knowledge is integrated into the actual decision making. We conceive this as a second phase because the introduction of the elaborated group knowledge into decision making is by far not an automatic process, but is challenged by the aspects such as the knowing-doing gap (Pfeffer & Sutton, 1999), which we will discuss later.

On the basis of this understanding of knowledge integration, we aim to understand what challenges the successful integration of knowledge in the expert decision maker interaction. Are the challenges of differences in language use and the lack of common ground, which have already been discussed in the literature (Bechky, 2003; Dougherty, 1992) also characteristic for the expert - decision maker communication? What other challenges can we identify in this communication? Research on the integration of knowledge in decision making is rather limited and focuses mainly on experimental settings without considering the organizational contexts in which decisions are taken (see, for example: Okhuysen & Eisenhardt, 2002; Piontkowski *et al.*, 2003). To our knowledge, there is no study available which specifically presents an analysis of the integration of knowledge between experts and decision makers.

In the next section, we will present the expert - decision maker situation and then propose a process model that can serve as an analytic lens to study the knowledge communication between experts and decision makers.

2   The Expert – Decision Maker Situation

In the following, we will circumscribe the expert - decision maker situation and argue why it is possible to conceive experts and decision makers as distinct categories.

In the dictionary, an expert is defined as someone with a "special skill or knowledge representing mastery of a particular subject" (Webster, 2006) and also as someone "whose special knowledge or skill causes him to be regarded as an authority" (OED2, 1989). These definitions of experts reveal that an expert not only is someone who has in-depth knowledge on a special area of expertise, he/she is also regarded as such by a community. Sociological studies on experts and expertise very much focus on this aspect and show

through which mechanisms an expert is recognized as such by his/her community, and why and how expert positions are not only formulated, but also maintained, and lost (for an overview, see: Hitzler, 1994). In such an understanding, "the expert" is fundamentally a social construct and his/her knowledge (and the appreciation of which) always stands in relation to the knowledge of others (Mieg, 2001). Mieg argued that "'the expert' has to be regarded as a social form of interaction, and that 'expert' is an attribution to the person who, in this interaction, provides information or explanation, respectively" (Mieg, 2001: 73). Elements in the analysis of the social construction of experts and expertise are, to name two, the processes of self-representation (e.g. ways how experts talk, and use certain emblems and symbols) and power constellations (e.g. affiliation to certain institutions leads to institutionalized competence, funding of specific scientific discourses and not others) (Hitzler, 1994).

Next to sociologists, the study of experts and expertise has been of special interest for researchers from cognitive psychology and many definitions reflect their research findings. In most cases, experts are allocated on a continuum of expertise, called also the 'proficiency scale' (Ericcson, 2006: 22), which ranges from novice to master and has in the middle people with growing levels of expertise like the initiate, the apprentice, the journeyman, and the expert[2]. Along this axis, Hoffman (1998), as adapted by Ericsson et al. (2006: 22), defined an expert as:

> "the distinguished or brilliant journeyman, highly regarded by peers, whose judgments are uncommonly accurate and reliable, whose performance shows consummate skill and economy of effort, and who can deal effectively with certain types of rare or 'tough' cases. Also, an expert is one who has special skills or knowledge derived from extensive experience with subdomains."

The definition resumes the already mentioned aspect of the social recognition of an expert. An expert is not merely defined by his/her skills and expertise, but also by his/her reputation in the community, which shows a social and communicative dimension of the expert's definition. Second, the above definition makes reference to many findings of cognitive psychology research (for an overview, see: Ericsson *et al.*, 2006; for an overview, see: Keil, 2001). Experts (in relation to novices) tend to excel in their speed of thought, in the accuracy of the solutions they find to solve problems or to design tasks (Klein, 1993), they have a better memory capacity with regard to their domain of expertise (Gobert & Simon,

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[2] A question often discussed in the literature is how an individual passes from the stage of a novice to the one of an expert. Researchers agree that, next to formal education and training, it is most of all practice and experience, which make an expert. It has been confirmed in various studies that ten years of intense practice are required in order to become an expert.

1996) and are better in detecting and recognizing patterns and features of an issue and are therewith able to understand the deep structure of it (Chi *et al.*, 1981). This in part is related to their major capacity of understanding qualitative differences of problems. Ericsson and Lehman argue (1996), for example, that there are qualitative differences in the organization of the experts' knowledge and the way they represent it. In fact, experts encode their knowledge around key concepts of a certain domain and use more domain-general heuristics, which allow them, on the one hand, for a rapid and reliable retrieval, and on the other, to adapt more quickly to changes in the environment (Ericsson, 2006). In this way, they can also better deal with particularly 'rare' or 'tough' cases. Because of their specific organization of knowledge, they are said to retrieve relevant information with less cognitive effort and suffer less quickly of effects from information overload (Swain & Haka, 2000). Next to all these positive capabilities, experts tend to be more overly confident in their domain-specific judgment than novices (Oskamp, 1982). They are further 'glossing over', which means that, at the expense of their knowledge of deep structures of an issue, they overlook and lack to recall surface or peripheral aspects and details (Ericsson, 2006: 25). Finally, from organizational research, we further know that knowledge can be an inhibitor of novel solutions and innovations (Leonard-Barton, 1992; Levitt & March, 1988). Knowledge is highly 'path-dependent' (Carlile & Rebentisch, 2003) as it needs large investments of time, which makes it difficult for organizations and individuals (like experts), to 'give up' their own knowledge and start to build on completely new promises. For this reason, if changes lead to challenges outside the usual range of expertise, experts tend to continue to rely on their expertise and proceed by analogy. Yet, in fast-changing environments where situations change radically, analogous behavior might not be adequate.

It is for the risks associated to the path-dependency of expert's knowledge in fast-changing environments that *decision makers*, on the other hand, need to be generalists. Langlois argued that managers as generalists have the function to buffer the uncertainty of the environment (Langlois, 1986). This, in effect, is the most apparent way how to distinguish experts from decision makers: While experts are specialists in a specific knowledge domain, decision makers are generalists that allow for the vertical integration of the functionally specialized domains on a corporate level (Chandler, 1994). To some degree, one could argue that decision makers are specialists as well, but that their area of specialization is transversal. In fact, they are highly skilled in activities such as planning, organizing, motivating, and controlling. Yet, in terms of the functions of an organization, their knowledge is one of a generalist. To further distinguish decision makers from experts, we can mention

the controversial research on the traits of decision makers[3], discussing managers' and leaders' capacities, guiding values, power orientations, and patterns of behavior. Scholars found (see for example: Jago, 1982; Kirkpatrick & Locke, 1991; Yukl, 2005) that leaders positively differ from non-experts with regard to tolerance to stress, energy level, self-confidence, adjustment, integrity, cognitive ability, and knowledge of the business and to some extent also in terms of charisma, creativity, and flexibility. Alternatively to traits, experts have been defined in terms of their behavior. Mintzberg's study on managerial work is classical in this vein. Managerial work is characterized by a big work load (long hours of work), brevity (short time allocated to a single task), variety (quantity of different daily activities), fragmentation (frequent interruptions), and communication intensity (strong engagement in meetings, phone calls, emails) (Mintzberg, 1973).

In the following, the trait characterizations and definitions of experts and decision makers are conceived as approximate tendencies. In fact, the expert - decision maker distinction is not a polar opposition as is the one of the expert and novice. Former experts might be promoted and become decision makers. On the other hand, decision makers might resign from their decision position and take over a more reflective work and expert position (as is the case for the experts of the Brookings Institution, see Chapter 3). As a consequence, managers might have in-depth knowledge within one or two definite specialization areas and experts might be characterized by traits otherwise attributed to decision makers. In certain instances, in terms of acquired knowledge, mental models, and social orientations, experts and decision makers might not differ radically and a considerable common ground exist (see: Figure 3, situation 1). In other cases, experts and decision makers differ largely in their specializations and their common ground is almost non-existent (see: Figure 3, situation 2).

While experts' and decision makers' knowledge and orientations can be closer or more distant, they can be clearly distinguished on a functional level. The decision makers are the ones who make the final choice among alternatives. The experts instead have no formal substantive decision making power, but rather advice decision makers either on direct request, on indirect request (through funding of experts' activities by decision makers) or on proper initiative. The functional differentiation brings along different types of tasks and task qualities. For example, while an expert can dedicate longer uninterrupted time slots for analysis and development, decision makers can allocate only a brief amount

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3 Research on traits of decision makers was criticised by authors following more contingency based approaches who claim that while certain traits may be favorable in some situations they are not in others (Jago, 1982).

of time for each decision. In addition, while the experts tend to analyze a phenomenon from a functional perspective and with an intrinsic interest in the phenomenon itself, the decision makers, on the other hand, are surrounded by political and cost coercions, have to foresee and compromise among a variety of perspectives, and have to be pleased with a solution that is not the most functional, but a relatively good and feasible one. In this way, the different roles and functions, which experts and decision makers hold, lead to specific experiences and furthers specialization.

Situation 1:   **Situation 2:**

Legend:

[DM] Ground of the decision maker including his task related & personal knowledge, plus his mental, emotional, and social orientations

[Ex] Ground of the expert including his task related & personal knowledge, plus his mental, emotional, and social orientations
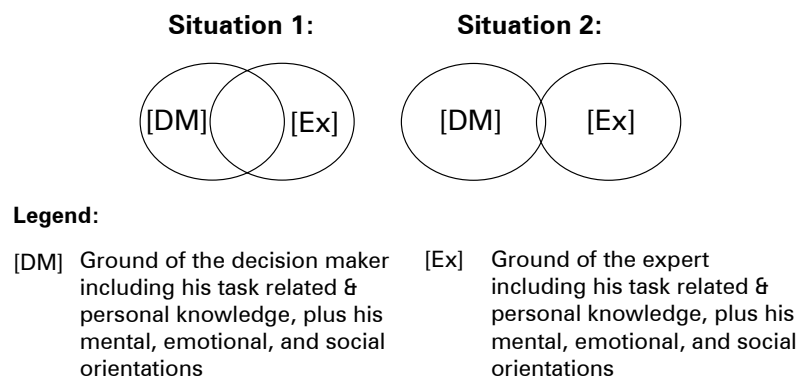
**Figure 3: The Common Ground between Experts and Decision Makers –
Two Situations**

We have shown that experts and decision makers can be distinguished clearly in terms of their functions (who holds the decision power and who has the role of the adviser). Experts and decision makers can be further differentiated – even if in a less clear-cut way - in terms of their capabilities, skills, experiences, and mental orientations. There are expert - decision maker constellations where there is more common ground and others where the specialization is strong and the common ground poor so that considerable knowledge boundaries exist between the two and challenge their knowledge communication.

Having shown the particularities of both experts and decision makers, we can envision that their particular situation leads to a set of communicative challenges. For example, expert's knowledge is to a large extent tacit and contextually based in actions (Polanyi, 1966) so that experts have difficulties to verbally represent and communicate it (Benner, 1984; Dreyfus & Dreyfus, 1986; Nonaka, 1994). To gain a better understanding of the knowledge communication process between experts and decision makers, in the following, we will describe the communication process between this duplet and discuss which challenges are specific to certain phases in the process.

3   A Phase Framework of the Knowledge Communication of Experts and Decision Makers along the Decision Making Process

The knowledge-rich interaction between experts and decision makers does not start and end with the transfer of expertise and of research results at the moment decision makers take their decisions. Experts interact with decision makers – although with various intensity - along the whole decision process. It might even be the case that experts present an issue to the decision makers at a moment when the latter have not yet developed a sensibility for the topic and are not aware that there is a need or possibility to take a decision (see: Agenda building theories, e.g. Dutton, 2002). One question of interest therefore is *how the interaction between experts and decision makers is structured in time and which communicative challenges and practices are of particular significance at which moment of the interaction (compare 1st sub-question, Chapter 1).* Yet, we cannot propose a knowledge communication process as a phase process along the decision making process without considering the extensive literature on phase frameworks of decision making.

Phase frameworks that follow the 'phase theorem' (Witte, 1972) have a long tradition in decision science (Gerwin, 1969; Mintzberg et al., 1976; Nutt, 1984; Simon, 1960). Many of them refer to the one of Simon (1960), in which he presents three core phases of the decision process. These are: 'intelligence' (finding occasions for making a decision), 'design' (finding possible courses of action), and 'choice' (choosing among courses of action) and are interrelated in a cyclical manner. Sequential, linear phase frameworks were criticized to a great extent as they are said to be based on the paradigm of rationality and as such offer poor descriptions of actual decision processes. The presumption of rationality was challenged from a variety of perspectives, for example from the behavioral and cognitive position (Bazerman, 2001; Kahneman & Tversky, 1979; Simon, 1979) as also from a political stance (Allison, 1969; Eisenhardt & Bourgeois III, 1988; Pettigrew, 1973; Pfeffer & Salancik, 1974). Linear phase frameworks are based on the assumption that actors enter the decision process with known and stable objectives and then have to pursue logical steps, which lead to an optimal decision outcome (Eisenhardt & Zbaracki, 1992). Cohen et al. (1972) and Cyert and March (1963) were among the first to question these assumptions of the rational view and showed that goals are ill-defined and inconsistent across people and time, that search procedures are local, and that decision makers' attention is limited. Limited is also the decision makers' understanding of technology, that is they are

poorly aware of how means are connected to ends and in which operational routines they
engage to reach said objectives. In view of these limitations, Cohen et al. concluded with
regard to linear phase frameworks:

> "Although it may be convenient to imagine that choice opportunities lead first to the genera-
> tion of decision alternatives, then to an examination of their consequences, then to an evalua-
> tion of those consequences in terms of objectives, and finally to a decision, this type of model
> is often a poor description of what actually happens" (Cohen et al., 1972: 2).

Opposing (linear) phase frameworks, the authors proposed an alternative descriptive
model, valid for highly ambiguous settings, and called it the 'garbage can' model. They
describe the decision process as the coincidental meeting of problems, solutions, partici-
pants, and choice opportunities (situations that need a decision). These four organizational
streams develop in a parallel, but uncoupled way from each other and are not casually or
logically correlated (Cohen et al., 1972). Rather, it is a "stochastic meeting of choices look-
ing for problems, problems looking for choices, solutions looking for problems to answer,
and decision makers looking for something to decide" (Eisenhardt & Zbaracki, 1992: 27).
All four streams develop in long timeframes and a solution developed several months or
years ago, might all of a sudden gain attraction and be considered by decision makers to
best meet a problem. For this reason, it is most difficult to identify when a decision process
starts or ends and how to structure it in time.

In spite of the fundamental critique of prescriptive, rational frameworks, which de-
fine clear-cut phase processes, the 'phase theorem' (Witte, 1972) continued and continues
to be of importance. In part, this can be explained by the soft empirical support for the
garbage can model and its modest methodological validity (Eisenhardt & Zbaracki, 1992:
27) or by the fact that these descriptions of the decision making process did not lead to
advancements in prescriptive accounts, that is they hardly led to new approaches how a
decision maker could manage decisions. The phase frameworks, even if used from a de-
scriptive stance, do not preclude prescriptive implications. For the management of deci-
sions, structuring the decision process in phases, even if the structure is not fully accurate,
might help decision makers to structure a complex and ambiguous problem, which other-
wise would be too intricate to activate an action whatsoever. In fact, Mintzberg et al.
(1976) showed that decision makers need to reduce the complexity and ambiguity of their
decision task and structure it in a set of manageable phases made of specific procedures or
routines. Weick (1995) argued for the importance of tangible structures for sense-making
and problem resolution, even if these structures are not accurate representations of the
'reality'. He gives the example of a Hungarian detachment lost in the icy Swiss Alps, which

finds its way back to the base thanks to a wrong map. In retrospect, the lieutenant discovers that his group used a map not of the Alps, but of the Pyrenees. Weick claimed that the wrong map was sufficient to animate and orient people and that inciting action and a continuous comparison of the map and the new location was more important than an accurate representation of the Alps (Weick, 1995: 54-55).

Having argued that phase frameworks of decision making continue to have an important role even for unstructured, complex, and ambiguous decision tasks, we will briefly present one of the most influential phase frameworks, which is the one of Mintzberg et al. (1976). We will particularly refer to its major characteristic, which is its recursive, iterative and cyclical nature. Mintzberg et al. (1976) attempted to structure seemingly unstructured decision processes in the context of strategic decisions made under ambiguity. They identified a model for the decision making process by identifying, on the one hand, phases (characterized by routines) and, on the other, dynamic factors that lead to recursive iteration loops between and within the various phases. By referring to Simon (1960), Mintzberg et al. (1976) showed that the decision making process consists of three phases – an identification, a development, and a selection phase. In the identification phase, the need for a decision must be recognized and then the decision makers must try to make sense of the situation and engage in diagnosis activities. In the development phase, one or several possibilities for courses of action are elaborated. Decision makers search ready-made solutions or dispose that novel, custom-made solutions are designed. The third phase, the selection phase, stands for the various moments in which decision makers select among alternatives. Mintzberg et al. characterize each phase by specific behavioral routines (e.g. diagnosis routines, search routines, evaluation routines) and discuss support routines present across the various phases (decision control, communication, and political routines).

The most important aspect of Mintzberg et al.'s decision process model is that the three main phases of the strategic decision making process do not progress in a linear flow, but that the process is 'groping' and cyclical (Mintzberg et al., 1976: 265). The authors describe various internal and external interferences, which can lead to dead ends (for example caused by unexpected constraints, political impasses), delays, or feedback loops. One key reason for feedback loops are the 'comprehension cyles', which the authors describe (by referring to Deising, 1967) as follows:

> "By cycling within one routine or between two routines, the decision maker gradually comes to comprehend a complex issue. He may cycle within identification to recognize the issue; during design, he may cycle through a maze of nested design and search activities to develop a so-

lution; during evaluation, he may cycle to understand the problem he is solving" (Mintzberg et
al., 1976: 265)

The decision process is cyclical not only because of politics and the negotiation of in-
terests, or because of delays or abrupt changes in the context of the decision (e.g. introduc-
tion of a new technology). Most of all, there are cyclical movements within the process
because of how decision makers make sense of a problem or opportunity. Decision makers,
who recognize to have a potential issue of decision, do not identify firsthand, what exactly
the problem is and in which direction to take a decision. Their recognition of the problem
is still fuzzy and can be refined only after first analyses. While in Mintzberg et al.'s case the
decision maker is a single individual who is struggling to make sense in order to take a
decision, these 'comprehension cycles" in most cases involve communications among vari-
ous partners.

The phase framework for knowledge communication we present aims to cast light on
how experts and decision makers make sense of a decision issue within and through their
communications and how they integrate their diverse knowledge into the decision process.
We aim to show with the model how the specialized knowledge between experts and deci-
sion makers is integrated in decision making through communication. We will particularly
focus on the role of cycling behavior, not for fostering single comprehension, but for creat-
ing a shared understanding among experts and decision makers. The model leaves out
other explanations why cycling behavior is taking place (Mintzberg et al. referred to the
political and organizational reasons, as well as to reasons outside the organization's
boundaries). As opposed to decision theories focusing on how people make choices, for
example the prospect theory (Kahneman & Tversky, 1979), which outlines a variety of
heuristics people use when evaluating and making choices, we focus on preceding phases of
the decision making process and concentrate on communicative (and not cognitive) issues.
The question we are addressing with such a focus is how experts and decision makers try
to develop a shared understanding of what the problem, the goals, and the alternatives are.
Weick states that „sensemaking is about the interplay of action and interpretation rather
than the influence of evaluation on choice" (Weick, 1993: 634). In this way, the focus is on
the co-construction of meaning within decision making and not on decision making as
choice.

By identifying distinct phases, we are able to provide only an approximate and to
some degree erroneous description of the knowledge communication. However, we believe
that the phase framework is useful in order to locate which communicative challenges and

practices exist when decision makers aim to integrate the experts' expertise in their decision making.

The knowledge communication framework is of fractal nature or self-similar. As such it serves as an ex-ante structuring device and the reader can imagine that the whole communication process we will describe in the following pages, can take place both within one of the three decision phases proposed by Mintzberg et al. (1976), or along the whole decision making process. Within one decision phase means that the decision makers, for example in the design phase, need to contact specific experts, expose to them their request, and try to implement the conveyed insights. Applying the knowledge communication process to the decision making process as a whole means that the decision makers contact experts when they struggle to identify the issue of decision and unfold the whole communication process until the decision is taken. Both scenarios are possible and we will not aim to align the two processes precisely.

A final remark on the knowledge communication model is necessary. For reasons of simplification, we do not consider the whole communication taking place within the decision maker group and that within the expert group. We equally do not consider the case of multiple expert groups working with the decision makers on the same decision process at stake. We focus more narrowly on the direct interaction within the dyad of the expert and the decision maker. This narrow choice gives us the possibility to single out the communicative dynamics present in the interaction between the expert and the decision maker. Larger communicative and socio-political dynamics will be described as part of the context of the single expert - decision maker interaction.

Figure 4 shows the knowledge communication process between the experts and the decision makers. In five phases it outlines how experts and decision makers communicate with each other in their attempts to integrate knowledge in the decision making process. These phases are: identification of experts and expertise; articulation of need; analysis of issue and development of possible courses of action; conveying insights suggestions, and solutions; and applying and implementing suggestions and solutions. The arrows "A" to "E" show the feed-forward and the arrows "a" to "j" the feedback loops and express how communication partners move from one phase to the other and back. In the following paragraphs, we will describe the phases, as well as the cyclical nature of the loops by which the communication partners navigate through the process.
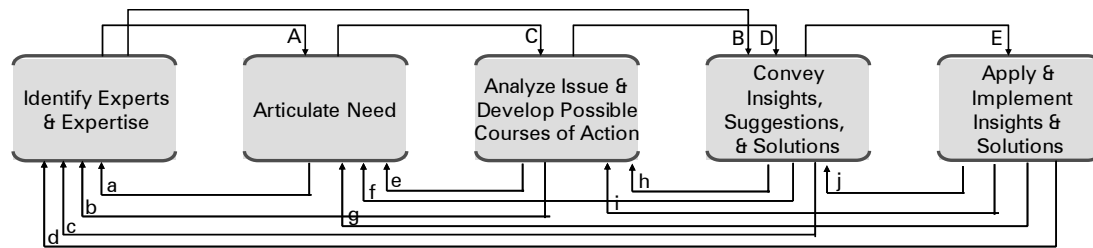
Figure 4: Knowledge Communication Process between Experts and Decision Makers

3.1 Identification of Experts and Expertise

Decision makers aim to identify experts and expertise when they have at least roughly recognized that there is a need or opportunity for taking a decision and that they alone will not have the necessary expertise for taking it. Decision makers need to identify, first, which knowledge they are lacking and, second, who could provide them with the relevant expertise. They have to identify possible knowledge sources and assess whether they can provide relevant knowledge for the issue of decision. It is an intertwined activity of search and assessment (Carlile & Rebentisch, 2003: 1189).

As decision makers often have only a very vague idea about the issue of decision, in some cases they might even have difficulties in identifying which areas of expertise are pertinent to the decision to take. A real estate company, for example, which plans to build a huge holiday resort along a coastal line might, at a first moment, not consider it to be necessary to draw on biologists for their decision making process. Yet, going on with the project, the decision makers learn that the coast is an important hatchery for turtles and that the light emissions from the hotel complexes would impede the baby turtles to find their way to the sea (usually, freshly hatched turtles orient themselves on the moonlight shimmering over the sea). Once at knowledge of this situation, the real estate company fears that this possible biological drama could severely damage the image of the holiday resort as a preferred holiday destination. Thus, at a second moment, the company identifies biologists as important experts advising them in their decision making processes.

Important for the identification of experts and expertise is that the decision makers need to be well connected within formal and informal networks (Harryson, 2002) so that they can potentially access experts from various fields, both internal or external to the organization. Important is also that the decision makers have access to knowledge brokers,

that is particularly well connected people in the social network who can provide access to a variety of expertise.

Also from the perspective of the experts, a well functioning social network is particularly important in this phase. Experts need to gain the attention of the decision makers, especially if experts and decision makers are not organizationally bound. An expert needs to convey credibility and assure that he/she is perceived as a thought leader in his/her specific domain (Carlile & Rebentisch, 2003). Experts will apply specific communication strategies to create awareness in different target communities and promote their ideas through various communication media and formats. In these activities, the experts very often not only have to promote their name and credibility, but also have to argue more generally for the importance of certain issues and perspectives, and have to increase the decision makers' sensitivity for a certain issue. They help decision makers to perceive specific signs as different from a "normal" behavior and provide a language, which facilitates the noticing and bracketing of cues as noteworthy objects or events (Weick & Sutcliffe, 2005). Finally, the better the experts are informed on the strategic directions of the decision makers and the better they know the existing decision agenda, the better they are able to proactively propose their expertise to management.

Multiple Feedback Loops Leading to the 'Identification of Experts and Expertise'

The example of the real estate company has shown that decision makers, potentially, can realize after each phase in the communication process, that they need additional expertise and that they have to call in alternative experts in the decision making process. Feedback loops from each phase of the knowledge communication model are possible (see: feedback loops "a", "b", "c", and "d" in Figure 4). When decision makers formulate their need to the experts ('articulate need' phase) and try to circumscribe what before has not been much more than a gut feeling, the decision makers might realize that the decision touches unsought areas of expertise (feedback loop "a" in Figure 4). It might also be that the experts say that they cannot really help with the problem and that they would have to identify experts from another field. Alternatively, it could also be that the decision makers, only once the decision is taken and implemented ('apply & implement insights & solutions' phase), realize that it has completely unforeseen consequences and that they need to collaborate with additional experts (feedback loop "c" in Figure 4).

3.2 Need Articulation

Once the decision makers have identified the experts with which they would like to work, they have to present to them the issue of decision and specify with regard to what they would need their expertise (see: arrow "A" in Figure 4). In other words, they try to *articulate their need*. To do so they struggle making sense of the past and present and give a first rough definition of the problem or opportunity. At the same time, they try to imagine a future state and a possible solution. Weick argues that this sense-making activity can often be better described by decision makers "imagining" the past and "remembering" the future as they superimpose own categories and values to past events and think of a future state in supposed analogy to the past (Weick, 2005). In the case of the expert - decision maker interaction, the sense-making activity is particularly challenging for the decision maker, as the issue deals with domains where he/she lacks knowledge and expertise. We will show various reasons, which make us believe that it is not feasible that the decision makers alone play an active role in this phase and hand in a precise and specific brief to the experts. Rather, both parties have to take over a very active role in this phase, engage in an iterative process of gradual refinement of the need articulation and an extensive use of face-to-face conversation, in order to then reach a joint understanding of what kind of insight is expected of the domain experts.

The literature on decision making, and in particular also the literature on defining designs and briefings in the construction industry, has dealt with the issue of problem definition and the structuring of problems. March and Olson, for example, state that the challenge of defining problems and outlining courses of actions is bound to the fact that our goals are in flux and often conflicting (March & Olsen, 1997). For Simon (1973), the problem definition is difficult, but less problematic. He believes that even ill-structured problems can be structured, decomposed and become computable trough a process of transformation (imposing closure). While for him, the difficulty of the definition of a problem depends on the characteristics of the task, Schön and Rein claim that the task has no a priori structure, which could be uncovered, and the process of structuring depends more on the qualities of the decision maker or designer rather than the task. In his view, the determining factor for the definition of a problem is how decision makers frame both problem and solution. A frame is made of "structures of beliefs, perceptions, and appreciation" (Schön & Rein, 1994) and the decision maker or designer uses them to add structure to unstructured or even wicked problems (Rittel & Webber, 1984). The research on abductive reasoning (as understood by Peirce in his later work, see: Weick, 2005: 433), which

inquires into a form of thinking that allows for the creation of novel explanations of problems and solutions (Nesher, 2001; Roozenburg, 1992; Zimring & Craig, 2001), also accounts for the weight of frames and mental models in the definition of a problem.

While much of the mentioned research focuses on cognitive processes and how individuals make sense of a problem, the question gains complexity if we acknowledge that a problem is framed not by individuals, but mostly by groups interacting. Experts and decision makers with their different background knowledge, will frame a problem differently, identify diverse aspects to be priorities and attribute different structures. In this constellation, communication issues become a central role. The question to be asked is how experts and decision makers can interact with each other in a way so that they can both benefit from the varieties of their framings, but at the same time gain a shared understanding of the task to tackle and of the objectives to reach.

Bowen et al. (1997) acknowledge the centrality of communication within the definition of a problem and argue that the formulation of a clear brief is directly related to the quality and satisfaction with the later decision and project outcomes. They conclude that clients need to "define their needs more clearly and communicate these requirements to procurement team members unambiguously" (Bowen et al., 1997: 10). To do so, the authors limit themselves to indicate that decision makers (clients) need to be more actively involved and that the experts (architects) have to spend considerable time with them to elicit clear requirements. Barrett (1999: 637) shows that communicating clear requirements is, in fact, a challenging task and mentions language problems in briefing situations. Clients have, for example, difficulties in reading the drawings of architects and understanding their jargon.

Another important reason why it is difficult for the decision makers to articulate a clear need is that, themselves not being experts on the topic at issue, they are often unable to clearly articulate what precise analysis and expertise they need from the domain experts. They do not know what are the important factors of the problem (Barrett & Stanley, 1999), where to focus the attention, and what is needed to solve the problem. In the context of information retrieval, Belkin et al. called this situation the "ASK"-problem, an "anomalous state of knowledge", in which a user identifies his knowledge as inadequate for completing a specific task and recognizes that he needs further information. Yet, he is unable to specify what information he needs. "The ASK hypothesis is that an information need arises from a recognized anomaly in the user's state of knowledge concerning some topic or situation and that, in general, the user is unable to specify precisely what is needed

to resolve that anomaly" (Belkin *et al.*, 1982: 62). For the information retrieval context, Belkin et al. conclude that "it is more suitable to attempt to describe that ASK, than to ask the user to specify his/her need as a request to the system" (1982: 62). Transferred to the context of the expert - decision maker interaction, this means that the decision maker might be able to define what the problem or opportunity is, but have difficulties in delineating clear directions for a solution. The experts cannot expect from the decision makers a document, which clearly outlines the requirements to a solution. Rather, it is the task of the experts to guide the decision makers through a process, which leads to a gradual refinement of what the decision makers need, starting with the inquiry of the anomalous state of knowledge, a description of the problem, to then move to objectives and a general outline of the directions for a solution. Communication needs to be interactive and allow for various forms of expression in order to gradually reach a clear definition of the decision maker's need.

Multiple Feedback Loops Leading to the 'Need Articulation'

We have argued that it is almost impossible for the decision maker to articulate a clear need in a one shot communication attempt. Their formulation of their need is gradual and requires multiple iteration cycles of formulating, analyzing, conveying, and implementing (see feedback loops "a", "e", "f", "g" in: Figure 4).

The theory of sense-making explains why these iteration loops are necessary: sense-making is "about the interplay of action and interpretation rather than the influence of evaluation on choice" (Weick *et al.*, 2005: 409). Weick's sense-making formula, drawing on Wallas, "how can I know what I think until I see what I say" (Wallas, 1926: 10; Weick, 1995: 12) expresses this need of interaction between thinking, saying, and doing. In fact, sense-making can only take place in iterative cycles of *talk* and *action*. Sense-making does not start as a purely cerebral and abstract activity, but is profoundly rooted in *action*. People have made an experience and want to understand and change it. In *talk*, people "bracket" certain elements of the passed action and give their tacit and private knowledge a verbal representation (Weick et al., 2005). In this way, the issue receives a more tangible existence and can be confronted with other representations. The recognition of differences makes it also possible to develop a shared understanding, which lays the ground for future *actions*. This idea that a decision maker alone will not be able to define a clear request upfront, but that the interaction between thinking, saying, and doing is necessary is supported also by research more classically focusing on decision making. Wildavsky (1969),

for example, showed that managers do not know that they want until they see what they can get.

For the expert - decision maker interaction, this means that feedback loops from the analysis and development phase to the need articulation phase are necessary. A first inter-action helps decision makers to sense whether their perceptions of past and present events are meaningful also to experts and to delimit the issue and gain an idea of which elements are pertinent to it. In other words, the first interactions are useful to align their different frames of reference and understandings, realize the motivations behind diverging priorities, and start developing shared understandings. Yet, after these first interactions, experts start to conduct a first analysis on the issue and elaborate scenarios and possible solution paths ("analyze issue & develop possible courses of action"). In the interactions that take place during this analysis phase, decision makers might realize that the direction of the analysis is the right one, but that the experts should focus more narrowly on a specific issue. It might also be that with the analysis ongoing, experts and decision makers realize that they have only in part understood each other and that there are still persisting misunderstand-ings. They see the necessity to articulate their need more precisely, to orient the project in a different direction, or to remediate a misunderstanding and move back to the 'articulate need' phase (feedback loop "e"). This recognition can take place also only after the experts have finished their analysis and convey their insights or suggestions to decision makers (feedback loop "f"). In unhappy cases, it can also be that only after having taken a deci-sion and implemented a solution, decision makers realize that they actually need a different insight from their experts and have to redefine a new request (feedback loop "g"). In this way, in order to reach a more refined understanding of an issue, a cyclical entanglement between action and talk is necessary and various loops that feed back to the articulation of need are possible.

3.3 Analyze Issue & Develop Possible Courses of Action

With a more or less precise request on behalf of the decision makers, the experts start analyzing the issue, inquire into problems, and elaborate possible courses of action (see: arrow "C" in Figure 4). Mintzberg could show that this phase, when solutions to problems have to be developed, is the most demanding in the decision making process in terms of resources (Mintzberg et al., 1976).

This phase is generally under the lead of the domain experts who applies techniques
for analysis (e.g. conducting interviews, doing tests, studying documents, using analytic
frameworks etc.) and other techniques for solution development (e.g. scenario techniques,
creativity techniques, or evaluation techniques). Given the necessity for the distribution of
expertise and the division of labor between experts and decision makers, the collaboration,
in most cases, will not be too close and time-consuming, but can show various degrees of
collaboration and formality, ranging from a rather *loose collaboration* and sporadic inter-
action (e.g. in the case of imprecise requests on behalf of decision makers) to a rather *close
collaboration* (e.g. in the case of a consultancy that goes working at the client's place
where the consultants conduct interviews, work with the clients' documents, or observe
processes).

Within a close collaboration that is characterized by frequent and informal interac-
tions, trustful relationships can grow and *tacit* knowledge might be integrated simply
through socializing, but also through joint work activities and observing the others' work
(Leonard & Sensiper, 1998; Nonaka & Toyama, 2003). Experts have the possibility to get
to know the decision makers' context, their room of maneuver, their preferences and pri-
orities. They have the possibility to ask specific questions on parameters of the analysis,
which are not yet clear to them. The decision makers, on their side, can communicate
quickly and informally changes in their request. Misunderstandings can be uncovered and
readjusted steadily. During these interactions, the diverse frames of reference of experts
and decision makers at times will certainly abut on each. Yet, depending on the way of
communication (e.g. a communication that is oriented on continuous feedback, that allows
for a constructive dealing with content conflict) and depending on how the interaction
partners deal with relational and political tensions that arise from knowledge gaps such as
threats to authority (Black *et al.*, 2004) or micropolitics of knowledge (Lazega, 1992), the
contact with different perspectives gives experts and decision makers the chance to develop
novel approaches and widen their own perspectives.

Instead, if collaboration is loose and interaction rather infrequent, knowledge inte-
gration, if at all, takes place in more formal means of communication. Experts have fewer
chances to become acquainted with the context of the decision maker and to readjust their
analysis on the basis of this information. For this reason, the risk to go on with the analysis
in a wrong direction for a considerable time is much larger. Also, as domain experts are
less exposed to different perspectives and approaches, the risk is greater to repeat hitherto
solutions, which experts consider somewhat uncritically as the one best solution. In such a

constellation, decision makers need to ask not for one solution proposal, but for many so that experts have to start thinking in equally feasible alternatives, each of which with its advantages and disadvantages.

Multiple feedback loops leading from and to the 'analyze issue & develop possible courses of action'

Earlier, we have mentioned that it is particularly difficult for decision makers to define their need very clearly upfront and that various iteration circles are necessary. Depending on how precisely the need could be articulated, the quicker the expert can do the analysis and the less modification requests are necessary (feedback loops to 'articulate need' phase, see: arrow "e" in Figure 4). On the other hand, there are two feedback loops (arrows "h" and "i" in Figure 4) leading from phases 'convey insights, suggestions, & solutions' and 'apply & implement insights & solutions' to the 'analyze issue & develop possible courses of action' phase. We will discuss them when describing these phases.

3.4 Conveying Insights, Suggestions, & Solutions

When the experts have concluded the analysis and have elaborated various decision making options, experts communicate (arrow "D") their insights in a variety of ways and formats (e.g. reports, in face-to-face meetings, presentations) to the decision makers. Communication formats might vary depending on the content that needs to be communicated, the characteristics of the decision maker, and the decision making situation more at large. Rosenthal and Hart (1991), for example, argue that in crisis situations, experts interact with decision makers mainly through face-to-face interactions.

From a communication perspective, this phase contains a variety of communicative challenges, with which experts have to tackle if they want to successfully convey knowledge to decision makers. A first challenge for the integration of knowledge is related to the limited absorptive capacity (Szulanski, 1996) of communication partners and the risk of information overload (for a review on the topic, see: Eppler & Mengis, 2004). Ackoff commented already in the sixties that the more urgent problem for managers was not the lack of information, but the overabundance of irrelevant information and this should be true both for the number of documents, as well as for the number of information items per document (Ackoff, 1967). Iselin (1993) could show in the accounting context that managers are and feel overloaded with information when exposed to financial reports that show

both financial ratios and statements (Balance Sheet and Profit & Loss Statement) so that their decision quality declines. They conclude that design recommendations for communication formats (structure and types of information to show) should be aligned with such insights from information overload studies.

In the case of the expert decision maker interaction, information overload is a pressing problem as the expert needs to synthesize a huge amount of information. The experts have worked for weeks on the issue, they have analyzed thousands of pages of documents, conducted a large number of interviews etc. and now are faced with the difficult task to make, for example, a brief report out of it or a 10-minute presentation. To do so, they need to prioritize which information is most pertinent for the decision maker. Yet, since experts have different mindsets and value systems than decision makers and the decision makers' priorities are quite unknown to the experts, this prioritization work is rather difficult. As a result, experts might deem types of information to be relevant, which then are not particularly useful to the decision maker.

Validity is another, related aspect in this phase of the knowledge communication. Information overload is caused not only by too much information or by an overabundance of irrelevant information (Ackoff, 1967). If information is ambiguous (Schneider, 1987; Sparrow, 1999), uncertain (Schneider, 1987; Tushman & Nadler, 1978), or of poor quality (Sparrow, 1999) people tend to suffer more quickly from information overload. Thus, when conveying their insights, experts need to think of procedures to guarantee the validity (Eppler, 2006) of a piece of information (e.g. through internal review processes, templates, checklists), find forms of communication that make this validity easily perceivable (e.g. through certificates, testimonies, user votes) or at least make the piece of information verifiable (e.g. give the decision makers access to the raw data on which the interpretation is based so that they can recheck the information). The validity of information is important not only to facilitate the decision makers' navigation within the sea of information and to fight information overload, it is equally important to prevent known biases that make people tend to discard ambiguous solutions (Ellsberg, 1961; Sutcliffe, 1994). Thus, experts, in order to avoid that their insights not to be fully considered in the decision making process, must have as one of their top priorities to guarantee the validity of their insights. Sutcliffe recalls that one way to deal with ambiguity (the fact that information allows for multiple equally plausible interpretations) is to install debate. In discussion, people clarify issues and "shape a reality on which they agree" (Sutcliffe, 2005: 421). Finally, validity is important

for experts in order to affirm and maintain their reputation of being an expert and with this guarantee the acceptance of the information.

Another challenge in this phase of the knowledge communication is related to *language and comprehension*. Knowledge is very context dependent and rooted in practice. For this reason, there is always an inherent risk in the knowledge communication that there are unconscious or conscious misunderstandings taking place between the communication partners (Husted & Snejina, 2002). They can only interpret the message within their context of reference, and when these contexts differ substantially – as is the case for the expert - decision maker interaction - misunderstandings and differences in language use are highly probable.

Finally, the '*common knowledge effect*' (Gigone & Hastie, 1993; Piontkowski et al., 2004; Stasser *et al.*, 2000; Sutcliffe, 1994; Wittenbaum *et al.*, 2004) is another major challenge in this phase of the knowledge communication. It stands for the tendency according to which people with diverse knowledge tend to focus in their communications on those parts of the knowledge that they already share (the common knowledge) rather than discussing the types of information that are distributed and unique to the single individuals. In other words, experts and decision makers tend to discuss more those ideas that they already share rather than exploring new elements, which represent unique knowledge of the experts or the decision makers respectively. As a consequence, they only sub-optimally profit from the diversity of their knowledge.

Multiple feedback loops leading from and to the 'Convey Insights, Suggestions, & Solutions'

There are various feedback loops possible stemming from this phase of the knowledge communication. Once the experts have presented to the decision maker, what are the important elements to consider in the decision, which are the feasible solutions to envision, etc., decision makers might decide that they need an additional analysis on a specific aspect (arrow "h") or that they still have doubts on specific aspects of the issue and need to draw in additional experts (arrow "c"). They might even realize at this stage of the interaction that they have not completely understood each other, which is why they have to reformulate their need (arrow "f").

3.5 Applying and Implementing Suggestions and Solutions

At a certain point, when the experts' knowledge has been conveyed to the decision makers, the question is what communication is necessary between the two parties so that the decision makers want and are able to implement part of the gained insights into their decision making and actions (arrow "E"). There is a set of important challenges related to this process.

A first one is related to the resistance of the decision makers to accept the expertise of the domain experts. Above, we have mentioned that 'the expert' is a social construct, which is always relative to other people (e.g. laypeople). As such, in the communication of knowledge, the knowledge proposed by the expert, the expert himself, and the institutions of which he/she is part, can always be called into question (which is why the expert has to continuously nurture and affirm his credibility). Dirk Baecker observes regarding this:

> "Das wichtigste Qualitätsmerkmal dieses Wissens ist, dass es kommuniziert werden muss, um wirksam zu werden, und dass die Art und Weise, wie es wirksam wird, davon abhängt, wie es in der Kommunikation ausgewertet wird. Qualität und Wirksamkeit sind dabei davon abhängig, dass tatsächlich nicht das Wissen als solches kommuniziert wird, sondern immer nur die Differenz zwischen Wissen und Nichtwissen. (..) Die Ablehnungswahrscheinlichkeit jeden Wissens erklärt sich daraus, dass mit jedem neuen Wissen sowohl die Realitätssicht des sozialen Systems, in dem dieses Wissen kommuniziert wird, als auch das System selbst, das sich diese und nicht eine andere Realität konstruiert, auf dem Spiel steht."[4] (Baecker, 1999: 78)

Following these arguments of Baecker, the decision maker risks in accepting the knowledge provided by the expert and this not because the proposed insight is wrong, but because it *puts into question the decision maker's view of the world*. There is therefore a considerable probability that the decision maker will discard the knowledge communicated by the experts. Carlile argues similarly that knowledge integration across functional boarders often puts current knowledge 'at stake' because people would have to discard part of their hard-won knowledge and skills (path-dependency of knowledge) (Carlile, 2002; Carlile & Rebentisch, 2003). Especially if the novelty of the communicated knowledge is con-

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[4] The most important quality attribute of this knowledge is that it has to be communicated to be effective and that the means how it becomes effective depends on what is prioritized in the communication. Quality and effectiveness thereby depend on the fact that it is not the knowledge, which is communicated as such, but always only the difference between knowing and not knowing. (..) The probability of rejection of all knowledge can be explained by the fact that with each new knowledge, the current view of reality of the social system is at stake, as well as the system itself, which constructs itself this reality and not another." (translation by the author)

siderable and the changes it implies are substantial, the decision maker is reluctant to accept this knowledge.

If experts and decision makers are not part of the same organization, decision makers might be reluctant to consider a solution just for the fact that it has not been developed within the organizational boundaries. Katz and Allen (1982) called this phenomenon the *not-invented-here syndrome*, which finds its more general socio-psychological explanation in in-group favoritism (Brewer, 1979): the stronger the group affiliation, the more the knowledge of the in-group is favored with respect to the outgroup knowledge (Husted & Snejina, 2002). In this way, if the experts and the decision makers feel like belonging to different groups and communities, the aversion to accept insights from the out-group might be an issue.

Political reasons like, for example, the need to gain prestige vis-à-vis other organizational members, can also be responsible for decision makers tending not to consider the experts' advise. Forms of communication are more promising, in which decision makers feel their own knowledge to be valued and where the solution does not seem to be invented and proposed, but only solicited by the experts.

Next to the problem of knowledge acceptance, an additional challenge is the translation and reification from the accepted knowledge into concrete action plans and actions. Pfeffer and Sutton call this problem the "knowing-doing gap", a phenomenon such that, although people accept a certain knowledge to be useful and although they would know how to do something, they are reluctant to implement their knowledge into action (Pfeffer & Sutton, 1999, 2000). The authors mention various reasons for the 'knowing-doing gap'. The focus on talk and building elegant plans and strategies, for example, often substitutes for a focus on action. In addition, a culture of fear, distrust, and competition within companies may inhibit learning from mistakes (Pfeffer & Sutton, 2000).

Another reason why we argue that it is difficult to close the knowing-doing gap, is that the passage from the abstract (because not self-experienced, but provided by the expert) knowledge to its concrete implementation in decision making and action is not obvious. Are the recommendations of the experts really embedded and exemplified in the context of the decision makers so that they have a chance to interpret them correctly? Is the experts' knowledge communicated in a way that it can be recalled and activated easily? What are the concrete implications of the experts' recommendations, and which operational steps are needed to implement them? In view of this additional reason for the know-

ing-doing gap, it would be useful that the experts assist the decision makers in the passage from knowing – for example, a government principle, an analysis of the major competitive threats, a strategic conduct etc. – to doing. They would need to lead 'doalogues' (Eppler & Mengis, 2006), a dialogue that prepares the doing. In such knowledge intensive conversations, experts help decision makers to translate an analysis into a concrete action plan, to discuss operational details, and to define responsibilities and timelines. Put it bluntly, without a concrete talk of the walk, the knowing-doing gap risks to remain open and the walk of the talk stands on shaky ground.

Departing from this phase, again, several feedback loops are possible.

Multiple Loops Leading from the 'Implement Suggestions & Solutions'

The implementation of insights and ideas into decisions is not the endpoint of the interaction between experts and decision makers. When decision makers engage very practically with the ideas, they come up with more questions to the experts. The latter will convey further insights (feedback arrow "j" in Figure 4) and conduct additional analysis for the specific implementation challenges the decision maker encounters (feedback arrow "i" in Figure 4). In some cases, decision makers who engage at this point in doing, realize that the insights provided by the experts were not exactly what is needed and have to reformulate their need (feedback arrow "g"). In still other cases, they ask experts to do an evaluation of the implementation to monitor and analyze the effects and implications of the decision taken (feedback to analysis phase, arrow "g"). Yet, if the same experts are not the right people for this type of service, decision makers have to identify additional/alternative experts (arrow "d"). In this way, also from the "last" phase of the knowledge communication process, various feedback loops originate so that it becomes the "first" phase.

We have proposed a process framework for the knowledge communication between experts and decision makers. It has shown that the delegation of the "preparatory work" of the decision to the expert brings with it the need for a whole set of coordination and communication efforts so that the knowledge can be successfully integrated into the decision making. We have outlined a set of challenges such as how to gain visibility and credibility, how to overcome the ASK-problem, how to reach in-between complexity, how to gain and sustain the big picture of an issue, how to overcome the knowing-doing gap: all these threaten the successful integration of experts' knowledge in decision making. The framework does not only identify phases and specific challenges that are related to them,

but, more importantly, postulates feed-forward and feedback loops among these phases. We have particularly stressed this cyclical nature of the knowledge communication between experts and decision makers.

The discussion of the process framework is a general description of the knowledge communication between experts and decision makers and we have left out certain qualifying arguments. For example, we have not mentioned which weight the single phases carry in the knowledge communication process. Do these weights depend on whether the knowledge is actively pushed by experts (without a specific request from decision makers) or specifically sought by decision makers? Does the push versus pull situation impact on the configuration of the feed-forward and feedback loops? Finally, in the description of the knowledge communication process we also have not highlighted who (experts/decision makers) takes over which engagement in the various phases. In Chapter 4, when presenting the case studies and analyzing whether the process framework provides a useful structure for describing the actual communication between experts and decision makers, we will address the above mentioned – and yet unanswered – questions.

In the outline of this thesis, we have mentioned that we will highlight particularly the role of face-to-face conversations in the process of knowledge integration. Face-to-face conversations represent a major form of how experts and decision makers interact and are a "prototypical case" of how people develop, share, and integrate knowledge in social interaction and that "all other cases are derivates of it" (Berger & Luckmann, 1966: 28). Giddens claims similarly that "contexts of co-presence" are "always the main 'carrying contexts' of interaction" (Giddens, 1984: 143). In this way, gaining a better understanding of the micro-interactional patterns of face-to-face conversations helps to sharpen the understanding of how decision makers integrate experts' knowledge in more macro-communicative processes as we have described them in the phase framework for knowledge communication above[5]. The next section will provide an overview on the literature on face-to-face conversations in the organizational context, in particular with regard to social knowledge processes, such as knowledge integration.

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[5] Giddens argued that it is not possible to directly infer from the micro to the macro context and that the macro communicative structures are not aggregations of the conversational patterns on a micro level. Yet, the "interaction in contexts of co-presence is structurally implicated in systems of broad time-space distanciation" (Giddens, 1984: Xxvi). With this Giddens contributed to the longstanding discussion of sociologists on the difference between agency and structure and reminded us that we cannot directly infer macro communicative structures from micro-interactional patterns.

4 The Role of Conversations for Knowledge Integration and Approaches for their Management

Already in the seventies, Weick stressed that members of an organization make sense of their daily actions mainly in meetings and face-to-face conversations (Weick, 1979: 133-134). Face-to-face conversations are this "class of events which occurs during co-presence and by virtue of co-presence", in which people interact with each other through verbal statements, but also glances, gestures, and positioning (Goffman, 1967: 1). Conversation partners do not merely interact to transmit information, but also to affirm themselves (Goffman, 1981), express their relation with others (Watzlawick *et al.*, 1967), to recursively form the social (Giddens, 1984), and also to develop and share human knowledge (Berger & Luckmann, 1966). Face-to-face conversations are central to the *co-construction of knowledge* because they are a highly flexible, interactive, and iterative form of communication that allows participants for asking clarifying questions, deepening certain aspects, asking for the larger context of a specific piece of information, and for recursively adapting their communication style to the language and knowledge of their vis-à-vis. In addition, through conversations people create shared experiences (Dixon, 1997); they build trust and strengthen relationships between participants (Harkins, 1999) a prerequisite for the effective sharing (Szulanski, 1996) and integration of knowledge. Conversations (and particularly meetings) are therefore said to be the "cradle of social knowledge in any organization (..), they allow the first and most essential step of knowledge creation: sharing tacit knowledge within a microcommunity" (von Krogh *et al.*, 2000: 125).

Conversations can also create problems for the successful integration of knowledge. The previously praised flexibility of conversations leads to situations in which topics alternate chaotically in the conversational flow and it is difficult to know for the conversation partners what the outcome of the conversation is. Conversations are also ephemeral and contributions of the single interaction partners vanish the moment they are pronounced. This linear structure puts limits to complex comparisons of multiple variables as well as to the persistence of conversations over time (Bregman & Haythornthwaite, 2001). In addition, several of the mentioned advantages of conversations are bound to the physical co-presence of the participants (para- and non-verbal signs are important factors in the sense-making process). Therefore, geographical distance still represents a major challenge to the use of conversations for the systematic management of knowledge (Chidambaram, 1996). Certain conversational routines and interaction patterns, such as defensive arguing (Argyris, 1996), unequal turn-talking (Ellinor & Gerard, 1998), or dichotomous arguing

(Tannen, 1999) impede the successful integration of knowledge. These patterns are based on cognitive and socio-psychological processes and tendencies like face-threatening or face-saving behavior (Slugoski & Turnbull, 1988), poor analogical reasoning (Thompson, 2000), in-group favoritism (Brewer, 1979; Messick & Mackie, 1989), and groupthink (Janis & Mann, 1977).

In view of the arguments for the centrality of conversations for knowledge integration in the organizational context and, concomitantly, the challenges bound to this form of communication, the question is how conversations can be *managed to allow for the integration of knowledge across knowledge boundaries, such as across experts and decision makers*. Such a management of conversations from a knowledge perspective has to take into account that face-to-face conversations are highly flexible. "It is comparatively difficult to impose rigid patterns upon face-to-face interaction. Whatever patterns are introduced will be continuously modified through the exceedingly variegated and subtle interchange of subjective meanings that goes on" (Berger & Luckmann, 1966: 30). As we have argued above, we believe that the flexibility of conversation is one of the main reasons why this form of communication is so important for the co-construction of knowledge. Conversation partners continuously adjust to the state of knowledge of their vis-à-vis and can swiftly react to their understandings and perspectives. A conversation management that imposes structure on conversations results in a minus in flexibility, which can result counterproductive if the structure is too rigid (especially for conversations such as informal chats during coffee-breaks or for very emotional discussions). The questions are thus what conversational patterns favor knowledge integration and what methods for the management of conversations encourage such patterns without imposing too rigid and formalistic structures? By looking at the literature on conversations in organizations as it relates to knowledge management, we propose a synthetic framework for the management of conversations from a knowledge perspective and we aim to give answers to these questions.

Conversations have been analyzed in a wide range of disciplines such as sociolinguistics, socio-psychology, sociology, communication, decision making, and studies of organizations. The literature is of such a scope that it would be impossible to review it all in this stance. Even if we took only one branch that would be pertinent for the analysis of sensemaking and social knowledge processes in talk-in-interaction, ethnomethodology, first proposed by Garfinkel (1967), the literature would be immense and would merit specific reviews (see, for example: Atkinson, 1988; Linstead, 2006). Our scope is much narrower as we focus merely on the scientific contributions that examined conversations in the or-

ganizational context. We further focus in our analysis on contributions that examine the conversations' potential to share, integrate, or create knowledge. This choice has various reasons. First, while organizational scholars argued for the central role of conversations for social knowledge processes and sense-making (see, for example: von Krogh et al., 2000; Weick, 1995), we aim to show what research has unfolded from these rather general deliberations on the role of conversations. Second, as the expert - decision maker interactions take place in organizational settings (even if their interaction can be inter-organizational), organizational studies represent our direct domain of reference. In a first moment, we outline the various understandings and definitions of conversations in organizations and discuss the different roles that have been attributed to them. Based on the literature of communication theory, we propose a conceptual *framework* for the management of conversations, which identifies *six dimensions* that conversation partners take into account when making sense in their conversations and along which conversation management can be structured. We thus use the framework as an analytic lens to review *specific ways* of managing conversations from a knowledge perspective. In this endeavor, we particularly focus on conversational principles and rules.

We have identified the relevant literature by carrying out a systematic search within the electronic databases of ABI Inform, Science Direct and ACM Digital Library using the keywords conversation, dialogue, group communication, and group interaction. We have considered those contributions in which conversations are discussed as a central subject and are related to social knowledge processes within organizations. We have merely taken into account those articles that appeared in journals, which are embedded in organizational studies. From the references of the identified articles, we have moved backwards and identified other relevant research on the subject to complement our sample (the so-called snowball method). To further complete the literature base, we have also included major book contributions (Donnellon, 1996; Frey *et al.*, 1999; Harkins, 1999; Isaacs, 1999; Schwartzmann, 1989; Senge *et al.*, 1994; von Krogh et al., 2000). We have not considered the many purely practitioner-oriented 'how-to' books on crucial, fierce or otherwise special conversations in organizations. We have developed several synthetic tables on the reviewed literature in order to identify recurring issues and research gaps.

4.1 Perspectives on Conversations

One could argue that the study of face-to-face conversations in organizations is part of the more general discipline of organizational discourse analysis. Discourse analysis, in

the organizational context, investigates how discourse is intertwined with processes of organizing in other words, how organizational practices are shaped by the way meaning is negotiated in organizational discourse (Fairclough, 2005; Grant & Hardy, 2003: 7; Heracleous & Barrett, 2001). On the other hand, if discourse analysis is understood very narrowly as the linguistic analysis of language use beyond the boundaries of a sentence, the studies on conversations in the organizational field is not confined purely to discourse analysis. This already becomes apparent when looking at the multitude of labels, definitions, and descriptions attributed to the concept (see: Table 2).

Label	Definitions/Descriptions	Authors
Appreciative conversation	A conversation in which conversers collectively share diverse ideas, try to identify positive possibilities by focusing on past or current strengths, but at the same time challenge existing thinking and organizational practices.	(Barge & Oliver, 2003)
Decisive dialogue	A form of conversation that addresses the ineffective organizational culture of indecision. This dialogue is characterized by openness and inquiry (outcome is not predefined), candor (expose sensitive issues, air conflicts), informality (invite conversation partners to ask questions), and at the final stage by closure (point concrete ways to action).	(Charan, 2006)
Dialogue	A specific form of conversation which conversers collectively pursue to open up problems into multiple best perspectives in order to explore the whole among the parts and the connections between the parts, to inquire into assumptions and combine inquiry with disclosure. Through dialogue, one aims to learn about the nature of the problem from all interlocutors and to create a shared meaning among many. Its etymological roots come from the Greek word *logos* which signifies word, meaning, and *dia* which means through. Dialogue is thus a process for transforming the quality of conversation, and in particular, the thinking that lies beneath it.	(Argyris, 1996; Bohm, 1996; Ellinor & Gerard, 1998; Isaacs, 1999; McCambridge, 2003; Nonaka & Takeuchi, 1995; Schein, 1993; Senge, 1990a; Tannen, 1999; Thomas *et al.*, 2001)
Generative conversation	A conversation in which different bodies of knowledge meet the individual subject and develop new knowledge and generate innovative activities. It is a form of conversation that is creative, encourages the linking of concepts and ideas and the upholding of divergent ideas.	(Steyaert & Bouwen, 1996; Topp, 2000)
Good conversation	A vocal interaction, in which people speak up and challenge views and assumptions and in which all sides participate and listen to each other's view.	(Quinn, 1996)
Good fight	A conversation that keeps a constructive conflict over issues from degenerating into dysfunctional interpersonal conflict and aims to argue without destroying the ability of the conversers to work as a team.	(Eisenhardt *et al.*, 2000)
Great talk	A great talk is a conversation where questioning and doubt are institutionalized and big and broad questions legitimized.	(Gratton & Ghoshal, 2002)
Honest conversation	A public, organization-wide conversation about essential issues that engage in uncovering the 'truth' in order to allow fundamental change.	(Beer & Eisenstat, 2004)

Powerful conversation	An interaction between two or more people, which progresses from shared feelings, beliefs, and ideas to an exchange of wants and needs to clear action steps and mutual commitments.	(Harkins, 1999)
Skillful discussion	A conversation that intends to come to some sort of closure (e.g. make a decision, reach agreement, identify priorities) but at the same time aims to explore and create a deeper meaning and insight. A skillful discussion incorporates some of the techniques and devices of dialogue, but also focuses on tasks.	(Ross, 1994)
Strategic conversation	– A conversation that is oriented towards the advancement of the company, to the creation of the future for the business, and to the creation, acquisition and allocation of resources for the future. It promotes a dialogue for understanding rather than an advocacy for agreement (von Krogh & Roos, 1995). – A micro-level interaction between superior and subordinate to obtain an understanding of the actual origin of the feelings of exclusion and the presence and absence of energy around strategic initiatives (Westley, 1990).	(Eisenhardt et al., 2000; Manning, 2002; von Krogh & Roos, 1995; Westley, 1990)

Table 2: Prescriptive Labels and Definitions Attributed to Conversations in Organizations

The main distinction we can draw between the definitions and labels on conversations in organizations (as shown in Table 2) is between *descriptive* and *prescriptive* concepts. Some authors look at conversations from a descriptive standpoint and simply outline their (multiple) functions within organizations. These authors use generic terms such as conversation (Ford & Ford, 1995; Overman, 2003), talk-in-interaction (Huisman, 2001), group communication (Hirokawa & Salazar, 1999; Poole, 1999; Sunwolf & Seibold, 1999), meeting (Schwartzmann, 1989: 61), or team talk (Donnellon, 1996). The descriptive intent can be seen in the way that these authors define and describe conversations: Huisman, for example, states that a talk-in-interaction is made up of "interactional and linguistic features that characterize the construction of a 'commitment to future action'" (Huisman, 2001: 70). In contrast to this approach, many authors in the area of organization studies have a more *prescriptive* aim (see: Table 2) (Charan, 2006; Gratton & Ghoshal, 2002; Harkins, 1999; Ross, 1994). Researchers who study "dialogue" in organizations share a prescriptive understanding of their object of study: Dialogue is seen as a specific conversational form in which participants collectively open up problems into multiple perspectives in order to explore the whole among the parts and see the connections between the parts (Argyris, 1996; Bohm, 1996; Ellinor & Gerard, 1998; Isaacs, 1999; Schein, 1993). The prescriptive focus is also evident in the fact that these authors propose an effective communicative behavior for facilitating innovation and learning. They do not, however, systematically analyze and describe actual conversational patterns, as we will discuss below.

In organizational studies, knowledge processes have been discussed in relation to conversations in at least four disciplinary areas: knowledge management, organizational learning, decision making, and change management.

In the field of *knowledge management* the contributions on conversations outline the central role of dialogue and face-to-face conversations for knowledge processes. They do not analyze conversations more closely. Nonaka and Takeuchi argue, for example, for the importance of dialogue in the knowledge-creation process. They show that especially in the knowledge-externalization phase, when one tries to find a (verbal) structure for one's tacit knowledge, the dialogic culture of openness, trust and collaboration is crucial (Nonaka & Takeuchi, 1995). On the basis of this premise, von Krogh, Ijicho, and Nonaka provide some more specific suggestions on how conversations among interaction partners should be managed. They outline four principles for managing conversations and show how they can be applied within the various phases of the knowledge-creation process (von Krogh et al., 2000). Unfortunately, contributions in the realm of knowledge management (Overman, 2003; Thomas et al., 2001; Topp, 2000; von Krogh et al., 2000) often lack an empirical base and do not demonstrate empirically which conversational behavior hinders or enables group knowledge processes.

Authors who view conversations from the perspective of *organizational learning* represent quite a homogeneous group of research. Many refer to David Bohm who conceives conversations as being directly related to thought. In his view, the ability to adapt systemic thinking or to question mental models is dependent on how people interact with each other in conversations (Bohm, 1996). Dialogue – as a qualified conversations that is characterized by systemic reflection and inquiry - helps to uncover premises, inferences and defensive routines (Argyris, 1996) and thus becomes central to innovation and organizational learning (Dixon, 1997; Schein, 1993, 1995). The researchers in this field have opened the black box of conversations (at least conceptually) and they have highlighted various conversational mechanisms (Argyris, 1996; Harkins, 1999). But these studies often confine themselves to being prescriptive and lack extensive descriptive accounts on the micro-processes of conversations. Their synthetic case-study work (Argyris, 1996; Gratton & Ghoshal, 2002; Harkins, 1999; Isaacs, 1993; Senge, 1990b) mainly outlines the importance of dialogue and its impact on the organizational reality, as well as how to best profit from this potential, but provides only little evidence on specific interaction patterns.

Researchers who study conversations in relation to *decision making* form the largest community and provide an extensive empirical base. Many adopt a rather functional per-

spective on conversations (e.g., conversations are instruments for dealing with tasks and making decisions). In this view, conversations are just a medium of group interaction and mediate the effects of the personal traits or of the task characteristics, which impact on the decision making process and outcome. We do not refer to this body of research systematically as excellent reviews in this field already exist (Frey, 1996; Frey et al., 1999; Hirokawa & Poole, 1996). It is important to note, however, that there are very few empirical studies that view conversations not from a functional perspective, but as constitutive of group decision-making (Hirokawa & Poole, 1996: 7). Only the latter understanding opens the way to analyze conversations from a knowledge-perspective by analyzing how people actually make sense of a subject or decision option during an interaction. In this vein, linguists as Huisman (2001), or management scientists as McCambridge (2003) or Eisenhardt et al (2000) aim to understand how the formulation and content of decisions are connected to the (communicative) situations in which they are produced.

Authors who approach conversations in the context of *change management* mainly hold a constructivist view on organizations: in conversations, people construct a meaningful organization and do not merely transmit information. Conversations are the generative mechanisms in which change occurs and not only a tool for it (Ford et al., 1995). To structure conversations means to shape change directly and to form an organizational reality (Barge et al., 2003). The empirical work in this field is based on a few case studies (Beer & Eisenstat, 2004; Manning, 2002; Steyaert & Bouwen, 1996).

Finally, there are contributions in which authors argue for the central role of conversations for organizations in general. Conversations are vital in shaping the socio-cultural system and reality of the organization. Most of these contributions are conceptual (Bohm, 1996; Donnellon, 1996; Ellinor & Gerard, 1998; Quinn, 1996; Weeks, 2001), while a few present interesting qualitative evidence (Isaacs, 1999; Schwartzmann, 1989).

A first analysis of the literature on conversations in organizations shows that contributions are mainly conceptual and often only refer anecdotally to empirical evidence. Case studies have been used to argue for the importance of conversations for organizing and for social knowledge processes. These case studies have not resulted in actual and accurate analyses of real-life conversations. The research on group communication and decision making constitutes an exception to this trend, but as it mainly holds a functional perspective on conversations, it is less enriching if we are interested in conversations as the central mechanism for social knowledge processes such as knowledge integration. In the functional paradigm, communication is merely an unproblematic medium to reach change, making

decisions, sharing information, or carrying out other types of tasks. It has been criticized that such an approach does not consider the socioemotional qualities of conversations and presumes that there is an objectively best solution (Hirokawa & Poole, 1996). Instead, communication can be understood as a constitutive process in which people take decisions or integrate knowledge. In such a frame, the conversation does not "serve" to transmit information, but recurringly creates a social reality within which people make sense and co-construct knowledge. Shotter claims that it is from "within the dynamically sustained context of these actively constructed relations that what is talked about gets its meaning" (Shotter, 1993: 2). A first suggestion for future research is therefore to consider the extensive literature outside the organizational field, which disposes of vast empirical material, which is more qualitative and contextual in nature and conceives communication to be constitutive of social knowledge processes. These contributions can be found in the areas of argumentation studies (Walton, 2000), medical communication (Gülich, 2003) or manager-subordinates interaction (Courthright *et al.*, 1989). Furthermore, complimentary to the currently well-positioned case-study research, future contributions in the field should study the micro-interaction patterns empirically and examine their relation to larger organizational processes and structures (as for example Barry & Crant, 2000). A key impediment to this research strategy may be the reluctance of managers to let researchers participate in strategic conversations and document and analyze their interactions.

After this first overview on the field, we will review specific ways of managing conversations from a knowledge perspective.

4.2 Towards a Framework for Conversation Management

Managing conversations implies paying attention to the key elements that have an impact on the quality of such interactions. Through the analysis of the existing literature on conversations, we have identified six areas that influence conversations and along which conversations can be managed and structured (see: Figure 5). These key areas are: the message, the conversation process, the conversational intent, the mental models of the participants, the group dynamics and the outer context. They reflect the factual (message), temporal (conversation process), pragmatic (conversational intent), cognitive (mental models), emotional (mental models, group dynamics), and social (group dynamics, outer context) aspects of conversations.

We can also trace these dimensions back to various communication models (Gerbner, 1956; Herrmann & Kienle, 2004; Jakobson, 1960; Merten, 1999; Shannon & Weaver, 1949; Sonesson, 1997). From a knowledge perspective, old transmission models of communication (Shannon & Weaver, 1949) are insufficient for various reasons: First, they do not elucidate the sense-making process involved in communication, but proceed from the assumption that meaning is a property of the message and is fully specified by its elements. Yet, messages have to be selected, contextualized, interrelated, and appropriated by the receiver. Active construction and knowledge-generating and transforming mechanisms are involved in the sense-making process (Cook & Brown, 1999: 393). Second, transmission models are linear and static in nature and do not include evolving contextual aspects. If we are interested in how people make sense and integrate knowledge through and within their conversations, context-rich and not purely sender-based, but also receiver oriented communication models like the ones presented by Merten (1999), Herrmann and Kienle (2004), Krauss and Fussell (1998), or also Sonesson (1997) are more insightful. Merten, for example, refers to reflexive, circular communication structures that involve a selective elaboration of information (Merten, 1999: 63). In his understanding, the construction of meaning within the communication is bound not only to the stimuli of the message, but also to the inner (e.g. previous experiences) and outer (e.g. social norms) contexts, and to temporal elements of the communication (feed-forward and feed-back structures) (Merten, 1999).

Our aim is not to extend or replicate such general communication models, but rather to present a simpler, management-oriented framework that explicitly refers to the interactive group context of conversations. Our aim is to outline the most important dimensions that need to be taken into account when managing conversations and to provide guidelines for each dimension (based on a review of existing literature). We present key diagnostic questions for each dimension to facilitate this management approach.

The first area or dimension that conversation management has to consider regards the exchanged *messages* of a conversation. This dimension includes all signs that are shared by conversation partners. From a knowledge perspective, the main question we have to ask is: *Does the message (both in its format and its content) provide sufficient cues so that the conversation partners can make a shared sense of it, given their inner (i.e., the interaction situation) and outer (i.e., organizational) context?* Appropriateness not only refers to the alignment of the message to the specifics of task and audience (Krauss & Fussell, 1998), but also to whether it is rooted in facts or not. More specifically we therefore

ask, is the message aligned to task and people and rooted in facts? The more a message is rooted in actual facts, the better we can ground our sense-making process and the less problematic are inference processes (Argyris, 1996). This aspect refers to a first interconnection of this dimension with the one of the mental models. Another interconnection exists with the group dynamics dimensions. The 'para-verbal' (i.e. intonation) and 'non-verbal' (i.e. gestures) qualities of the message are of great importance for the emotional and relational aspects of the communication (group dynamics). Situations are frequent where verbal signs are correct and clear, but the para- and non-verbal signs express underlying inter-relational conflicts.
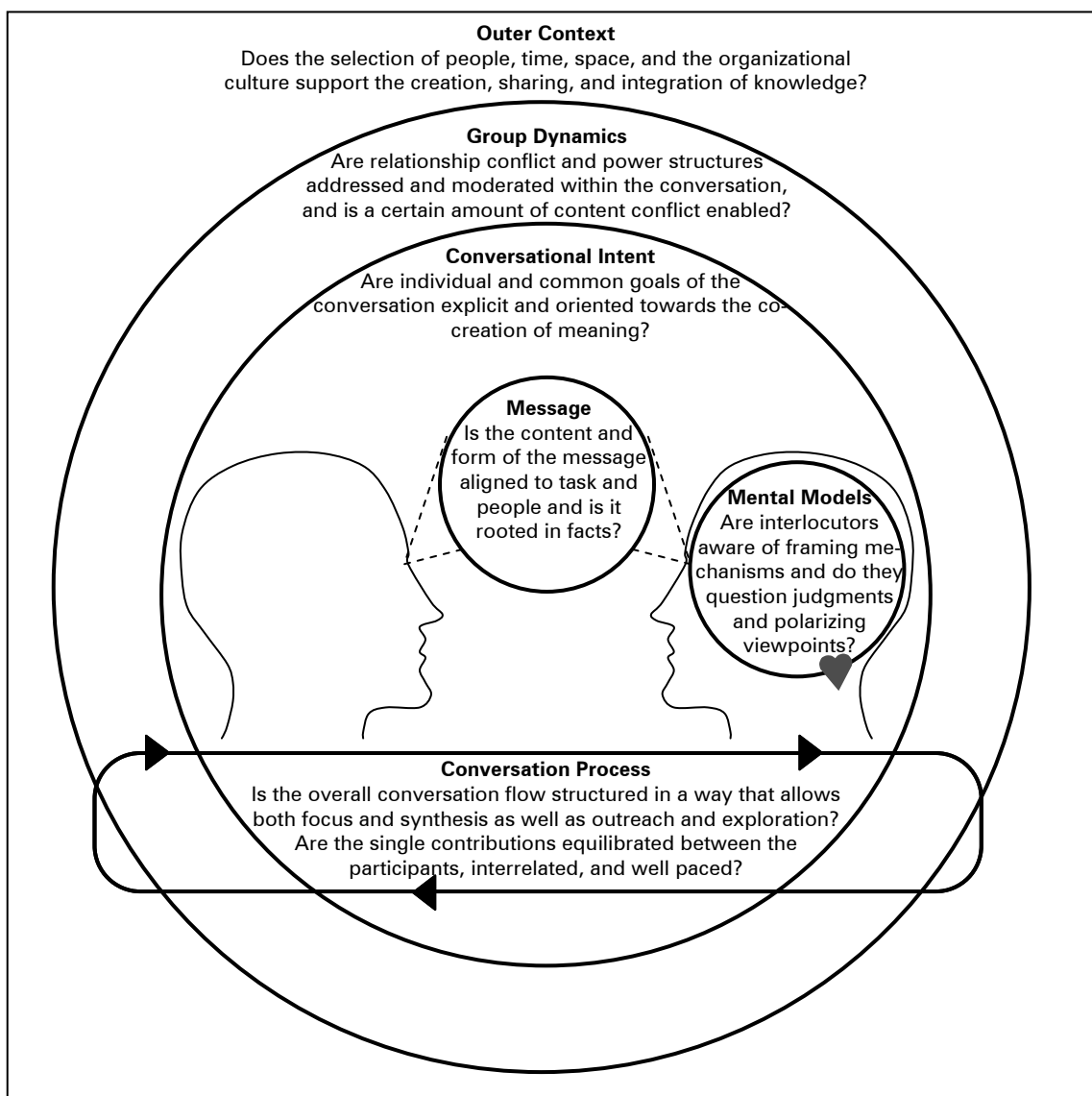
Figure 5: Key Dimensions and Questions of Conversation Management

The *conversation process* is the dimension which represents the time element of conversations and designates the flow of a conversation in time (e.g. the agenda of a meeting). The process of a conversation is recursive (therefore the circular representation in Figure 5) and creates, on the one hand, expectations for future interactions (feed-forward) and, on the other, allows feed-back on interactions that have already occurred (Merten, 1999: 107). The question that arises in this dimension is *whether the overall conversation flow is structured in a way that allows for focus and synthesis, as well as outreach and exploration. Also, are the single contributions balanced between the participants, do the single contributions build on each other, and are they paced in a way that permits silence, reflection and attentive listening?* Various authors have different opinions regarding an adequate degree of structure in a conversation process (i.e., Bohm 1996 versus (Beer & Eisenstat, 2004; Harkins, 1999).

From a management point of view, the overall intent and objective that is pursued with a conversation is an important aspect to consider. The *conversational intent* includes the specific common and individual goals which are pursued with the conversation. The various participants often do not have the same or even compatible goals. Also, individual intentions often remain obscure to other interlocutors. The supposed or explicitly shared conversational intent is one of the main elements people draw on when making sense of an interaction (Giddens, 1984). A key diagnostic question to ask is therefore whether the communicational intent is explicitly shared by all participants and whether this purpose reflects the main interests of all involved parties.

Group dynamics are the socio-psychological aspects that are present in the conversation and that emerge as a result of the interaction among the participants. When groups co-construct meaning within conversations, group dynamics play a central part in the collaborative sense-making process. Each conversation incorporates both an aspect of content and one of relation (Watzlawick et al., 1967). The participants treat not only factual issues, but always consider (at least implicitly) the relations between them. The sender communicates his/her self image and says something about the relation between him/her and the others. The relational aspect of the communication gives the receiver indications of how to interpret the content of the message. Group dynamics are also the cause of "political" conversations and mistrust, which are obvious in conversations where only certain people speak, particular issues remain taboo, participant try to save face and do not dare to contribute dissenting views (Janis & Mann, 1977; Schein, 1995; von Krogh, 1998). From a knowledge perspective, previous research suggests that while content conflict can have positive on the elaboration and interpretation of exchanged information, conversa-

tion partners usually do not know how to deal constructively with relationship conflict (Argyris & Schon, 1978; Eisenhardt et al., 2000). The question at this level is: *Are relationship conflict and power structures addressed and moderated within the conversation, and is a certain amount of content conflict enabled?* Another interrelationship between the group dynamics dimension and the outer context dimension can be identified. In fact, group dynamics are strongly dependent on the organizational structure, the formal and informal hierarchies, and on the communication culture. We will see in the next section that the main question in this dimension is how to deal with informal and formal power structures and how to cope with relationship conflict (in particular how to ensure that content is not primarily understood on a relational level) so that knowledge can be effectively shared, created and integrated.

The *mental models* represent the frames and interpretive schemes with which we choose new information, make sense of it by relating it to a certain situation or to other information (Kim, 1993). Mental models are the deeply anchored, internal pictures of how the world works (Senge, 1992) and consist of the values which fundamentally determine our actions. In conversations, mental models play a fundamental role both in talking and listening. They are responsible for the selectivity of our attention, the interpretation of a message, and the construction of meaning. If conversations are entirely social, then the mental models represent the individual level. When constructing or making sense of a message, not only rational, but also emotional aspects intervene (that is why in Figure 5 the circles around mental models include a heart icon). We use a whole network of values, convictions, assumptions, and psychological dispositions for our sensemaking and move in a nanosecond from the original message to our interpretation of it (Argyris, 1996; Bohm, 1996; Isaacs, 1993; Schein, 1993). Conversers are usually quite unaware of the active role of their mental models, which leads to implicit misunderstandings, unsound inferences, and rather aggressive forms of discussions. A key diagnostic question is thus *whether the conversation partners are aware of the mental models and framing mechanisms that come into play in a conversation and whether they are able to suspend and question them* (Argyris, 1996; Isaacs, 1999; Schein, 1993; Senge et al., 1994).

Finally, the *outer context* represents the larger setting in which conversations take place and includes general communicative structures (e.g. reporting systems), the physical space (e.g. sitting in a circle) and the organizational setting (e.g. hierarchies, guiding values, norms, and relationships within the organization or the single working groups). Conversations are embedded in a larger organizational context and participants use this context to

make the communicated messages meaningful (Herrmann & Kienle, 2004). At the same time, conversations shape and structure the larger organizational context (Giddens, 1984). Goffman (1967), but also Giddens in his structuration theory (1984) have advanced that the single interaction and the more general communication processes are reciprocally interlinked. According to Giddens, conversations are highly influenced by the communication structure that surrounds them. At the same time, ongoing conversations form the more global communication structure (Giddens, 1984)[6]. We define the outer context of conversations as all the physical, organizational and habitual elements that are not directly activated within the conversation, but that constitute the outer frame in which conversations are embedded and that exert an influence on the conversations. The outer context includes the physical space, the organizational and cultural setting of conversations, but also the social networks and the general communicative routines. The key diagnostic question in this dimension is *whether the selection of people, the allocation of time, the choice of the physical space, and the organizational culture support the integration of knowledge*. By structuring these contextual elements (i.e. providing coffee corners or/and time for informal encounters and socializing), conversations can be managed in an indirect and less rigid way.

We have presented the six dimensions of conversations as distinct, while stressing their interdependencies; group dynamics, for example, influence the conversational process: in a conversation with strong formal or informal leaders (group dynamics), the turn-taking (conversational process) is most likely to be dominated by one or two conversers. In addition to this, some of the conversational dimensions can be more easily managed than others. Conversational problems can be discovered and managed in the first place along the rather visible dimensions of the message and process. Yet, challenges on these dimensions are linked to the less accessible dimension of group dynamics or mental model. Future research could examine this proposition and study whether certain problems of less tangible and manageable dimensions (like mental models or group dynamics) can be addressed by measures that act on the interlinked, but more tangible dimensions (process, message).

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[6] In sociology, the micro-macro distinction is one of the most historic discourses, also referred to as the agency-structure distinction, whereby agency stands for the continuous flow of conduct and is characterized by temporality. Structure, instead, is the patterning of interaction and its continuity in time (Giddens, 1984). Without pretending to contribute to the conceptual discourse on agency and structure, we aim to incorporate its general idea in that we acknowledge that each conversation takes place in a larger context, is both influenced by it and also forms it, which is why it cannot by analyzed completely detached from the context.

In the following section, we show how and in which direction management activities try to structure the six dimensions of conversations we have presented. We thereby particularly focus on the role of conversational rules and principles. These rules prescriptively define how conversations have to be characterized in order that conversation partners can integrate their specialized knowledge among them.

4.3 Approaches for the Management of Conversations

Conversations are guided by specific, but implicit rules or routinized (behavior) patterns between the interlocutors (Lyotard, 1984). The set of conversational rules and resources that are instantiated in ongoing conversations form the structure of conversations (Giddens, 1979; Orlikowski, 2000). Conversers continuously draw on theses rules and resources when they communicate and make decisions (Poole & Hirokawa, 1996). Specific implicit rules and communicative behavior patterns may not be in line with certain objectives that are pursued with the conversations. Chris Argyris particularly discussed one problematic conversational pattern which inhibits learning. He labeled it 'defensive reasoning' on a cognitive level and 'defensive routines' on a behavioral one. "Defensive reasoning occurs when individuals make their premises and inferences tacit, then draw conclusions that cannot be tested except by the tenets of this tacit logic" (Argyris, 1994: 81). Other such negative patterns are, for example, destructive argumentation (Ellinor & Gerard, 1998), dichotomic reasoning (Tannen, 1999), or groupthink (Janis & Mann, 1977). To our knowledge, there are not many contributions that descriptively study such conversational patterns which in effect inhibit social knowledge processes. Mostly, authors define how conversations should be characterized (mainly through conversational principles and rules) and how to overcome "unwanted" conversational behavior.

In the following, we will give an overview of two ways to change unwanted conversational patterns that are currently being discussed in the literature: formal procedures and conversational rules.

The literature proposes the use of *formal procedures* to be an effective mean to become aware of conversational patterns and to actively shape the structure and mode of conversations (for an overview, see: Sunwolf & Seibold, 1999) Such formal procedures are, for example, devil's advocacy, idea writing, straw polls, dialectical inquiry, learning maps, or the lateral thinking approach. Formal procedures offer guidelines for structuring the conversation process and supporting groups in analytic and creative tasks and in reaching

agreements (Jarboe, 1996). Their use has various objectives, such as reducing social pressure, equalizing participation, promoting non-judgmental idea generation or fostering knowledge integration (Okhuysen & Eisenhardt, 2002; Sunwolf & Seibold, 1999). The term "formal procedure" is used to label a variety of – often combined – cognitive and interaction frameworks and techniques. A few formal procedures work with visual formats (e.g. cognitive maps, lotus blossom, fishbone diagrams) while others designate specific roles to certain conversation partners (e.g. devil's advocacy, external expert approach, role switching) (Sunwolf & Seibold, 1999). Certain procedures shape conversations "in action" while others are more reflective. The action oriented ones (e.g. dialectical inquiry, devil's advocacy) provide formats for overcoming conversational patterns, which are problematic in certain contexts. The aim of the use of brainstorming techniques, for example, is that conversers overcome conversational orientations like dichotomous arguing, a focus on status-quo solutions, the - too strong - urge to come to solutions, or the counterproductive criticism of the ideas of others. Reflective tools are intended to make people aware of their own (conversational) behavior. Examples are the "ladder of inference" or the 'left-hand column'. They foster direct reflection on certain conversational routines (Senge et al., 1994) and can be used to 'freeze' (Weick & Quinn, 1999) an interaction, to pause for a moment and raise awareness of the social processes occurring. This process of creating awareness is a first important step in changing conversational behavior (Argyris, 1990; Isaacs, 1999; Nelson & Winter, 1982; Topp, 2000). While *action*-oriented procedures have been analyzed mainly by scholars from the fields of group decision-making and group communication, *reflection*-oriented instruments have been of greater interest for researchers from the organizational learning domain.

Secondly, a change in conversational behavior can result from the introduction of explicit *conversational rules and principles*. In the following, we will review this second approach more extensively since, as we will show further on, it has been widely discussed in the literature and there exists, to our knowledge, no literature review on the matter. Besides formal procedures, many authors present a set of explicit *conversational principles and rules* as a way to change conversational behavior (Beer & Eisenstat, 2004; Gratton & Ghoshal, 2002; von Krogh et al., 2000). The idea pursued by these authors is that, with time, people substitute their implicit rules with explicit ones which they gradually interiorize until they become their new routines. Rules have the advantage of being easily memorable and through their "vividness also aid in focusing reflection" (Putnam, 1994: 261). Rules have the advantage not to structure conversations excessively (Bohm, 1996; Isaacs, 1999), but impose only a relatively loose structure that can be appropriated quite differ-

ently by the interacting group. As we have argued earlier on, the flexibility is a central characteristic of conversations and the means of their management should take this aspect into account. Conversational rules should always be enacted by conversation partners beyond a guideline-based behavior: they should link them to a certain spirit, as a spirit of appreciation or of collaboration (Barge & Oliver, 2003). At the same time, conversers should be cautious in applying rules across different contexts since what is a fruitful conversational behavior in one setting (e.g., assessing different options), can be inhibiting in another (e.g., creating new ideas). While fostering a positive attitude may be functional for conversations focused on change, this may be counterproductive for learning, argues Argyris: "in the name of positive thinking managers often censor what everyone needs to say and hear" (1994: 79). Von Krogh and Ross (1995) argue that strategic conversations should be guided by principles that radically differ from those of operational conversations. Rules thus always depend on the specific purpose attributed to the conversation (von Krogh et al., 1995). Specific rules are proposed for leading difficult conversations (Harkins, 1999), initiating change (Barge & Oliver, 2003), or stimulating group learning (Argyris, 1994). The probably most famous formulation of rules for leading conversations are the ones of Grice subsumed in his 'cooperative principle': "make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged" (Grice, 1975). Under this principle he discussed four maxims, one of quantity (give as much information as is required, and not more than is required), one of quality (do not say what is false or that for which you lack adequate evidence), one of relation (be relevant), and finally one of manner (be clear, orderly and avoid ambiguity). While we do not aim to present a reflection of Grice's cooperative principle (it has been widely discussed in the literature, both vigorously criticised and resolutely supported. For an overview, see: Lindblom, 2001), we limit ourselves to highlight one aspect, which is that Grice himself showed that these maxims are frequently not followed by conversation partners. The same is true for the conversational rules, which we are going to review in the following. "Breaks" in conversations are very frequent and, within these breaks, conversation partners continue to try to make sense of their interactions. Even if a communication is ambiguous and badly ordered, conversation partners try to make sense of it, yet, depending on the gravity of the "break" in the conversation, they are severely hampered in doing so. Below we review the rules discussed in the organizational literature, prescribe how conversations should be characterized in order to foster social knowledge processes such as knowledge integration. We structure the rules identified in the literature with the help of the previously discussed six dimensions of our management framework.

Table 3 gives an overview of the conversational rules that can be attributed to the *message* dimension. Some rules regard the form of how messages should be communicated, e.g. using humor (Eisenhardt et al., 2000) or visual support (Harkins, 1999), making hypothetical expositions and, in general, fostering innovative language (von Krogh et al., 2000). The two latter rules are important for developing new visions, looking at familiar issues from new angles and creating new knowledge. Other rules concern the content of the message, like the one that urges participants to distinguish between facts and opinions (Margerison, 1989).

Expansive Message Form (verbal & non-verbal)	
• foster innovative language and experiment with new words	(von Krogh et al., 2000)
• make hypothetical expositions	(von Krogh & Roos, 1995)
• use humor	(Eisenhardt et al., 2000)
• use visual support to gain focus	(Harkins, 1999)
• make clear statements by avoiding euphemisms and talking in circles	(Weeks, 2001)
• use a neutral and moderate tone (intonation, facial expressions, body language, type of language) in difficult and stressful conversations	(Weeks, 2001)
Fact-based, Prioritized, and Positioned Message Content	
• select topics that are broad, relevant and personally meaningful to participants	(Gratton & Ghoshal, 2002)
• focus on the issues that matter most	(Beer & Eisenstat, 2004)
• distinguish between facts and opinions	(Margerison, 1989)
• include data in a democratic way and remain close to it	(Argyris, 1996; Dixon, 1997; Quinn, 1996)
• distinguish between identifying problems and giving recommendations	(Beer & Eisenstat, 2004)
• allow a certain level of ambiguity in strategic conversations	(von Krogh & Roos, 1995)

Table 3: Conversational Principles and Rules Regarding the Message

On the *process dimension* (Table 4), certain rules concern the way a conversation should be structured as a whole, while others regard the individual interactions. Regarding the first aspect, the question is discussed of how strict and in what way conversations should be structured and planned. Bohm made the argument that the natural flow (and with it flexibility and openness) is the strength of conversations (1996). Various authors define clear phases for conversations including a phase that aims to ensure a common understanding of the issue, an analysis phase, a more creative phase where solutions are developed, an assessment phase, and a more operational phase where action plans are decided (Beer & Eisenstat, 2004; Harkins, 1999). These authors argue that conversations should include first a divergent phase, and then a convergent one. Since conversations in organizations often take place with great pressure of time, the divergent phase is often

missed out and people do not have the chance to develop new ideas, inquire into the subject more in depth, so that the organization's capacity to be innovative is lowered (Harkins, 1999).

Explicit Macro Conversation Structure	
• structure conversations in the following phases: analyze actual status - define fictitious, realizable objectives - elaborate main driving forces, root causes - draw out possible solutions - define action plan	(Barge & Oliver, 2003; Beer & Eisenstat, 2004; Harkins, 1999; Manning, 2002)
• structure the conversation in time by including converging and diverging phases	(Beer & Eisenstat, 2004; Harkins, 1999)
• plan the agenda	(Ross, 1994)
• convert generalities to specifics and migrate from specific issues to general principles	(Margerison, 1989)
• start the conversation as broadly as possible	(Topp, 2000)
• edit conversations appropriately, make incisions to crystallize main concepts	(von Krogh et al., 2000)
• make very specific proposals for changing communicative behavior	(Ford & Ford, 1995)
Balanced and Well-paced Micro Interaction Processes	
• alternate the contributions of the various participants in balanced ways to actively encourage participation and collaboration	(Barge & Oliver, 2003; Beer & Eisenstat, 2004; Dixon, 1997; Eisenhardt et al., 2000; Ellinor & Gerard, 1998; von Krogh et al., 2000)
• let it be continuous and speak when the spirit moves you	(Ellinor & Gerard, 1998; von Krogh & Roos, 1995)
• always link new statements to the previous contribution	(Topp, 2000)
• do not rush but allow silence between phrases	(Ellinor & Gerard, 1998; Isaacs, 1999; Topp, 2000)
• engage in effective and deep listening (listen to whole phrases, rephrase, etc.) without resistance to ensure common understanding	(Ellinor & Gerard, 1998; Harkins, 1999; Isaacs, 1999; McCambridge, 2003; Ross, 1994; Topp, 2000)
• alternate talking with writing down individually in order to lay out differences and make possible constraints explicit	(Beer & Eisenstat, 2004)

Table 4: Conversational Principles and Rules Regarding the Conversational Process

With regard to micro interaction processes, authors mention that the various messages should be connected explicitly (Topp, 2000) and that there should be pauses and silence between the single contributions (Isaacs, 1999; Topp, 2000). Moments of silence are important to calm down frenetic or aggressive discussions and to allow participants to reflect upon assumptions, arguments or emotions (Ellinor & Gerard, 1998). Another rule

states that the contributions of the various interlocutors should be balanced so that various perspectives can be considered (Ellinor et al., 1998) and knowledge is shared. This rule of the process dimension directly refers to an underlying dimension, that of group dynamics (actively sharing responsibility and leadership to encourage participation and collaboration (Ellinor et al., 1998)).

Authentic Content Conflict	
• maintain a healthy level of content conflict over issues and be hesitant to interpret a critique on an issue as an personal attack	(Argyris & Schon, 1978; Eisenhardt et al., 2000)
• speak with one's own voice and listen to oneself	(Isaacs, 1999)
Moderate Relationship Conflict	
• manage interpersonal conflict by focusing on facts and multiplying alternatives to enrich the level of debate	(Eisenhardt et al., 2000)
• disarm attacks by restating and clarifying intentions	(Weeks, 2001)
• lead personal talks to establish trust and empathy and to clarify relational aspects	(Gratton & Ghoshal, 2002)
• legitimize emotions	(Gratton & Ghoshal, 2002)
Balanced Formal and Informal Power Structures	
• balance power structures by leaving power fluid and defining roles dynamically	(Ellinor & Gerard, 1998) (von Krogh & Roos, 1995)
• suspend roles and status or pick them as a theme if they exert too much influence on the conversation	(Argyris, 1996; Bohm, 1996; Ellinor & Gerard, 1998; Senge, 1990a)
• actively share responsibility and leadership (by speaking to the group and creating common goals) to encourage participation and collaboration	(Ellinor & Gerard, 1998)
• become aware of games and tactics and name them in order to neutralize them	(Topp, 2000; Weeks, 2001)
• honor your partner by acknowledging responsibility	(Weeks, 2001)

Table 5: Conversational Principles and Rules Regarding Group Dynamics

The rules that regard the *group dynamics* of conversations (Table 5) aim to give answers to the question of how the participants of a conversation can deal with relational issues so that these do not inhibit the group from completing its task successfully or integrating knowledge. Various authors suggest that it is necessary to be able to address interpersonal issues and lead emotional talks in order to create an atmosphere of trust (Argyris, 1996; Bohm, 1996; Gratton & Ghoshal, 2002). In conversations in organizational settings, participants have different functional and hierarchical roles and a narrow understanding of one's responsibility (or a sense of inferiority) might impede conversers to participate equally, challenge ideas, propose alternatives or share knowledge effectively (Dixon, 1997). Therefore, various rules propose means to deal with power structures (e.g. suspend roles or

status and balance power structures) (Argyris, 1996; Bohm, 1996; Eisenhardt et al., 2000; Ellinor & Gerard, 1998; Senge et al., 1994).

Balance between (Playful & Analytic) Discovering and Focusing	
• uncover underlying assumptions and unfold the invisible patterned reality	(Bohm, 1996; Isaacs, 1993, 1999; Quinn, 1996)
• balance inquiry and advocacy (Engage in advocacy by providing data, and explaining your reasoning. Engage in inquiry by slowing down the speed, reframing, open up for new solutions, asking for the person's observable data and reasoning, and by asking yourself what led you to a specific view)	(Argyris, 1996; Beer & Eisenstat, 2004; Dixon, 1997; Ellinor & Gerard, 1998; Harkins, 1999; Ross, 1994)
• release the need for specific outcomes and leave room for exploration, imagination, and learning	(Bohm, 1996; Ellinor & Gerard, 1998; Quinn, 1996)
• institutionalize doubt, vigorous, disciplined questioning and big, broad questions	(Gratton & Ghoshal, 2002)
Suspended Immediate Judgments and Emotional Reactions	
• suspend assumptions, certainties and your judgment, acknowledge that they don't have to be out of necessity and actively engage in reframing problems and issues	(Bohm, 1996; Dixon, 1997; Isaacs, 1993, 1999; Senge, 1990a)
• suspend and observe your immediate reactions (e.g. anger)	(Bohm, 1996; Topp, 2000)
Interrelated Statements & Viewpoints	
• do not polarize viewpoints, but explore and respect differences and look for their interconnections and the shared meaning (systemic thinking) also by putting yourself in the other person's shoes	(Bohm, 1996; Dixon, 1997; Ellinor & Gerard, 1998; Isaacs, 1993, 1999; Putnam, 1994; Ross, 1994; Senge et al., 1994; Topp, 2000)
• develop a shared meaning and seek (but not force) consensus with qualification	(Dixon, 1997; Eisenhardt et al., 2000; McCambridge, 2003)
• think of the dynamic nature of things	(Isaacs, 1999)
Affirming Options	
• develop an affirmative and generative competence and think in positive possibilities and solutions rather than problems	(Barge & Oliver, 2003; Topp, 2000)

Table 6: Conversational Principles and Rules Regarding Mental Models

The rules and principles regarding the *mental model* dimension (Table 6) aim to create awareness about the role of our inference processes. They allow us to develop a critical capacity towards the way we make messages meaningful. If such processes remain hidden, then participants continue to misunderstand each other, fall back into the same paradigms, and are incapable of seeing interconnections between various perspectives. For this reason, one central rule of the mental model dimension is to uncover underlying assumptions and to unfold the invisible patterned reality (analytic exploring) (Argyris, 1996). In a second step, the conversers learn to suspend and question their assumptions, certainties and judg-

ments (Bohm, 1996; Isaacs, 1993, 1999; Senge, 1992). The argument is not that certain
mental models are wrong and have to be changed, but that some are more suited to achieve a certain goal than others. Problematic patterns for social knowledge processes are dichotomic reasoning, polarizing viewpoints, defensive routines (Argyris, 1996), problemoriented thinking (Barge & Oliver, 2003) or the focus on advocating (Ellinor & Gerard, 1998; Harkins, 1999; Ross, 1994).

To overcome these problematic patterns, participants should, on the one hand, engage in systemic thinking and relate diverging statements and viewpoints. Systemic thinking (Bohm, 1996) is important to see the interconnectedness between various aspects or points of view and to discover the complexity of certain issues. It therefore leads to conversations that are less aggressive because they are not oriented on either-or thinking and therefore on winners and losers. Secondly, conversers should balance inquiry and advocacy, i.e. balance discovering and focusing, encouragement and criticism. This implies that one has to inquire further into new alternatives, explore the standpoint of others, and inquire into one's own viewpoints (its reasons, implications, etc.). The aim is to see the connections between viewpoints. In this way, diverging opinions are put forward so that new ideas can emerge (Dixon, 1997).

The rules regarding the conversational intent of a conversation (Table 7) mainly originate from authors from the field of organizational learning who distinguish general goals that any conversation should achieve, and specific, context-related goals. Bohm argues that the final goal of dialogue is to enhance learning, innovation and understanding, which is why the conversational intent has to leave room for unforeseen outcomes (Bohm, 1996). Harkins states that a conversation should always include three general objectives: advancing the agenda, creating shared learning, and creating stronger relationships (Harkins, 1999). Harkins thus not only points out the learning aspect of conversations, but also their emotional and relational function.

With regard to the conversational intent of a specific conversation, two authors point out that the conversers have to share their individual objectives, or at least clarify the common objectives that are pursued by the conversation (Bohm, 1996; Ross, 1994). To reveal one's own intentions seems to be a rather difficult requirement (Wittenbaum et al., 2004). It seems more productive to define clear common objectives than just individual ones. In this context, Eisenhardt, Katwajy, and Bourgeois refer to the fact that working out shared objectives is important for the group in order to create a collective vision and not

see the conversation as a simple exchange of individual interests where some win and the others lose (Eisenhardt et al., 2000).

Explicit Individual Goals of the Particular Conversation	
• pay attention to your intentions and make sure that the intentions of the various participants are shared by the conversing group	(Bohm, 1996; Ross, 1994)
Shared Aim of Conversations for the Co-Creation of Meaning	
• define common objectives and a shared vision to be pursued jointly	(Eisenhardt et al., 2000)
• do not define the conversational intent too narrowly, but leave space for unforeseen outcomes. Thus, let the intention of a conversation be threefold: advancing the agenda, creating shared learning, and creating stronger relationships	(Ellinor & Gerard, 1998; Harkins, 1999)

Table 7: Conversational Principles and Rules Regarding the Conversational Intent

Finally, various authors discuss rules that regard the context of conversation i.e. the situation in which the conversation takes place (Table 8). Some rules concern the constellation of participants. Together, the conversers should bring in the necessary knowledge to effectively address the issues at hand. Certain authors see a great advantage in including a facilitator who leads the conversation, but who always backs out of this leading position and does not impose an artificial hierarchy. Next to people, the physical space in which the conversation takes place plays an important role. Suggestions range from arranging participants in a circle to organizing the meeting in a location outside the organization's walls. Harkins suggests that in doing the latter, in closing the doors on the everyday context, the conversers will open up and have a more distant, external view of the issue (Harkins, 1999). Another important set of rules regards the general conversational etiquette and the conversational culture in which the conversation takes place. Other aspects of the context, such as general organizational values, are rarely considered in the literature on conversations and would merit further research attention.

Assorted People & Roles	
• ensure that relevant information and individuals are present at the conversation, e.g. involve generalists	(Gratton & Ghoshal, 2002; von Krogh & Roos, 1995)
• assign a 'facilitator' who 'holds the context' of dialogue	(Senge, 1990a)
Allocated Time and Conversation Formats	
• create time and space for (emotive) conversations	(Gratton & Ghoshal, 2002)
Supporting Space	
• choose and arrange the physical space of a conversation so as to facilitate a certain type of conversation (sitting in circles, blocking out interruptions, holding meetings outside the walls of the organization, etc.)	(Bohm, 1996; Harkins, 1999)

Shared Conversational Culture

• establish a conversational etiquette and communicate it at the beginning of a meeting	(Beer & Eisenstat, 2004; Gratton & Ghoshal, 2002; von Krogh et al., 2000)
• make the type of conversation (e.g. strategic conversations) explicit	(von Krogh & Roos, 1995)
• create a safe haven for participants by making openness and trust the rule rather than the exception and by encouraging and rewarding the injection of new perspectives	(Ross, 1994)

**Table 8: Conversational Principles and Rules Regarding the Outer Context of
Conversations**

4.4 A Framework for Conversation Management

We have argued for the centrality of conversations for social knowledge processes such as knowledge integration and for a communicational approach towards issues of knowledge management. Members of an organization often engage in sense making during conversations and it is through this communicational form that they share, create, and integrate knowledge. Yet, conversations are often characterized by routines that inhibit the integration of knowledge. Given the crucial role of conversations, but being aware of the challenges related to this form of communication, we have argued for the active management of conversations from a knowledge perspective. In order to develop such an approach, we have viewed at the literature on co-located conversations within the organizational context that stress aspects of learning, sense-making, and knowing. In particular, we have reviewed research on conversations from the fields of knowledge management, organizational learning, decision making, and change management. We have found that most of this research is prescriptive in nature and lacks a strong empirical base (with the exception of the studies in the field of decision making). While such empirical evidence is provided outside the organizational domain a stronger integration of this literature is needed. Studies on ethnomethodology, for example, which engage in conversation analysis (e.g. Schegloff, 1987), are certainly of great relevance for the study of conversations from a knowledge perspective. Next to the integration of studies conducted outside the organizational domain, future scientific contributions need to conduct more empirical research to study micro-conversational dynamics from a knowledge perspective. Feasible research methods for this endeavour are conversation analysis, ethnographic studies, action research, participatory observation, or other research approaches that are also highly immersive, focused on language, and generally context-rich.

Referring to general communication theory, we have proposed a framework with six dimensions along which conversations can be managed from a knowledge perspective. These dimensions are the message, the conversation process, the conversational intent, group dynamics, mental models, and the outer context. Conversers contemporaneously draw on each of these dimensions when making sense of and within an interaction. Each of these dimensions can be shaped more or less directly (from message to mental model). We have presented two specific means of managing conversations: formal procedures and conversational rules and have provided a more thorough review of the latter. While many reviewed studies outlined one single rule, we have tried to present a more systematic picture and 1. showed on which level of the communication these rules act (e.g. on the message dimension) 2. provided a structure (the framework) thanks to which the interconnections between the various rules becomes apparent.

Figure 6 is an integrative result of this work and presents a prescriptive framework for the management of conversations. It ties the six dimensions of the management of conversations to the conversational rules that prescriptively define how conversations should be characterized to allow for the integration of knowledge among conversation partners.
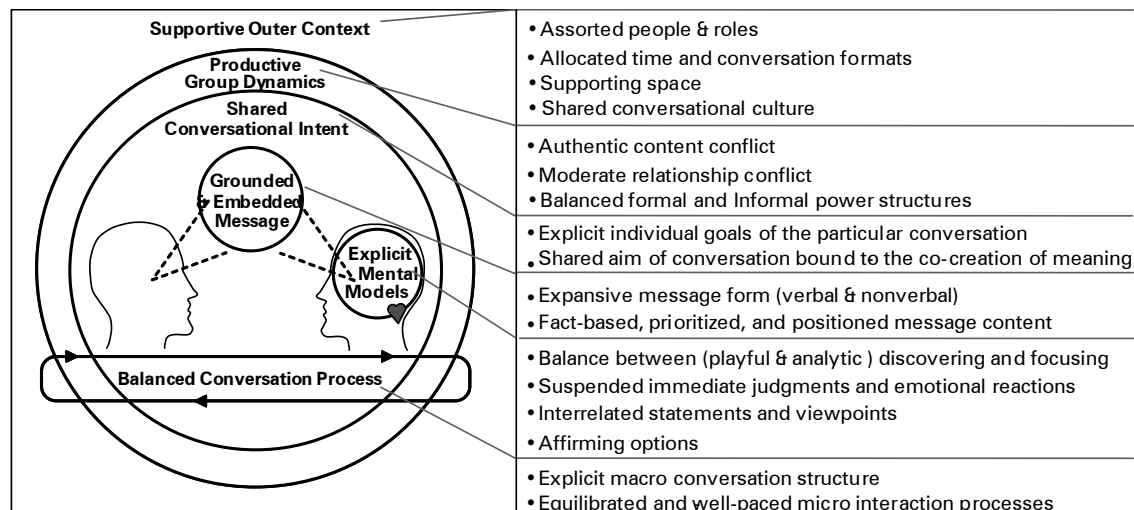
Figure 6: A Framework for the Management of Conversations in Organizations from a Knowledge Perspective

In view of the discussed advantages (e.g. they impose a relatively loose structure, they are easy to recall) and drawbacks (e.g. a guide-line based behavior has to be combined with a certain spirit) of conversational rules, we believe that future research should also investigate other means of improving the quality of conversations. Such alternative means are important for conversers to acquire and interiorize effective conversational behavior as

defined by the various conversational rules. An example with a focus on training is McCambridge's study on the use of film extracts to teach conversational behavior (McCambridge, 2003). Augmenting conversations with interactive, real-time visualization software provides another interesting alternative. In particular, applications that are based on interactive, content-specific visuals (Weinberger & Mandl, 2003) or on visual metaphors (Haber et al., 1994) seem promising from a knowledge perspective. Not only do they foster reflection on one's own conversational routines, or invite conversers to try out alternative conversational patterns, they also provide an additional language (visual semantics and syntax) to enrich sense-making.

Another implication regards the context of conversation research. Here, we see two developments: first, integrating the research on conversations in organizations in general, and, secondly, developing differentiated approaches to conversations, based on their specific application contexts (ranging from change discussions to strategic conversations).

Regarding the first aspect, we have highlighted the fact that there is a need for more integrative research on conversations in organizations. An integrated approach is necessary to better understand the central role of conversations in organizations. A first step towards the development of such an integrated approach is the prescriptive framework we have presented (although it clearly focuses on the potential of conversations to enable knowledge creation and transfer). An integrative approach can be further advanced by linking the definition of high-quality conversations with tools (e.g. formal interventions, software supported visual tools, work with film excerpts) to acquire and internalize the desired conversational behavior. An integrated approach to the management of conversations has to emphasize three major aspects: First, it has to outline the various functions of conversations and the various intents that can be pursued by conversations. Secondly, it has to show which conversational behavior is favorable in which context and to outline methods through which problematic conversational patterns can be uncovered. In fact, in the previous review of the conversational rules as they are discussed in the literature, we did not single out clearly which communicative behavior is favorable for knowledge creation, which for knowledge sharing, and which for the application of knowledge. In part, this was due to our focus on knowledge integration, where specialized knowledge is not only shared, but new insights are developed in this co-construction of knowledge and where the developed group knowledge has to be applied in decision making. Upcoming research should show more precision with regard to the type of knowledge process that aims to be fostered. Finally, it has to define a whole set of means that will allow conversers to change

their conversational routines and internalize the conversational behavior that is prescribed by conversational rules. These means have to differ in their modes (playful versus analytic, reflective versus active) and in the degree to which they structure and interfere with the conversation (providing a loose structure vs. a rigid structure). Such an integrative approach can drive micro-interaction patterns that foster sense-making and the co-construction of knowledge.

The term 'conversation management' seems adequate for this kind of systematic, balanced and differentiated approach to conversations and gives a voice to the increasing awareness of the fundamental importance of conversations for organizational life.

5   Section Summary

This chapter has aimed at outlining a conceptual panorama within which the communication and integration of knowledge between experts and decision makers can be studied. In a first moment, we have cast light on the *process of knowledge integration* and have argued that the expert - decision maker situation, in which there exists a concomitant need for specialization and collaboration, has to be conceived as a situation of "knowledge integration" and not as one of "knowledge transfer". By referring to social constructivism (Berger & Luckmann, 1966) and in view of our object of study, we have then proposed to conceive knowledge integration from a *communication perspective* and have defined knowledge integration as the communication process by which people with differing specialized knowledge (i.e. skills, perspectives, priorities, experiences) engage in joint sense making and deliberation to co-create new and shared meanings and to embed this interpersonal knowledge in decision making. From this definition followed that we understand knowledge integration as *a two-phase process* where first, the individual specialized knowledge has to be co-constructed on a group level and then, in a second phase, this social knowledge has to be applied in decision making.

After a brief clarification of the expert - decision maker situation, we have built on the idea that knowledge integration is a two-phase process and have aimed at developing more precision in what could be a communication perspective on social knowledge processes. We have proposed a process model for the knowledge communication between experts and decision makers. For each phase of the model, we have discussed challenges, such as the ASK-problem (Belkin et al., 1982) in the 'need articulation' phase, or the knowing-doing gap (Pfeffer & Sutton, 1999) in the 'conveying insights, suggestions, & solutions'

phase. In the discussion of the model, we have put particular emphasis on the cyclical nature (feed-forward and feedback loops) of the knowledge communication process.

Arguing that co-located face-to-face conversations represent a major mean how experts and decision makers attempt to integrate their specialized knowledge in decision making, we have reviewed the literature on conversations in organizations and have particularly focused on contributions that adopted a knowledge perspective. From there we have developed a framework for the management of conversations from a knowledge perspective.

On the basis of this interdisciplinary background – involving literature from the domains of knowledge management, sense-making, communication and decision making – and with two conceptual frameworks at hand, we have the possibility, in the next chapter, to review the empirical material of the three case studies with the help of multiple structures. We thereby follow the idea of Minsky who argued that in order to understand an issue, it is necessary to switch perspectives and to try to understand it in more than one way (Minsky, 1986).

Chapter 3

Three Theory Building Case Studies

Outline

1 The Scope of Building Theory from Case Studies

This chapter addresses the basic questions of this study: how does the knowledge communication between experts and decision makers unfold? By which communicative challenges is the knowledge integration in the decision making process challenged and what practices have experts and decision makers in place to overcome these challenges? What roles thereby have face-to-face conversations and collaborative visualization in overcoming these challenges?

To find answers to these questions, we studied the process of knowledge communication and integration in three contexts.

1. the senior scholars of The Brookings Institution (a major U.S. Think Tank) and the policy makers of the U.S. Senate,

2. the consultants of pom+ (a consultancy specialized in construction, facility, and portfolio management) and their clients,

3. the IT specialists of InSure[7] (a European leader in the insurance market) and the managers of InSure's business line

The single cases can be found in the Appendices 1, 3, 5 and we will only present the cross-case analysis in the body of this thesis. In this way, we believe that the argumentation will be more stringent. Yet, the richness of qualitative case study research lives from thick contextual descriptions; this is why we warmly invite the reader to consult the long recounts in the appendices.

We develop the discussion around the three questions raised above. We first aim to see whether the process model of the knowledge communication provided in Chapter 2 provides an accurate structure for the description of the interaction between experts and decision makers in the various contexts. We discuss these challenges and practices specific to the single phases of the knowledge communication process, which are common to the three cases. We then present more general, phase-independent challenges and practices and structure them around the framework presented in Chapter 2. The two conceptual lenses help us switch perspectives in analyzing knowledge communication in more than

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7 For privacy reasons, we omit the name of the corporation, as well as the characteristics that make its identification definite.

one way (Minsky, 1986) and are conductive to a fruitful engagement in theory-building (Eisenhardt, 1989).

2   Methods

The research design sets up qualitative analysis of three explorative cases of knowledge integration. The unit of analysis is the knowledge integration process. The focus within this process is on the expert aiming to convey his expertise, although we do not completely exclude the perspective of the decision maker[8].

Multiple case design (Yin, 2003) provides rich contextual data and at the same time allows for analyzing patterns across the single cases in order to engage in a theory building activity (Eisenhardt, 1989). The approach includes both within-case analysis and cross-case analysis and the aim is to engage in mid-range theorizing, as proposed by Eisenhardt: "Overall, the idea behind these cross-case searching tactics is to force investigators to go beyond initial impressions, especially through the use of structured and diverse lenses on the data." (Eisenhardt, 1989: 541). Developing theories out of multiple case studies stands for the idea that researchers can gain novel, testable, and empirically valid theories by the continuous and systematic comparison of evidence first within and then across "real-life" contexts (Eisenhardt, 1989; Yin, 2003; Yin, 2004). In its pure form, such an approach is inductive in nature and does not rely on existing literature or previous empirical evidence. It is most appropriate when little is known about a phenomenon or when current perspectives seem inadequate (Eisenhardt, 1989: 548). While we have proceeded very inductively for the collection of the data, during the analysis we have drawn in literature from various domains and have structured the data according to the two conceptual frameworks presented in Chapter 2. These frameworks mainly have helped us to engage in theorizing on knowledge integration from a communicative perspective.

A second argument for the case study method refers to the type of questions we aim to answer. Yin argues that while, for example, the survey method is suited to answer who, what, where, and how much questions, case studies are apt to answer how or why questions (Yin, 2003: 5). With this research, we aim to understand "how" the communication between experts and decision makers is characterized and "how" important face-to-face conversations and interactive visualization in this interaction are. More basically, we aim

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8 This choice is in part due to pragmatic reasons as access to decision makers was much more difficult.

to understand why it is that even if both communication partners are interested and motivated in sharing, developing, and integrating knowledge, these knowledge processes remain challenging[9].

Finally, a multiple case study design leads to findings with a stronger external validity (Leonard-Barton, 1990). If we find, in spite of the variations in the contexts of the case studies, similar communicative challenges or practices, similar communicative processes, and similar roles attributed to conversations within the knowledge communication between experts and decision, we can be slightly more confident in the robustness of our findings.

2.1 Sampling

The three cases were carried out as part of a larger study dealing with the knowledge-intensive communication between experts and decision makers. Within the scope of this research program, we conducted a total of ten case studies by using theoretical sampling, which means that we have stopped adding cases when the learning from case to case decreased (Glaser & Strauss, 1967)[10].

We have chosen to report three cases because their contextual settings allow us to have an interesting mix of communalities and differences in order to search for recurring challenges and practices of the knowledge communication process across the contextual settings of the singular case. Yin (2003) argues that variety favors both comparison and contrast and therewith facilitates the identification of meaningful patterns. Table 9 outlines the main contextual similarities and differences of the knowledge integration situation between the cases studied.

For the theoretical sampling (Glaser, 1998), we aimed to vary the industry, organizational, and institutional contexts in which the knowledge integration process takes place (see: Table 9). Different are also the knowledge domains, in which the experts are specialized. We also looked for variance in terms of how the knowledge integration process is initiated; either by a unique, explicit, and specific request by the decision maker, by an institutionalized general mandate, or by no mandate at all. Depending on these situations, knowledge tends to be either pulled by decision makers or pushed by experts. The idea

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9 In the knowledge management literature it is frequently argued that a major reason why employees are reluctant to share knowledge is because of organizational structures and processes that do not motivate them to do so (Osterloh & Frey, 2000).

10 For a detailed documentation on all the case studies, see: www.knowledge-integration.org

behind including these different types of variances is that if we are to observe similar communicative challenges across these various contexts, we can be more certain that the challenges are not due to these contextual elements, but bound to aspects, more intrinsically related to the knowledge integration situation.

Similarities between the cases	Differences between the cases

Expert – decision maker situation:
• Presence of domain experts and decision makers. Both parties have clearly attributed functional roles
• There is not a sole decision maker, but decision making is always collegial among various decision makers
	Expert – decision maker situation:
	• Area of expertise of the experts (e.g. financial expertise, economic expertise, process expertise)
	• Initiation of relationship between experts and decision makers and organizational bonding:
	  1) initiation by decision makers who actively call in experts and commission a concrete unique service (no institutional bond) (pom+)
	  2) initiation by experts who try to "push" their knowledge and gain the attention of decision makers (no institutional bond) (Brookings)
	  3) enduring, general assignment from decision makers in the realm of which concrete requests can be formulated (strong organizational bond) (InSure)

Decision type: • Decisions to take by decision makers are complex, involve in-depth expertise of various interconnected domains, involve considerable risks and take place in dynamic environments • The decision is of a nature so that decision makers would be in considerable difficulties if they were to take their decisions without calling in experts on the issues tangent to the decision • The need for taking a decision does not arise within a classical crisis situation (low probability, high consequence)	**Decision type:** • Strategic impact of decisions: Corporate (pom+), national, political strategies (Brookings), functional strategies (InSure)
Context of decision and knowledge integration: • Dynamic, uncertain, and ambiguous environments	**Context of decision and knowledge integration:** • Organizational context: Size of organization and geographical reach • Institutional context, in which knowledge integration is taking place: inter-organizational (Brookings, pom+) inter-functional departments (InSure) • Industry and market as well as sector (public vs. private) in which knowledge integration is taking place

Table 9: Contextual Similarities and Differences between the Case Studies (Sampling Choices)

While allowing for all these variations, cases have a set of similarities. First and foremost, cases are akin with regard to the fact that experts and decision makers can be easily identified and that there is a clear functional difference between the two roles (see: Chapter 2, on the expert-decision maker distinction). Experts are not empowered to take

decisions conjointly with decision makers; their role is limited to counseling. Equal to all cases is also that decision contexts are complex and are often characterized by ambiguity, extensive dynamism, inconsistencies, and the fuzziness of reality (March, 1994). In other words, decisions are subject to considerable complexity and decision makers feel a great need to draw on the advice and evaluations of domain experts. Finally, it is true for all the cases we studied that decisions are not taken by a single decision maker, but by a collegiality of decision makers.

2.2 Data Sources

For each case study, we have worked with multiple data collection methods (Eisenhardt, 1989). First, we have visited the organizations to conduct *semi-structured interviews* mainly with experts, but also with some decision makers. In total, we have conducted 32 face-to-face-interviews (10 for pom+, 14 for InSure, and 8 for Brookings) each of which lasting on average 45 minutes (a list of the interview partners can be found in Appendices 2, 4, and 6). In the case of Brookings, we merely interviewed their senior scholars and not the policy makers at the Senate. In the case of pom+, we have only interviewed the consultants themselves and did not have the chance to interview their clients (which represent the decision makers of this case). Finally, at InSure, we have interviewed IT-technicians (four) and IT managers (ten), but there too, we were unable to interview the managers from the business line. In doing so, we clearly have an expert bias and the focus is on the practices and challenges involved in the communication of their expertise to the decision maker.

The interviews were structured in three main parts: a first introductive part aimed at better understanding the context of the interviewee and the organization. Questions addressed – among others - the function of the interviewee within the organization, his/her educational and professional background, his/her areas of expertise and the types of decisions part of his/her responsibility, the organizational context of his/her work, and the role of his/her organization/department/team in the interaction with a specific instance of decision makers. The second set of questions aimed at gaining insight into the process of interaction between experts and decision makers. We asked how the interaction took place in time, what form it had at which stage of the interaction or for what type of content which media was preferred (media choice). We also asked what role the different communication forms played (oral communication, written communication, visual communication, metaphoric communication). The third part of the interviews was the most substan-

tial one and dealt with the particular challenges and practices characteristic for the knowledge-intensive interaction between the experts and decision makers. We asked, for example, which concrete measures they put in place to improve the knowledge communication with the decision makers.

All interviews were audio-taped and transcribed word-by-word. In addition, we took notes right after the set of interviews, documenting what had attracted our particular attention and what we wanted to ask differently or ask additionally in the next interviews. As we sometimes had a large amount of interviews within one day, we did not always manage to transcribe them within a 24-hour timeframe, as proposed by Eisenhardt (1989a) and Yin (2003).

To complement the interview data, we did a qualitative analysis of additional communication documents ranging from annual reports, newsletters, presentations, brochures, articles, working reports, printed products, media guides, and also the organizations' websites. This documented communication material helped us mainly to study the organization and structure of information items, as well as the visualizations that the experts used.

For one case, pom+, we further held a half-day seminar and later an interactive workshop with all the employees of the organization. These interactive sessions were useful to check our own understanding and interpretations of the collected data, whether they reflected the ideas of the interviewees, whether they were representative, or whether we missed important aspects. Between these very interactive contacts, a collaborative email exchange helped to verify our understanding and to receive the additional information we needed.

2.3 Data Analysis

We recursively coded the transcriptions of the interviews. In part, we used open coding (Glaser, 1998) and added tags with comments or categories to the single quotes. In other instances, we coded more theoretically (Glaser, 1998), for example, when attributing certain quotes to the phase model of knowledge communication or to the framework for conversation management we had in mind (see: Chapter 2). We used tables (Miles & Huberman, 1984) to further structure coding categories. For example, we made tables of the challenges and practices in the knowledge communication and documented in extra-rows, to which phase of the knowledge communication model a specific challenge referred, or in relation to which other challenge it was mentioned. After a first analytic

work, we wrote teaching cases, as suggested by Eisenhardt (1989a), which helped us, in their more directive style, to understand the specifics of each case (see: www.knowledge-communication.org). We then wrote detailed single research cases, each case around 60 pages long and used the same structure for all three cases.

For the cross-case analysis, we compared the phase-specific and unspecific challenges and practices of knowledge communication, which had emerged in the single cases and which we had structured along the phase model for knowledge communication and the conversation management framework. The aim was to see whether there are communicative challenges or practices that are recurrent even if the organizational and institutional context of knowledge communication quite radically changes. Finally, we compared the various roles of conversations and visualizations in the three contexts. After various iterations between the data of the cases and the emerging categories, we compared the results with the existing literature, which helped us to further structure and integrate the findings.

3 Overview on the Three Contexts of Knowledge Communication

Table 10 provides an overview on the three organizations.

	The Brookings Institution	**Pom+**	**InSure**
Description of Organization	One of the oldest "think tanks" of the United States: functions as an independent research organization that offers policy makers practical recommendations for dealing with current and emerging policy challenges.	A medium-sized consultancy, offering specialized consulting services in the fields of portfolio, facility, and construction management.	A large insurance company that is part of a worldwide leading financial services company. Offers insurance products in the life and pensions (e.g. retirement pension, life and disability insurance) and non-life segment (e.g. motor vehicle, property, fire).
Number of Employees	281	38	20'000 (200 employees within IT)
Geographical Reach	national (partly international)	Inter-regional	worldwide
Knowledge Integration Situation	*Inter-organizational:* Scholars provide recommendations and expertise to policy makers for up-to-date policy issues and in-depth analysis and conceptualizations of larger policy issues in order to nurture the U.S. policy making process	*Inter-organizational:* Consultants assist clients with expertise, evaluations, specific proposals in real estate portfolio decisions as well as construction and facility management decisions	*Inter-functional:* Specialists of IT department provide managers of business line with as-is analysis of today's IT system and with feasible proposals for IT application changes in order to assure that the IT-applications will optimally support business processes
Expert/ Decision Mker	– *Experts:* academically trained scholars (PhD),	– *Experts:* senior and junior consultants of pom+	– *Experts:* IT technicians with professional educa-

	with government experience and expertise not only in one, but several policy fields. – *Decision Makers:* large and heterogeneous group formed by representatives of the house, senators, committees, and congressional staff. In part specialized in particular policy areas, but knowledgeable in various policy fields.	mostly with technical degree at university, specialized in facility-, portfolio, and construction management, but with transversal (methodological) knowledge – *Decision Makers:* clients of pom+ (for ex. from public sector or from construction, financial, logistic), contact person typically is project manager, head of internal services department, has limited knowledge on facility-, portfolio, and construction management	tion in informatics. Do programming of software applications. – *Experts/Decision makers:* IT managers (team leaders, section leaders, IT department head) usually with double university degree in informatics and business administration – *Decision Makers:* managers such as team or project managers of the insurance's business line, knowledge in business processes, finance, and insurance
Main Communication Modes*	• internet • testimonies at congressional hearings • policy briefs • books	• workshops, seminars • interviews • daily work interactions • project presentations • project reports • Email	• formal and informal co-located meetings • workshops • reports such as business concept, technical requirements • phone calls • Email
Type of Relationship	Information is pushed by the expert and only occasionally required by decision makers (e.g. congressional testimonies) Long-term, occasional, formal, non-institutional, individual members of the organization	Information is pulled by decision makers Mid-term, frequent, fairly informal, non-institutional, team	Information is mostly pulled by decision makers, yet occasionally pushed by experts Long-term, frequent, informal, institutional, team
Macro/micro perspective	Macro	Macro and micro	macro and micro

Table 10: Overview on the Three Organizations Studied
                    * labelled in order of importance

3.1 The Brookings Institution

The Brookings Institution was founded in 1927 as one of the first think tanks of the United States. It conducts policy relevant research and provides advisory services to government, in particular to members of the U.S. Congress. It is a progenitor of a first generation of think tanks, that are mainly privately funded, have a strong commitment to academic research and, rather than contributing to policy enactment and doing policy evaluation, aim to frame the political discourse and to develop the political agenda (Weaver, 1989).

Brookings' activities fall into four main research programs (Foreign Policy, Governance Studies, Economic Studies, and Metropolitan Policy). It is engaged in over 40 re-

search projects and holds 9 policy centers, many of which are joint-ventures with other institutions. Its mission is formulated as follows:

> "Brookings is an independent, non partisan research organization (that) seeks to improve the quality of U.S. public policies. It addresses current and emerging policy challenges and offers practical recommendations for dealing with them, expressed in language that is accessible to policymakers and the general public alike." (Brookings Institution, 2005a)

Its founding values – non-partisanship and thorough scholarship – are combined with newer commitments such as timeliness, practicality and comprehensibility. Brookings sees its role not only in (1) building scientific, policy relevant knowledge by conducting research (proposing policy alternatives), but also in (2) effectively communicating these insights to policy makers, (3) convening political parties, and in (4) translating insights from the scientific to the policy world (working out the practical implications of theoretical ideas).

The *expert – decision maker situation* is represented by, on the one hand, Brookings' scholars and, on the other, policy makers of the U.S. Congress (representatives, senators, committees, staffers).

The *scholars of Brookings* are all academically trained in well-known universities and most of them have a PhD in Economics or Political Science. In addition, many scholars have important prior experience in government. Alice Rivlin, for example, is a senior scholar at Brookings, who spent about a third of her career working for the think tank, a small part in academia and about half of it in government (for example as Vice Chair of the Federal Reserve Board (1996-99) or as the founding director of the Congressional Budget Office (1975-1983).

The *policy makers* are quite a fragmented group in the Congress of the United States (McGann & Weaver, 2000: 15) and are formed by the 435 representatives of the house and the 100 senators, and also by the thousands staffers of Congress. The representatives of the House and the senators form the legislative body of the United States (lower and upper house). They have the power, among others, to initiate revenue bills, impeach officials, and elect the president in electoral college deadlocks. Congressional staff assists members of Congress (e.g. by evaluating the outcome of legislative proposals, making recommendations regarding particular issues) and are often trained economists and specialized in specific policy areas (Capitol Advantage, 2005). Other important targets of Brookings' communication are the media, academia, and the general public. All these au-

diences can be the source of a new policy or can influence, at least indirectly, policy makers and the policy making process.

To a large part, Brookings *pushes* its findings and recommendations without a clear request on behalf of the policy makers. Exceptions are testimonies at congressional hearings, where policy makers directly ask scholars of Brookings' to provide their expertise on a specific issue. It can also be that a congressional staffer or policy maker invites a scholar of Brookings to a meeting, or that a journalist asks for an interview.

3.2 pom+

pom+ is a consultancy company active in the sectors of construction -, facility-, and portfolio management. In 2004, the company had a turnover of 6.5 million Swiss Francs (4.2 million Euros). It employs 38 people, and has offices in Zurich and Bern, Switzerland. pom+ was founded in 1996 as a spin-off of the Swiss Federal Institute of Technology Zurich. Under the mission "we make companies, real estate properties, and projects fit!"[11] (pom+, 2005a), pom+ offers a diversified set of consulting services. Next to project management it does consulting for organizational development, for information and communication management, and supports companies in the design of processes and structures.

The *experts* in the case are the consultants of pom+ and the *decision maker*s are formed by their clients. The consultants of pom+ mostly have a university degree in engineering, informatics, or architecture. Some of them have an education in facility management from an advanced technical college. While almost all of pom+'s experts have a rather technical background, some have completed secondary studies in management and issues related to business administration. A few consultants have a PhD.

The clients of pom+ are state organizations like universities or state departments, but also many larger private companies from industries such as the insurance, the telecommunication, or the retail industry. The contact people on the client side are mainly project managers of, for example, quality management or facility management projects, heads of the real estate or of the internal services department. While in the early days of pom+'s activity, the client had only a very limited know-how on facility -, construction -, and portfolio management, today, both the industry and also the single clients have become more professional and the knowledge asymmetry is no longer blatant.

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11 Wir machen Unternehmen, Immobilien und Projekte fit!

These organizations ask for the support, assistance, and consulting of pom+ with regard to their projects on facility, construction, or portfolio management. Typical decisions are: what type of facility management software to implement, what strategy to pursue in the development of a real estate portfolio, or what business model to adopt for a specific construction project.

3.3 InSure

InSure[12] is an insurance company and part of one of the leading financial services companies worldwide. It employs around 20'000 employees and has a business volume of 30 billion Swiss Francs. The group is active in Europe, North America, and Asia. It has close to 15 million clients worldwide, which are composed both of private individuals and small and medium-sized enterprises. Activities are divided into two main units: the smaller Non-Life segment and the more important Life & Pensions segment. The Non-Life segment offers insurance products that cover the range of health and accident insurance, motor vehicle, property, fire, and general liability insurance. The Life & Pensions segment offers 1) retirement pension and saving solutions (voluntary & mandatory), 2) life and disability insurance and 3) investment products.

The knowledge communication deals with the communication around decisions that concern the remodeling of the internal IT applications and IT systems. These IT applications have to be developed or changed in order to better support the typical insurance business workflows and processes such as compiling offers, managing customer information, consulting clients, managing remunerations, calculating risks, verifying costumer claims, handling the back-office tasks, or analyzing and reporting financial numbers to the CFO.

In order to take knowledgeable decisions on these issues, the communication takes place not merely among a duplet, but a triplet of *experts and decision makers*. In fact, the expert – decision maker situation exists, first, between the *IT technicians* and the *IT management* and second between the *IT (both technicians and managers)* and the *business line managers*.

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12 For privacy reasons, we omit the name of the corporation, as well as the characteristics that make its identification definite.

The *IT technicians* have a variety of professional backgrounds (e.g. teachers, electricians, etc.) and most of them completed, in addition, the informatics school internal to the organization.

The *IT managers* (from team leaders up to IT-department leader) mostly have a masters degree in informatics or in related topics such as electrical engineering and many of them completed a postgraduate study in management sciences as, for example, an executive MBA.

The *business line managers*, finally, are the team managers, project managers, and up to the members of the executive board of the business line of the market unit Switzerland. They are specialized in business, finance, and insurance issues and conduct the daily activities of an insurance corporation.

The knowledge communication can be initiated in basically two ways. First, and this is true for most cases, it can be a request from the business line and be initiated by a change in the law or by wishes from the business line regarding the automation of a process that has been carried out manually until today. Such requests can be rather short term and small or involve rather big, mid-time projects that are decided by the steering committee. Finally, IT-experts also proactively propose projects that grow, for example, from necessities out of the technical development (e.g. migrate an old system). We focus on the communication of larger projects that grow out of the business line.

4 The Knowledge Communication Process between Experts and Decision Makers and its Main Challenges and Practices

Figure 7 shows the phase model of knowledge communication between experts and decision makers by bringing together those challenges and practices, which have ensued from the three case studies. The figure also shows the major feedback loops of the cases. Many additional challenges and practices, specific to the singular cases, are documented in the Appendices 1, 3, 5.
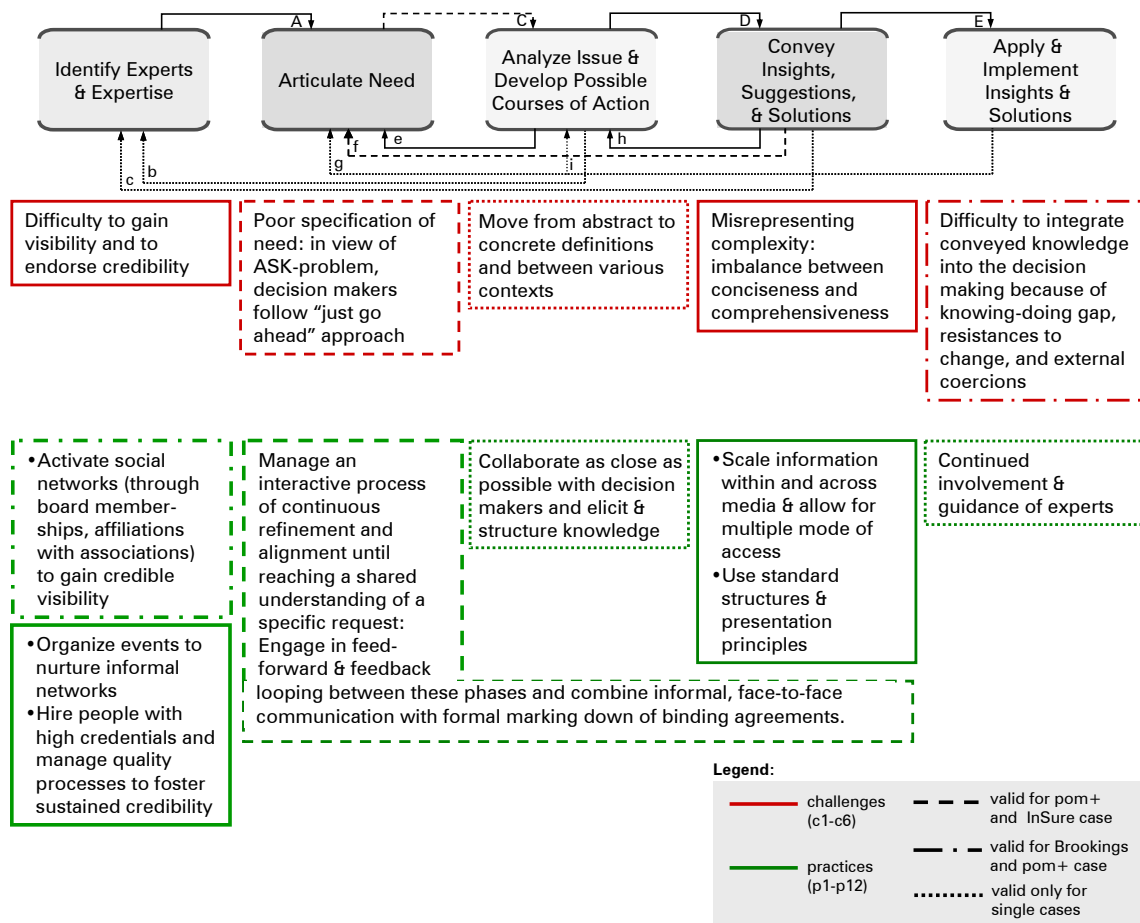
Figure 7: Major Challenges along the Phase Model of Knowledge Communication between Experts and Decision Makers

4.1 Identify Expert and Expertise

Experts are identified quite differently across the three case studies. In the case of Brookings, expertise is generally pushed to decision makers and policy makers address Brookings' scholars only for specific occasions (e.g. to testify in front of Congress). In such occasions, policy makers contact a certain scholar because they know him personally or because the expert is well known for his/her expertise in a specific field. Other possibilities of how the policy makers identify an expert is through Brookings' communications office (which has the role of a knowledge broker), through Brookings' website, the media guide or through an article they have red of a scholar in the newspapers. At pom+ and InSure, knowledge is very specifically requested by decision makers (and not generally pushed by experts). In the case of pom+, potential clients get to know the consultancy during one of

the informative events it organizes for people from the industry, through a recommendation or, more formally, through a publication in a professional journal, or even through the business directory of the Swiss facility management market. They then contact the consultancy for very specific services. At InSure, the managers from the business line are institutionally bound to the IT-specialists and so have clearly designated IT-teams to whom they can submit their concrete requests.

Difficulty to Gain Visibility and Credibility

What is common to all three cases is that experts have to gain *visibility* and assert their *credibility* in ever more competitive markets of expertise (Evers & Menkhoff, 2003) and in a situation, where decision makers are ever more overloaded with information. Experts therefore have to engage in various means to gain the attention of the decision makers (visibility) and to merit their trust (credibility).

In the case of *Brookings*, *visibility* is a major issue as the organization is active in a very competitive market of expertise, in which more than 300 think tanks are active in the United States alone (Rich & Weaver, 1998). In the case of *InSure*, despite of the institutional bonds, it remains an important challenge to identify who are the real cracks in a specific domain and who are the grey eminences with the most power.

Experts often have to deal with the fact that their *credibility*[13] is questioned, which is truer for non-technical experts (consultants, public policy analysts). A senior scholar of Brookings mentions referring to this:

> "Virtually every major politician figures that I am as good as this guy in what is going to happen in the economy. (..) Whereas when they deal with a physicist, even if he is not able to effectively communicate and sell his insights to a policy arena, everybody agrees he is a real expert and knows something I don't."

At pom+, a challenge related to the problem of credibility is that consultants have to be careful in not giving away too much valuable knowledge to their potential clients, but nevertheless manage to signal their expertise.

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13 Wright (2002) argued that management consultants' challenge of legitimacy is twofold as their service, which is highly discretionary and lacks tangibility, requires more legitimacy than other services and the consultants often have to address the issue that their profession does not enjoy the legitimacy of other established professions.

In all three cases, we can see that experts have similar practices in place to deal with this challenge. 1. They build formal and informal social networks by engaging in institutional bonds, affiliating with associations, and organizing events; 2. They recruit experts with high credentials (degrees); and 3. They conduct quality controls.

Activate Social Networks (through Board Memberships, Affiliations with Associations) to Gain Credible Visibility

In the two cases where the knowledge communication takes place across organizational boundaries (pom+ and Brookings) experts try to gain a better access to decision makers by engaging in more or less formal social networks.
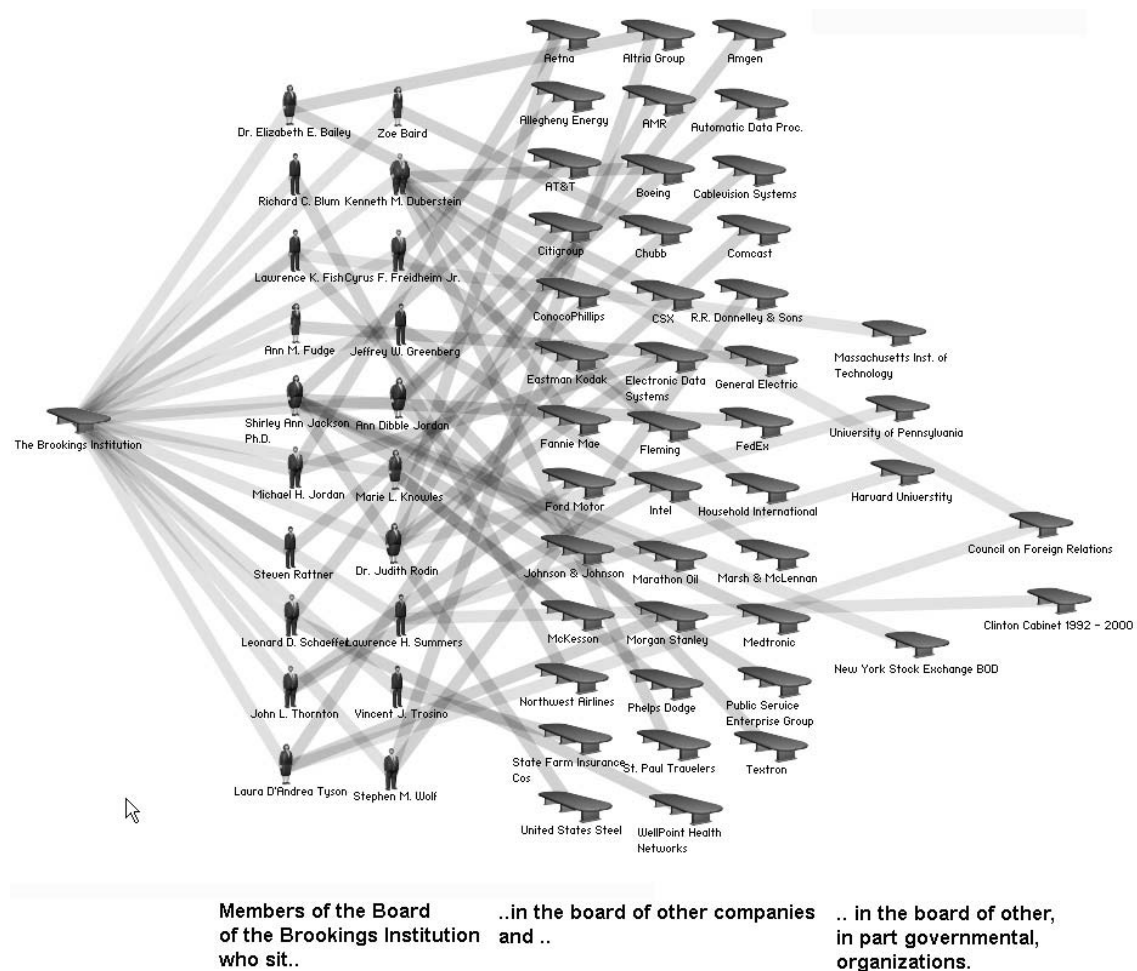
Figure 8: **The Direct Links between the Brookings Institution and Companies, Universities, and Governmental Organizations at the Level of the Board of Directors**
(Source: www.theyrule.net)

One type of rather formal bond can be established by assigning those people to be *members of the board* who have the same function also in other organizations. Figure 8 outlines such connections at the board level for the case of *Brookings*. Informally, Brookings tries to guarantee a well-functioning informal social network by hiring mainly scholars who have served in government and therefore know a lot of policy makers personally. Their geographical location in Washington also favors such informal contacts and which leads, in fact, to a higher media visibility and more testimonies in front of Congress (Rich & Weaver, 1998).

Similarly, pom+ is affiliated to a set of organizations. The company is a member of more than 20 associations and is also actively related to various universities. Such affiliations are important to increase the visibility and the possible paths through which a potential client will contact pom+. The consultancy can further benefit from the trust in expertise and excellence, which is associated to the brand of a particular association. Finally, theses networks are fundamental also for continuously renewing and affirming the company's knowledge.

Organize Events to Nurture Informal Networks

Another way to gain credible visibility and to nurture social networks is to organize *events* and to engage in a dialogue with decision makers. We can observe this practice throughout the three cases. A very illustrative example of such an event is *Brookings'* practice to organize *luncheons on Capitol Hill*. During lunchtime, Brookings – in collaboration with other organizations – holds talks and offers some food - not only for thought. Brookings often invites also a senator to comment on one of their research results and policy recommendations. Such events have various functions as, for example, convening parties or gaining attention for a topic. The choice of holding them on Capitol Hill is important to provide more ease of access. Policy makers not only have ever less time for reading Brookings' books, articles, or policy briefs, but also to attend their seminars or talks. Through such events, Brookings also marks its presence as one of major 'providers of policy expertise' right at the center of where policy making takes place. The fact of teaming up with other organizations, like for example with the Committee for Economic Development or the Heritage Foundation, gives the event a larger visibility. It gives the event also more credibility as the partner organization might stand for a different orientation and the policy maker cannot simply discard the event because he/she suspects it to be tendentious anyhow. Finally, the fact that they invite senators also serves various func-

tions. First, senators enjoy a high visibility so that the event will be taken up more easily by the media. Second, if senators comment on a book, for example, they engage with the subject rather intensively and are more likely to put forward some of its ideas in the Senate. By commenting, the senators also translate what was previously closer to the language of economists or political scientists into the language of policy makers. Finally, Brookings receives valuable feedback from the policy makers and is likely to improve the quality of its contribution and idea.

Next to Brookings, also pom+ and InSure organize informative events, to which decision makers are invited. During such occasions, internal and external experts hold presentations and lead discussions. In this way, Brookings, pom+, and InSure strive to gain the attention of decision makers, to continuously nurture their informal social networks, and to engage in a dialogue across partisan, functional, or disciplinary boarders.

Hire People with High Credentials and Manage Quality Processes to Foster Sustained Credibility

We have seen that a lot of practices that aim to foster visibility contemporaneously also improve the credibility of the experts. In the three case studies, we can identify some additional practices that specifically aim not only to signal, but also to assure the quality of the offered expertise. Only if the promise of expertise is later supported by high quality advice, will credibility be sustained in the long run. One way how experts and expert organizations signal credibility, but also guarantee the quality of expertise, is by *recruiting* almost exclusively experts with high credentials (it is mostly the case for pom+ and Brookings, but to a minor extent also for InSure). Experts hold university degrees from prestigious universities, have double qualifications (e.g. at InSure: a master in business administration and one in IT), or have previously worked for prestigious organizations (e.g. at Brookings: experience in the U.S. administration).

Next to recruiting procedures, the expert organizations (Brookings, pom+) and departments also have various *internal processes* in place to actually *guarantee the quality* of their services. They engage in continuous formal and informal review processes, they call in external experts, and they push standards in the presentation formats of their products (we will come back on this last aspect when discussing the phase 'convey insights, suggestions & solutions').

Brookings, for example, is known for its high quality and it's academic standards. It sticks to these values, but at the same time adapts to today's request for shorter outlet

formats and production cycles. Brookings therefore continually has to find new means to assure quality. A historic example shows how Brookings, already for many years, has been attempting to move within the stretch of maintaining high quality standards and responding to the changed environment: when the Heritage Foundation was founded and imposed a completely different form of communication (shorter formats, events, etc.), Brookings responded and launched the "Papers on Economic Activity". They wanted to publish an article more quickly, yet to guarantee a high quality. Therefore, they decided not to peer review the article any longer, but to place, next to the article, two comments by discussants. In addition, they carefully selected very renowned people for the board of the senior advisors, which not only signaled but also assured quality (R. Lawrence).

Non-partisanship remains another central fundament of Brookings in order to guarantee quality and credibility. Non-partisanship is fostered not only at the level of the organization, but also at the level of the single projects, as mentions one senior scholar of Brookings:

> "The different scholars working for this project (Restoring fiscal sanity) did not all share the same vision of how to resolve the problem of fiscal sanity. I do think it is a strength that Brookings does not have an institutionalized view. For this project, I deliberately chose authors who were well informed, that's the most important criteria, and secondarily who would have somewhat diverse perspectives on whatever is the issue. (..) I think that if you have to work with someone who has a different view than you, but who is equally well informed, you get a better product. I think that's a motivating factor and then, in my view, I think it leads to a more interesting book because not all people are singing from the same hymnals" (I. Sawhill).

Finally, Brookings assures quality through its procedures for approving a project (by board of trustees) and through the numerous formal external and informal reviewing processes. All books published by Brookings are externally reviewed by three reviewers, a process similar to what is common for a university press.

Similarly, pom+ tries to assure the quality of its service and has in place a tutoring system for new employees, invests in individual continuous education and spends resources on company wide education (e.g. workshops on specific issues).

All these practices show that the continuous signaling, sustaining, and nurturing of expertise are fundamental aspects in communicating knowledge. They are important not only to gain the decision makers' attention and to have the necessary access for the knowledge communication. We will show that these practices are directly related to the very last phase in the knowledge communication process. Credibility is an important pre-

condition for the acceptance of knowledge and its integration in the decision making process.

4.2 Articulate Need

In the 'articulate need' phase (see Chapter 2), the decision makers communicate to the experts what insights and services they need from them. This phase is almost non-existent in the case of Brookings as Brookings' scholars mainly push their expertise without a precise request on behalf of the decision maker. On the other hand, it is very important for pom+ and InSure. In the following discussion, we will focus mainly on these two cases.

Poor Specification of Need: in View of ASK-problem Decision Makers Follow "just go ahead" Approach

In most occasions, decision makers do not articulate a clear need upfront. While in some cases, decision makers are subject to excessive time constraints, in others, they are really in the impossibility of formulating a precise request. In many cases, decision makers vaguely communicate where they have a problem and that the experts should resolve it. A consultant of pom+ mentioned, for example: "Just right now I have a project where the client does not know a lot himself. He simply communicates his requests and says: just go ahead and do something[14]" and an IT-manager at InSure states this problem very poignantly: "Information is something, of which you have yet no knowledge of. And I really can't pose the right questions about something of which I do not know that exists"[15]. She adds that, as a consequence, decision makers are unable to formulate precise written requests: "The assignment from the business department is quite blurry. They know that they want more or less this and that. But they do not know enough to expose on five pages what we need to do".

These quotes show that we find support for the ASK-hypothesis ("anomalous state of knowledge", discussed in Chapter 2): The decision makers, acknowledging that they do

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14 Translation from German by the author, for quotes in original language, see: Appendices 3 and 5

15 This understanding of information goes along with Bateson's famous definition of information as a difference which makes a difference (Bateson, 1972). Information always represents a novelty to the person who receives the piece of information. To illustrate this point, Bateson gives the famous example of a coin that drops in a person's palm. It is first understood by the person as information, but with the time that the coin stays in the palm, it stops being news and as such information.

not have the sufficient knowledge to tackle the decision issue alone (they realize that their state of knowledge is anomalous with regard to the issue of decision), lack the sufficient knowledge to specify precisely what is needed to solve the anomaly (Belkin et al., 1982). In other words, the decision makers' knowledge of the issue is too limited to even state what precise insights they need from the experts. In view of their limited time and the difficulty of formulating a precise request, decision makers often ask experts to start their analysis and to 'just go ahead'.

Manage an Interactive Process of Continuous Refinement until Reaching a Shared Understanding of a Specific Request: Engage in Feed-forward & Feedback Looping between these Phases and Combine Informal, Face-to-face Communication with Formal Marking Down of Binding Agreements

The experts of both pom+ and InSure address the problem of a poor need specification in a similar way. They engage in a process of *continuous refinement and reciprocal alignment* and both give weight to a *lot of face-to-face communication, which is yet combined with officially marking down a clear request in written form*. A *strong involvement of the decision maker* is equally of particular importance.

InSure, for example, has a complex process in place, which involves various feed-forward and feedback loops between the phases 'articulate need', 'analyze issue & develop possible courses of action', 'convey insights, suggestions, & solutions' (for a visual representation of this process, see Figures 25 and 32, in Appendix 5). IT-experts first conduct a series of workshops to identify and demarcate the problem and to develop a shared understanding of it. They then conduct a series of interviews with the business managers to understand processes in more detail. The business managers then write, in close collaboration with the IT-experts, a business concept. Sometimes, collaboration is so 'close' that it is actually the IT-team, which writes the business request. They do so if the business is literally unable to write down what they actually need, but can recognize it once they have seen it[16]. After this first broad definition of the problem from the business perspective,

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16 The difficulty in articulating something, but recognizing it when one sees it ('I know it when I see it') is a phenomenon that arises when people have to deal with knowledge with a strong tacit dimension. It is hard to externalize tacit knowledge through words, but it is easier to recognize it once we see it. Weick claims, in addition, that this difficulty has to do with the way people make sense of their actions and the world around them. He refers to Wallas' sentence 'How can I know what I think until I see what I say' to argue that our sense-making process is mainly retrospective and that only after having done or said something, we can actually be more sure of what we think (Wallas, 1926: 10; Weick, 1995: 12).

they move from the 'articulation phase' to the 'analysis phase' (arrow "C" in Figure 7), but only to come back to it and refine the request. In fact, the IT conducts a high level technical analysis (identifies possible technical solutions, their impact on IT infrastructure, rough time and cost estimations) and discusses these first options with the business (feed-back arrow "e"). Experts and decision makers now have the possibility to remediate possible misunderstandings and to specify the request. The IT-experts then move again to the analysis phase, conduct a more detailed technical analysis and come up with an elaborate description of three feasible technical solutions, which they present in the so called 'preparatory study'. In this way, experts and decision makers then move to the 'convey insights, suggestions, & solutions phase' (arrow "D") and present the study in front of the steering committee (formed by both IT managers and business managers). The committee discusses the proposal and decides whether to go forward with the recommended option or whether further modifications and analysis are necessary (feedback arrow "h"). Once they receive the definitive order from the business, they move back to the 'articulate need' phase (feedback arrow "g" and sign a 'scope contract' and can they finally proceed to the "apply & implement insights & solutions" phase.

The example of InSure shows that the 'articulate need' phase can actually be fully completed only when experts have conducted some analyses and conveyed some of its insights and results. The refinement and alignment loops serve to gradually reach a more precise (refined) understanding of the issue, which is shared (aligned) among experts and decision makers. The process is similar for pom+, although not as articulated (see: Figure 7).

This process topology actually comes close to how sense-making theory describes how people make sense of problems and solutions (see: Chapter 2). Sense-making is not a purely cerebral process, but needs the continuous interplay of *talk* and *action,* and of *retrospect and prospect* (Weick, 1995; Weick *et al.*, 2005). The decision makers are not able to make sense of a problem by pure thinking, but need to talk with the experts to be able to *bracket* certain elements of the issue as particularly noteworthy. They need to engage into some action, for example, by letting experts start their analysis or developing a prototype. They then can reflect on these experiences, engage in further talk, and refine their thinking (Weick et al., 2005). In this way, sense-making requires a certain cycling behavior between talk, action, and reflection. Cohen et al. argue similarly that only in retrospect people know which questions were actually answered. "Despite the dictum that you cannot find the answer until you have formulated the question well, you often do not know

what the question is in organizational problem solving until you know the answer"
(Cohen et al., 1972: 3).

More than other forms of communication, *face-to-face interactions*, activate sense-
making processes (Weick, 1979: 133-134). In the three case studies, we find that interac-
tive talk is central in this phase also for other reasons. It also helps to elicit the decision
makers' knowledge, to show sincere interest and commitment, to avoid misunderstandings
between experts and decision makers, to gradually reach a shared understanding among
them, and to counteract possible resistances to change. This is why pom+, after the first
classical customer request, relies on meetings, brainstorming sessions, and interviews with
the customer. One consultant mentions:

> "If you flood people with documents at the beginning of a project, it is very possible that they un-
> derstand them differently than how they were actually intended. They believe that the consultant
> wants to go in a direction that they do not want to. Therefore, in the beginning, interaction is key."
> (C. Kaufmann).

However, an ongoing cycling and engagement in talk is very expensive. For this rea-
son, *face-to-face communication is in both cases combined with more formal, written, and
official forms of communication.* InSure relies on written business concepts, written tech-
nical concepts, a signed project scope. pom+ insists after a phase of interactive rap-
prochements and mutual adjustments in signing a written project definition. These docu-
ments bind both parties to certain commitments and mark the progress in the refinement.
For both InSure and pom+, this combination of fluidity (through iterative talk and cy-
cling) and holding down (written documents) is a central practice in their knowledge
communication.

Until now, we have characterized *feedback-loops* as being necessary and positive
elements to *refine* the need of the decision makers and *align* the understandings of experts
and decision makers. Yet, at both pom+ and InSure, there are cases of rather problematic
readjustment feedback-loops that are necessary to remediate an uncovered misunderstand-
ing or misalignment. There are instances where the request remains too vague, where the
experts have misunderstood the decision makers, or where there are various expectations
among decision makers. In the case of pom+ (see: Figure 9), for example, the consultants
often work with their contact person at a clients' – a project manager – and only at a later
stage, when first milestone results are communicated, the project sponsor and head of this
contact person is finally exposed to the work. At that point, it often becomes apparent
that the project manager and the project sponsor did not really align their expectations.
Giving attention to the subject only when the experts have already done a lot of their

work, they realize that they actually want from the experts a different service and insight. As a result, the need has to be rearticulated and the project can fall considerably behind schedule. An even worse case is when such readjustments turn out to be necessary only after the decision has already been implemented.
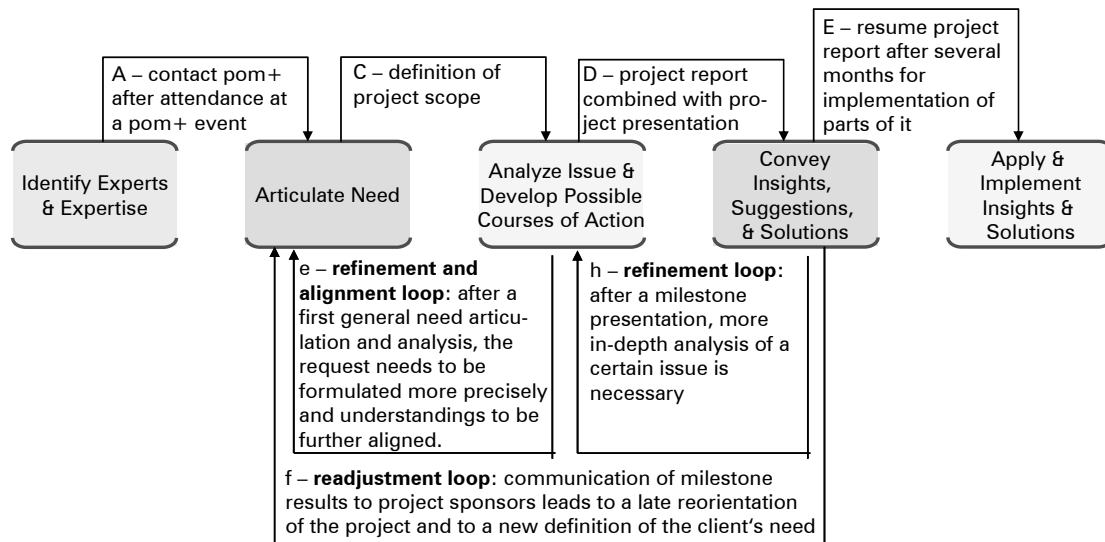
Figure 9: Instances of Feed-Forward and Feedback Loops (Refinement, Alignment, and Readjustment Loops) within the Interaction between Consultants of pom+ and their Clients

In the case of InSure, for example, sometimes was the case (before they defined the more elaborated need articulation process) that only after a new IT-application was already implemented, that the managers from the business line realize that the application did not satisfy what they actually needed and that a very late readjustment loop (arrow "g") was necessary. It is evident that late stage feedback loops, from the phases "convey insights, suggestions, & solutions" and "apply & implement suggestions & solutions" to the "articulate need" (feedback arrows "g" and "f") or to the "analysis" phase (feedback arrows "i" and "h"), can be highly problematic.

Therefore, in both cases, experts insist in actively involving the decision makers in this early phase of their interaction (e.g. through the workshops) and try to gain access also to those decision makers with the more powerful positions.

In sum, the 'need articulation' is not 'a one shot moment' in which the decision makers brief the experts on their needs. We have shown that a shared understanding of the decision makers' request can only be elaborated gradually, both in terms of a gradual alignment between experts and decision makers' perspectives and of a gradual refinement (concretization) of the request. The articulation of a clear request is in itself a process of

various feed-forward and feedback loops and spans to the phases of "analysis" and "conveying insights". If the necessary interaction between talk and action (sense-making) does not develop well enough, later readjustment cycles are necessary. Too loosely defined requests and implicit misunderstandings have to be remedied at the cost of delays and additional expenses. Experts and decision makers are therefore well advised to consider Drucker's appeal that "the important element in decision making is *defining the question*. The important and crucial steps are to decide whether there is a need for a decision and what the decision is about" (Drucker, 1974: 466, as quoted by Weick, 1995: 15).

4.3 Analyze Issue & Develop Possible Courses of Action

With (pom+, InSure) or without (Brookings) a request of the decision makers at hand, experts start analyzing the issue of decision and develop possible courses of action. The cross-case analysis did not lead to identify recurring practices or challenges valid for all three cases.

In *Brookings'* case, the interaction with decision makers is rather poor during this phase. Mostly, scholars conduct their analysis independently from policy makers, yet frequently interact with other scholars or experts in the field.

At *InSure*, the interaction of IT-experts with the business is rather vivid. IT-experts translate the business request in a technical request, do a feasibility analysis and elaborate various technical options. A recurring challenge during this phase of the knowledge communication process is that the IT-experts have to translate the very broad definition of the problem and objective on behalf of the business to a very specific and technical definition of the issue (requirements for the technical system). The definition must be so concrete that the actual programming code can be easily derived from it. The expert needs to move between various levels of abstraction and to contextualize the received information in a very different setting. To address this challenge, InSure employs people with a double qualification both in the insurance business and in IT. These function as 'translators' and are positioned both at the business and the IT side (for further details on this point, see in this chapter: Boundary-spanning Processes – Brokering).

At *pom+*, the experts conduct their analysis at the site of the client (decision makers) and in order to understand certain work processes of the decision makers, they interact with them very frequently. The consultant needs to understand what exactly the client's situation is, in what the problem consists and why it exists. The client is the consultants'

major source of knowledge, and by directly working with him, the consultant tries to find ways to elicit all the relevant knowledge for finding a reliable solution. For pom+, close collaboration is also a necessary precondition for that the client more easily accepts the recommendations of the expert. The client himself brings up the solution and the consultant only helps to voice, bring together, structure, and consolidate the propositions; as mentioned by a consultant:

> "In this way, we encounter fewer resistances - later in the implementation - because it is actually the collaborator who finally has the chance to express himself freely. Management gets information it would not get otherwise. It's really all about compressing and processing the existing knowledge. I have to decide what the important problems are and which ones we can address at a later stage" (L. Schaerer).

4.4 Convey Insights, Suggestions, & Solutions

Once the experts have conducted their analysis and have elaborated their recommendations for the decision makers, they aim to effectively convey their insights, suggestions, and possible solutions. Experts have to find ways of communication in order to gain the attention of the decision makers, to make the complex issue easily understandable, to make the insights memorable, and to assure that the decision makers will know how to concretely implement the gained insights.

The communication strategies, with which experts communicate their expertise, differ substantially between the three cases (detailed descriptions can be found for each case in the Appendices 1, 3, 5). For *Brookings*, this is the most important phase in their knowledge-intensive communication with decision makers as the organization mainly pushes its scholars' expertise to policy makers. They convey their insights in a very rich mix of written and oral communications: books, policy briefs, op-eds (opinion pieces in newspapers opposite the letter of the editor), periodic journals, papers, reports, articles in newspapers, testimonies at congressional hearings, events, informal meetings, public briefings, interviews, participation at radio and TV shows, and discussion series. Almost all of these communications can be accessible over the website of Brookings, which is one of the most important communication instruments for Brookings. A scholar illustrates it as follows:

> "We came out with this new study (..) on the effects of match rates on saving. We held a conference here to get it out to different offices (..) and the policy community of the different think tanks. We held a conference call with reporters and had 20 or 25 reporters on the phone. I had conversations with specific reporters and there was a story in the Washington Post and the Wall Street Journal, as well as a big editorial in the New York Times. This, I believe, influences policy makers. Then, I

brought it up again at a hearing before the Ways and Means Committee yesterday, which is yet another audience. At the same time, we are getting the paper out to the academic audience" (P. Orszag).

The experts of *pom+* convey their insights not only at the end of the project, but also during the analysis phase, for example, when they have reached milestones. They present their results and recommendations in presentations, meetings, workshops, and project reports. After a milestone has been reached or the project has been concluded, the results and recommendations are formally conveyed in presentations and through a written report. These situations are often of great importance as they constitute the few moments, in which upper management is present and have a determinant influence on the direction of the decision making. Prior to this moment, at the level of the project managers, much integration of more implicit knowledge has already taken place at this point since the client has been working for several weeks with the consultants of pom+.

The case of *InSure* is similar to the one of pom+. A preparatory study (containing all the analysis, the feasible technical options, and the recommendation of the IT-experts) is presented to the steering committee, is then discussed, approved or submitted to changes. The written document itself reflects a strong collaborative effort between the IT and the business people and much knowledge has already been integrated between the business and the IT experts prior to the presentation in front of the steering committee. It is nevertheless an important moment as this organ has the final decisional power on the development and implementation of a particular IT-application.

For the three cases, many communicative challenges and practices differ. In the following, we will present the core challenges and practices, which we found repeatedly in the three cases.

Misrepresenting Complexity: Imbalance between Conciseness and Comprehensiveness

At the basis of the expert-decision maker constellation is that decision makers have too little time and expertise at disposition to make a decision on their own and consequently ask experts to provide their in-depth knowledge in very short formats that are yet meaningful. Experts are asked to communicate their in-depth knowledge in a very concise manner, which appears to be a major challenge throughout the three cases, particularly in this phase of the knowledge communication process.

During congressional testimonies, for example, *Brookings* scholars have five minutes to outline to the Senate, House, Joint, or Special Committee of Congress the main causes and implications of a specific policy issue and to present possible solutions (Quarterly, 2005). A major challenge is for Brookings' scholars to *break down the whole complexity of an issue and present it within a five minutes talk* so that policy makers can understand and later remember it.

Similarly, when Brookings' scholars give interviews or participate at TV shows, a complex issue has to be turned into an extremely compact information format. Scholar Charles Schultze illustrates the difficulty of this undertaking:

> "Every month, I do a business, stock market TV show (..). I only have one minute and a half to get something across. If it is a subject I know, I can write what I have to write in half an hour. But it always comes out 2 to 3 times too long and then I spend hours to get it shorter."

At pom+, consultants have to break down the information of a thousand pages in a relatively small report:

> "The challenge is also that we got an enormous amount of information in these three weeks and we have to differentiate, what is relevant, what is not relevant. In the end, they get a report of 25 pages, in which they have to find the whole spectrum and variety of the issue" (L. Schärer).

In this way, experts are faced with the polar request of *being extremely concise and simple and, at the same time, exhaustive enough to live up to the variety and complexity of the issue. Brookings*' scholars find themselves faced with, on the one side, their professional responsibility as researchers to do and present research thoroughly and, on the other hand, to present research results very swiftly and in a very concise format.

From a knowledge perspective, the question is if the very concise formats allow for *meaningful* communications, in which the decision makers can transform the piece of information into knowledge. An IT-manager of *InSure* formulates this question as follows:

> „A big challenge today is to represent knowledge in a compressed manner. In the past, people wrote big books, reports. Today, nobody reads this anymore. There was a move to the one-pagers, these executive summaries. It is also a mentality of PowerPoint, that is, no more documents, just slides. The challenge really is how to communicate something in a meaningful way in such a short space."

For written communication, the conciseness/comprehensiveness challenge is particularly demanding because, depending on the characteristics of the single reader and the current situation he or she is in, different aspects of the issue have to be emphasized, as illustrates this quote from an IT-manager of *InSure*:

"How can I represent knowledge in a well structured manner? I would like to convey something to a client or to a decision maker. I have to do this on a few pages and here is the first problem: how can I present complex issues in a simple manner and give the reader the possibility to deepen certain aspects? (..) I think of a possible way of presentation that allows each reader to be informed himself on his/her level and exactly at the level of detail, which interests him/her."

In all three organizations, experts address this challenge of the concomitant request for meaningful conciseness and faithful comprehensiveness in part by scaling information within and across various media.

Scale Information Within and Across Media & Allow for Multiple Mode of Access

With the term 'information scaling' we designate the idea that a piece of information, e.g. a conducted research and its results, is presented in a variety of lengths and media formats. A report has, for example, a half-page executive summary and the same piece of information is communicated as a paper, a power point presentation and a visual image. Depending on the interest, specific need, and media preferences of the decision maker as well as on the time he has at disposition, he/she can decide how detailed he/she wants to be informed and whether he/she prefers to read to listen or to view a piece of information (streamed audio or video file). We have observed this practice of information scaling in all three cases.

At *Brookings*, this practice is dealt with very consciously and consequently. Within one media, Brookings has found out that an information product, such as a report, needs various summaries, as Ron Nesson outlines:

"We did fairly recently a survey asking congressional staff and serious reporters (..) on the form they would like our findings to have. (..) What is the ideal length of a Brookings' publication that they could really use? Some said one page, some said two paragraphs, and some said bullet points. (..) So we (..) will probably (..) keep the policy briefs (..), but we will have a one page summary of that, a two paragraph summary, and a bullet point summary."

Brookings scales a piece of information also across media. A one hour Public Briefing, for example, can give a general outlook of a problem and serve as a "summary" of a lengthy book. In addition, the same information can also be accessed by reading a policy brief that will present the information with moderate details. In this way, the busy congressmen takes the brief version that only outlines the conclusions and propositions, while the member of the congressional staff can look – in the longer version – at the numbers and facts that lead to the conclusions. The insights gained from a project might be com-

municated in a book, in various articles, in a report, in policy briefs, op-eds, events, in testimonies at congressional hearings, in interviews for newspapers, and when attending a radio or TV show. Oral communications like public briefings or radio-/TV shows thereby serve to quickly get a general overview and become aware of a certain idea or approach that is discussed more in detail in a book or report.

The different media and communication styles can serve various audiences. Combining different communication media and formats is further useful to reciprocally compensate for the drawbacks specific to each single format and to profit from its particular advantages. Brookings' books, for example, serve for in-depth conceptualizations of an issue and policy briefs or op-ed for more timely policy recommendations. At *InSure*, experts combine visual communication with written text and oral communication, as one IT-manager mentions: "The communication is most effective if it is a mixture between a graphical elaboration, a possibly very short description and then a meeting". While the face-to-face communication is particularly suited to convey the context of an information, show its implications, give an overview and elaborate jointly new ideas and insights, the written format allows for clearer structure, more in-depth information, and gives the reader the possibility to change the linear flow of the text, jump within the document and focus only on these aspects, which are most pertinent to him/her. The visual format has still other advantages as it provides an additional language and facilitates a shared understanding (see in this chapter: Boundary Objects, Visuals). By combining these three forms of communication, an IT-expert or decision maker can profit from the advantages of each one and overcome their respective weaknesses.

We call this practice of combining different media to convey an idea or insight to "scale" information across media and representation formats. A same content can be accessed in a variety of ways and an addressee has the possibility, depending on his affinities, needs, and interests, to focus on the format he/she prefers.

Use Standard Structures & Presentation Principles

In all three organizations, experts have developed standard structures and standard presentation principles for the specific information products. A standard structure facilitates a faster orientation within extensive sets of information and makes an information item also more quickly retrievable (Eppler, 2006). In the case of Brookings, Policy Briefs are organized following a loose standard structure. In size, Policy Briefs (see: Figure 10) are limited to 3000 words (8 pages), all have the same design, and show standard infor-

mation items such as a summary, related resources, and Brookings' corporate information at the outset of the article, as well as the contact information of the author, and singled-out quotes. Certain information items, like for example 'related resources' are standard not only for policy briefs, but for all information products of Brookings. Also on their website, the user finds, next to an article, various links to alternative resources on the topic, such as related events, webcasts, online chats, related policy briefs, journals, or courses provided by Brookings. The cross-referencing to related material has become a rule for most of Brookings' information products and provides the reader orientation across a single product. In this way, a standard can also span various information products.

Figure 10: Example of a Policy Brief of the Brookings Institution (Labels of Standard Features Added by Author)

pom+ and *InSure* also dispose of standard structures for their reports. *InSure*'s final 'preparatory study' shows an executive summary, benefits of the IT application project, objectives, analysis of the starting position, identified measures and options, plus a recommendation for one of the options. Next to a standard structure, the reports also follow some basic principles of presentation.

Principles of presentations are, for example, the use of little text as possible, but on the other hand, an extensive use of tables and a considerable use of visualization (e.g overview figures). Another principle is that all important terms are defined in the appen-

dix or that meta-information like the status of the study (e.g. proposed), the names of the authors, the person in charge, the date of the last revision, and the name of the document have to be included.

Next to written communication products, also *oral communication outlets can have standard formats*. At *Brookings*, there is the National Issue Forum, as the senior scholar Alice Rivlin explains:

> "A standard format for Brookings is what we call a National Issues Forum. That means that there is a Brookings paper or book, then we invite several political people, from the administration or out of the Congress to comment on the book. That gives them some exposure to the book, because they have to read it and comment on it. And it also gives wider exposure to the concept itself. If you have an important member of Congress giving a speech, then C-Span or others will be willing to cover it." (A. Rivlin)

Standard formats like the National Issues Forum are helpful for scholars as they do not have to reinvent new types of events after each book publication. It also helps policy makers to know, when receiving the invitation by Brookings for a 'National Issues Forum', what structure and quality to expect.

Finally, *standards* are defined not only for communication products, but also for *communication processes*. At *InSure*, for example, change requests have to follow certain standard procedures and the managers form the business side cannot simply come to the IT people and ask them to change the project.

To conclude, in the three case studies, we have seen that standards play an important role in managing the knowledge communication between experts and decision makers. Such standards can be applied for written and oral communication products as well as for communication processes. They regard the formal structure of the information product (e.g. where is what type of information placed), its graphical design (e.g. color), the conceptual structure of an information product (e.g. a presentation of an expert is followed by two comments by external experts) and can also include presentation principles (e.g. few text, many visuals). Standards facilitate the orientation and allow for a quicker screening and retrieving of the relevant information on both sides of the knowledge boundaries. They improve the quality of information products, and make coordination and the management of expectations easier.

4.5 Apply & Implement Insights & Solutions

The application of the expert knowledge in the actual decision making and the implementation of it in action take various paths in the three case studies.

In the case of *InSure*, the expertise provided by the IT-specialists lays the direct foundation for the decision that the managers from the business line will take. And after the decision is taken, it is the IT-experts themselves who will conduct the implementation. Within two months, the IT-experts build the application and launch it in the larger IT-architecture. During this time, the interaction between the IT-specialists and the decision makers is less frequent and the IT-experts develop the application rather autonomously. The IT team leader meets with the manager from the business line for weekly coordination meetings. *Modification requests* must follow formal procedures. Finally, when the application is developed, test phases start and the communication between the IT-specialists and the managers is again intensified. At InSure, the passage from the conveying insights to the taking of the decision is almost automatic – and clearly defined in the organizational processes – since the real knowledge integration effort has taken place in the earlier stages.

In the cases of *Brookings* and *pom+*, the opposite is the case. No organizational bonds exist between experts and decision makers and experts are not involved in the decision making processes. After having conveyed their insights and suggestions, they have poor control on whether and how their insights have actually impacted the decision making process. It depends on the decision makers to whether to consider the knowledge provided by the experts or not.

In such a situation the passage from knowing to doing is far from being automatic, but is rather a difficult path with various challenges. In the following, we will discuss the major challenges for the cases of *Brookings* and *pom+*.

Difficulty to Integrate Conveyed Knowledge into the Decision Making because of Knowing-Doing Gap, Resistances to Change, and External Coercions

In the case of Brookings the impact of the knowledge communications is very hard to measure. First, scholars do not know whether policy makers were actually exposed to their recommendations and insights. Second, even if the insights did reach the decision makers, Brookings does not know whether the policy makers will consider them in one way or the other in their decision making. One scholar of Brookings mentions on regard:

"It is very difficult to measure (..) how much impact this particular study had in the policy making process. Last year, when we put out our first book, it got quite a good attention. There were, I think, 12 major newspapers that mentioned the book by name. Many more editorials and articles talked about the substance of the book without citing it outright. We did many interviews with the press and with the media more generally. We had opportunities to testify before Congress and to meet with policy makers" (I. Sawhill)

Traditional impact measures of a think tank in the public policy discourse are the number of testimonies in front of Congress and media visibility. As far as testimonies are concerned, the Brookings Institution is leading off the U.S. ranking together with the Heritage Foundation (Brookings Institution, 2005a; Heritage Foundation, 2005). Also with regard to media visibility, Brookings is traditionally the most cited think tank by all U.S. newspapers, except for the clearly conservative Washington Times (Rich & Weaver, 2000). While these indicators can give some more certainty on whether the policy makers were exposed to the ideas of Brookings' scholars, the impact of these ideas on the policy making process remains diffuse and highly uncertain. Brookings' communications interact with the thousands of other think tanks, journalists, advocacy organizations or interest groups. Rather than having a direct impact, Brookings' communications might shape the perceptions of the policy makers, shift the attention to another aspect of an issue, redefine implicit priorities, reframe the discussion, or activate informal networks and friendships across partisan borders.

At *pom+*, although decision makers explicitly ask for the consultants' advice and guidance and although communication is therefore more direct, the step from *knowing to doing* remains uncertain. It is often the case that the decision makers do not implement the insights provided by the experts. A consultant of pom+ mentions on regard:

"Oftentimes, we propose interesting things, but the client is not ready yet to integrate them. He has to live, in some way or the other, the whole development he buys in through our service. We can't speed him up from 0 to 100 in just one year. That can be frustrating since right after the project, the reports end up in a drawer and nobody really profits from them" (C. Kaufmann).

There are various reasons for this gap between knowing and doing. In Chapter 2, we have mentioned issues related to the in-group bias like the not-invented-here syndrome (Katz & Allen, 1982), to organizational cultures characterized by competition and fear to make a mistake (Pfeffer & Sutton, 2000) and to an insufficient concretization of rather abstract decisions. In the case studies, we could identify some of these as well as additional reasons for the knowing-doing gap.

First, expertise has few chances to become actionable if decision makers find themselves in a narrow network of *external coercions* and *already made commitments*. A scholar of *Brookings* provides an illustrative example:

> "One of the things I said when I testified (..) was that you cannot strengthen social security without an increase in the payroll tax (..). But the President had given a very clear direction to the Commission that it was not to consider a payroll tax increase. They completely agreed with me, you cannot do this. But they were given the mandate that the payroll tax was not to increase, period. So the commitment was so strong that no information saying how stupid it was to do what they were going to do, would convince them not to do it" (K. Weaver).

Commitments can also be less explicit and regard informal relationships since a decision maker does not want to attack another decision maker and rather prefers to maintain alliances intact.

Face-saving behavior is another reason for not taking into account a certain piece of information. If decision makers have already exposed a certain opinion, they are reluctant to change it even if faced with substantial evidence that argues for an alternative conclusion. They *fear to loose face* (cp: Pfeffer & Sutton, 2000) as explicates Charles Schultze from Brookings:

> "If, as a consequence of your estimates, it makes a policy look stupid, which someone is pushing, they might agree, but they (..) won't start arguing. (..) They would try to find another expert who gives them another answer" (C. Schultze).

In the case of *pom+*, we have further found that resistances to a certain suggestion or piece of information often arise because clients *do not feel considered* and are *generally skeptical* against the external consultant (cp: not-invented-here syndrome, Katz & Allen, 1982).

> "It is important that the client can recognize himself and his situation (in the information we provide). We have to be descriptive so that the client does not have the feeling that just some external guys pop in and present a few theoretical approaches. Here again, conversations and the personal contact are hugely important" (B. Buser).

In this way, credibility and even more so trust play an important role in the implementation phase. Only if the decision maker really trusts in the capability of the expert, he/she is willing to leave aside part of his/her convictions, mode of behavior and knowledge and embrace the recommendation of the expert (cp. Baecker, 1999, Chaper 2).

Poor agreements and non-clarified functions between the various decision makers represent a final reason why experts' recommendations are not taken into account in deci-

sion making. In many instances, experts often only have the possibility to frequently interact with those decision makers whose decision power is rather limited and who can be easily overruled by upper management. If the agreements between the various decision makers are not very clear, it is improbable that experts' recommendations will be taken into account. The consultants of pom+, for example, found themselves several times in a situation, in which, during the final presentation of a project, the project sponsor finally attended and exposed a completely different view on the issue. As a consequence, the project was either filed or had to be completely redefined (feedback loops to articulate need phase).

We have exposed a panorama with multiple reasons for the knowing-doing gap. Many of them are part of the outer context of the expert-decision maker interaction and cannot be addressed by the expert directly. There is nevertheless a practice, which we could observe both at pom+ and InSure and this is the early stage active involvement of decision makers and the late stage guidance by experts.

Early Stage Involvement of Decision Makers and Late Stage Guidance by Experts

pom+ and *InSure* both try to involve decision makers early on in their projects and give them a very active role in the knowledge communication process. A first meeting, in which also project sponsors and upper management are involved, is often useful to assure a common understanding and a commitment also from the top. The active involvement of decision makers is further important to make them feel that it is actually them who proposed the solution. *pom+* persistently uses its clients as the most important source of knowledge and the consultancy considers itself as operating 'only' to structure, compress, and contextualize that knowledge with the help of its methods and approaches. *Early stage involvement of the decision makers* then has various important roles in order to reduce the gap between knowing and doing.

At *InSure*, we have further seen that late stage guidance by the experts very much helps to write down decisions in concrete terms and to integrate their expertise in the concrete actions for implementation. If it is the experts themselves who are responsible for the implementation, the continuity can be guaranteed even further.

The analysis of the knowledge communication process has shown that there are many communicative challenges and practices that are similar throughout the three cases. However, we have seen also differences in the knowledge communication process like, for

example, the importance of the single phases, the party (experts or decision makers) that holds the lead in the various phases, the challenges with which experts are confronted, the practices they put in place to address these challenges, and the level of interconnectedness (looping behavior) among the various phases.

Figure 11 shows differences in the knowledge communication process by comparing intra- versus inter-organizational communication and 'push' versus 'pull' cases. From this comparison, we can propose that:

	Experts „push" knowledge to decision makers		Decision makers „pull" knowledge from experts	
	Within organizational ties	Outside organizational ties – Brookings	Within organizational ties – InSure	Outside organizational ties – pom+
Identify Experts & Expertise		• very low communication intensity • experts have lead and are very active to gain attention	• low communication intensity • decision makers have lead, but experts propose pro-actively	• very high communication intensity • Decision makers have lead, but experts are very active to gain attention
Articulate Need		• low communication intensity • experts have lead, decision makers in lead only for testimonies, otherwise indirect role (policy agenda)	• very high communication intensity • experts have lead for guidance, yet responsibilities are on both sides, cyclical refinement	• very high communication intensity • expert have lead for guidance, cyclical refinement
Analyze Issue & Develop Possible Courses of Action		• very low communication intensity • experts lead and conduct analysis, no active role of decision makers	• moderate communication intensity • experts have lead and decision makers answer questions	• high communication intensity • expert have lead, but hands-on collaboration with decision makers
Convey Insights, Suggestions, & Solutions		• very high communication intensity • experts lead, use various formats and means to gain attention and impact	• high communication intensity • experts lead to gain understanding of decision makers	• high communication intensity • experts lead to gain understanding and acceptance
Apply & Implement Insights & Solutions		• low communication intensity • decision makers have lead and experts are almost never called-in	• high communication intensity • experts have lead and decision makers has role to give feedback (track errors and checks adaptability)	• low communication intensity • decision makers have lead and decides whether expert can still accompany the process

Figure 11: Cross-Case Analysis: Impact of Push-/Pull Situation and of Existence of Organizational Ties on Knowledge Communication Process

Note: The intensity of the knowledge communication between experts and decision makers goes from "very low" to "very high" and has been attributed by the author on the basis of the qualitative data of the cases.

First, *if the experts aim to push their insights and knowledge to the decision makers (Brookings, pom+)*:

– *the least intense is the knowledge communication between experts and decision makers during the "articulate need" and "analyze issue & develop possible courses of action" phases;*

– *the least looping behavior and refinement cycles characterize the knowledge communication process.*

Second, we can state, that *the more knowledge communication takes place across institutional boundaries,*

– *the more experts need to be active in the "identify experts & expertise" phase;*

– *the smaller is the possibility that the experts play an active role in the implementation phase.*

Overall, the process model of knowledge communication, as we have proposed it in Chapter 2, provides a useful structure for describing the knowledge-intensive interaction between experts and decision makers, especially for the case when expertise is pulled by decision makers. Instead, if knowledge is pushed by the experts without a clear request on behalf of the decision makers (case of Brookings), the communication is concentrated mainly on the two phases "Identify Experts & Expertise' and the 'Convey Insights, Suggestions, & Solutions' and the phase model does not provide a particularly insightful structure to grasp the particularities of the expert-decision maker interaction. Weaver and Stares (2001: 24), by referring to Kingdon, alternatively described the role of expertise in decision making with the help of March's "garbage-can" model: solutions (proposed by experts) often linger around unattended for quite a while until they meet quite coincidentally decision makers and are attached to a focal policy issue (Kingdon, 1995: 165).

In the next section, we will describe communicative challenges and practices, which are not specific to one or the other phase of the knowledge communication process, but more generally characterize the expert-decision maker interaction.

5   Phase Independent Challenges and Practices in the Knowledge Communication between Experts and Decision Makers

Some recurrent challenges and practices of the knowledge communication between experts and decision makers cannot be attributed to a specific phase in the knowledge communication process, but are valid throughout the process. These challenges and practices regard often more micro communicative aspects, like, for example, how to uncover terminology discrepancies between experts and decision makers, which otherwise lead to implicit misunderstandings.

In the following, we will discuss these general challenges and practices, which recurred in the three case studies. We have structured them along the framework for managing conversations from a knowledge perspective, as we have discussed it in Chapter 2. We argue that distributing these challenges and practices along the five dimensions of the framework allows for a better understanding of the dependencies between the various challenges and practices. Figure 12 gives an overview on the phase-unspecific challenges and practices of the expert-decision maker interaction.

In Figure 12, we outline phase-independent practices as we have elaborated them inductively for the three case studies and two meta-practices, which reflect concepts stemming from the literature, yet which grasp the kernel aspects of the case studies. In this way, the meta-practices are subsuming the inductively elaborated practices from the three case studies (indicated by the dashed lines). The arrows connecting the various challenges show proposed positive dependencies as they have emerged in the case studies and can be read 'leads to'. A lack in common ground, for example, 'leads to' a mismatched terminology. Although these arrows propose positive relationships (the more, the more), it is not our aim to elaborate precise propositions of causality (which is why we represent them in dashed lines). The arrows leading from the meta-practices to the challenges indicate negative relationships (the more, the less) and can be read 'reduces'. For example, engaging in boundary-spanning practices 'reduces' the problem of the lack of common ground. The lines from the meta-practices to the practices indicate "consist of".
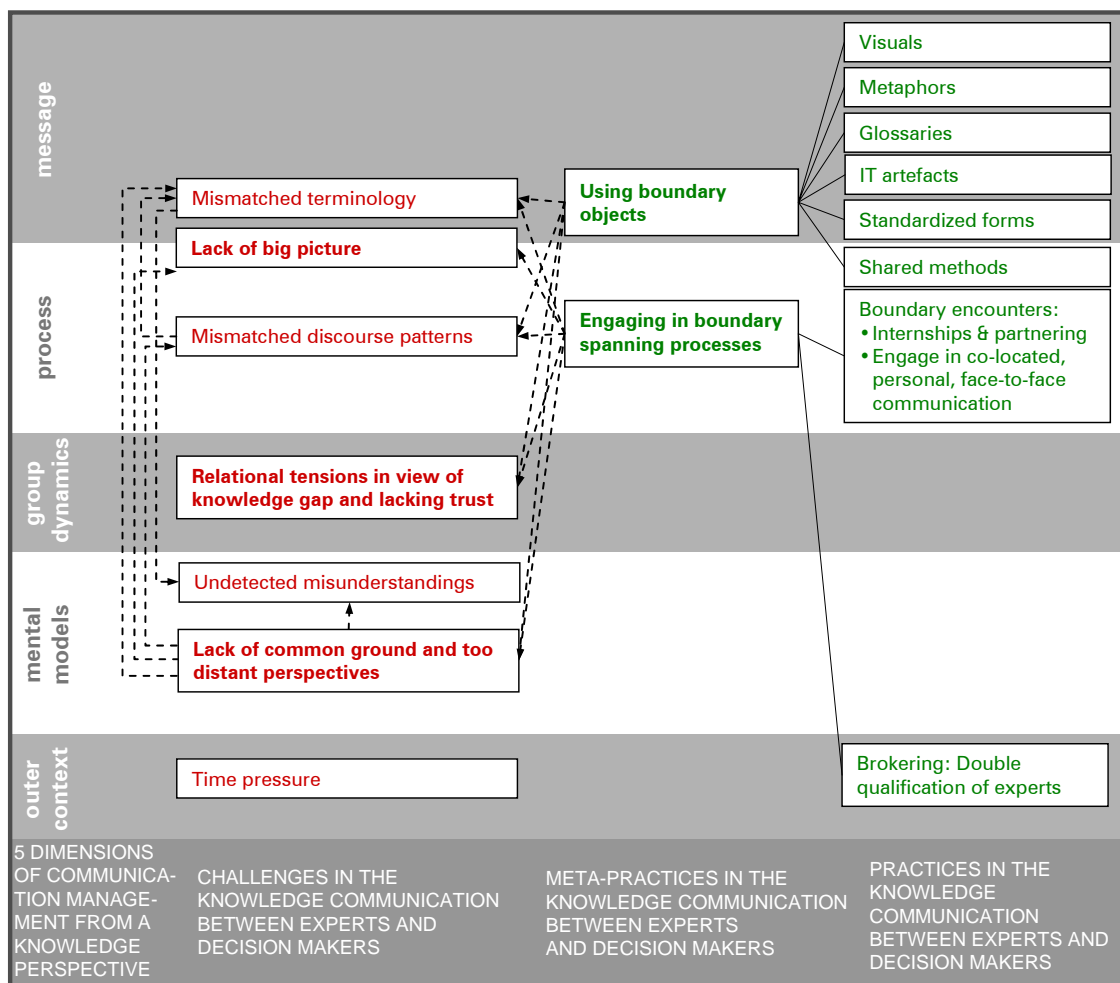
Figure 12: Major Phase-independent Challenges and Practices in the Knowledge Communication between Experts and Decision Makers across the Three Case-Studies

5.1 General Challenges in the Knowledge Communication between Experts and Decision Makers

Mismatched Terminology and Discourse Lead to Undiscovered Misunderstandings

Different language use has emerged as a recurrent problem in the three case studies. It often leads to undiscovered misunderstandings among experts and decision makers. We attribute the differences in language both to the message (mismatched terminology) and to the process dimension (mismatched discourse patterns) of the proposed framework (see: Figure 12). The problem of the undiscovered misunderstandings, instead, relates to the experts' and decision makers' interpretations and meanings and is therefore located on the

dimension of the mental models. As both aspects are closely interrelated, we will discuss them conjointly.

On the surface, the problem is about a *different use of terminologies*. At *Brookings*, for example, certain concepts that are very common to Brookings' experts like "cross-elasticity of demand", "multiplier effect", or "present value" are difficult to understand for policy makers. If Brookings' experts use such terms, the policy makers will concentrate on these and will divert their attention from the central issue, as William Gale mentions:

> "If you start: 'The present value of the social security deficit is 4 trillion dollars', they ask what you intend with present value, and you go and say that it is the amount today that with interest will equal.. and it just puts them off. I will say 'present value', (..) to make sure it is accurate, but I kind of put it at the end so that (..) so it does not block the listeners mind. I would say: 'Over the next 75 years the social security deficit is 4 trillion dollars in present value'."

At *InSure*, the use of technical terms equally makes a common understanding between experts and decision makers difficult. An IT-specialist explains that also the people from the business have a rather thick jargon, which is hard to understand for the IT expert:

> "The business side views the problem at a different level and speaks a different language than us. In order to make the communication work, it is our task to understand their language. If someone from the business unit comes and says: 'Regarding the premium reserve for external saving processes in the principality of Lichtenstein, next year, you have to give 1 percent of extra interests.' The typical IT-specialist can only shrug his shoulders and ask: 'What did he just mean with that?' A team leader is not allowed to shrug his shoulders".

The two quotes show that experts can counter this problem by *de-emphasizing technical expressions* and scientific terms and appropriating the vocabulary of the decision makers.

Yet, vocabulary problems do not only relate to the use of very technical terms. The more subtle problem is that experts and decision makers often *use the same terms to designate different things* or, to the contrary, that they *use different terms to designate the same thing*. A consultant of pom+ exemplifies this as follows:

> "It often happens that someone from the construction industry uses the same term as someone from the IT industry, but understands something completely different. (..) For example: what is a building? From a microeconomic standpoint a building is understood as a utilization unit and as such it is also represented in SAP. Added to this definition are criteria like how to rent and charge for the building. From a legal point of view, it is all different. There is a cadastral register, in which the

building is marked with a cadastral number, its borders are clearly circumscribed, and it has an insurance number. (..)" (R. Becht)

The example of the 'building' shows that misunderstandings are probable not only for abstract terms and abbreviations, but also for apparently very common and easy terms. At *InSure* misunderstandings have frequently arisen in relation to relatively simply words such as 'workflow', 'software production', 'admin-console', or regarding, for example, the difference between 'software' and 'application'[17].

The language difference cannot be grasped fully by the semantic differences. Language differences (at the message and process level) are based on differences in knowledge, experiences, and perspectives, which shows an interrelationship between the message and the mental model dimension of the framework (see: Figure 12, lack of common ground). A *Brookings*' scholar exemplifies this connection:

> "The language difference is often a proxy for a different set of experiences and backgrounds. You have members of Congress who have been running for Congress for 15 or 20 years and are used to a variety of activities that are not fundamentally based on economic research. (..) Economists talk in one type of way and, policy makers talk in a different way. Economists are almost naturally inclined to thinking: 'all else being equal, the partial equation of changing this is changing that'. Members of Congress often are not thinking in that way. They see two things happening at the same time so they must be casually related. It's much less theoretical. (..) There are often different languages involved. (..) The language difference is a proxy of a whole lot of other differences. Background and training really; and that manifests itself in language" (P. Orszag)

In this way, different modes of reasoning and 'thought worlds' (Dougherty, 1992) are expressed in language. In the previous quote it is shown that economists live in a 'thought world' of mathematical equations ('all else being equal, the partial equation of changing this is changing that'). IT-specialists, as shows the following quote, think in terms of information inputs and outputs:

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17 Bechky (2003) similarly discussed misunderstandings across occupational communities and showed that one reason for it is „decontextualization": A community assumes that their use of language is universal while it remains incomprehensible to another occupational community that is not sharing the same context. Bechky found that engineers attributed different meanings to the same word than assemblers or used different words to represent the same objects. While engineers had a more conceptual, schematic understanding of machines and work processes, assemblers' understanding was more spacio-temporal and processual. The misunderstandings that derived were either readily discovered or remained unknown for a considerable amount of time. Bechky showed that these misunderstandings could be reconciled through the use of „tangible definitions", that is the use of physical objects (such as machines) for illustrating one's understanding in a very tangible way. She claimed that these machines served as ‚boundary objects' and helped to create a common ground among the occupational groups. On the other hand, technical drawings from the engineers were not suited to create common ground as they were too abstract and unfamiliar and did not invoke „the loci of practice and conceptualization of the product that each group had" (p.325).

"The client has difficulties saying: 'In this and that module, you have to read the following constants from the database and multiply them with the value X, which is saved in another place'. We cannot expect from the client to know such internal aspects of the application".

As a result, not only vocabulary changes, but also discourse patterns[18]. While decision makers talk of cost efficiency, process reengineering and business opportunities, experts talk of functionality and risk containment. Language differences of this kind are not as easily remediable as when confronted with simple mismatches in terminology. The necessary translations can mostly be accomplished by developing a larger common ground and gaining a better understanding for the others' group preferences and perspectives.

Lack of Big Picture

The experts and decision makers in all the three case studies mentioned repeatedly that a major difficulty of their interactions with decision makers is to *gain and sustain the big picture of an issue*. At *InSure*, an IT-manager formulates this challenge as follows:

"One cannot always construct a complex image at first go. Everybody contributes some tesserae. That is often the problem: when can one be sure enough to know what is going on so that one can really make a reliable decision?"

Characteristic for a complex decision making issue is that it is tangent to a variety of specialized knowledge domains and that one expert or decision maker alone is unable to get an overall idea of it. The reported quote shows that because the experts' and decision makers' views are limited, it is difficult for them to know when the aggregation of the various specialized expertise allows for a faithful representation of the issue and for truly seeing the big picture.

At *InSure*, for example, if a change in an IT application has repercussions not only within the whole IT-infrastructure, but impacts also on a variety of business processes, then it is hard to see the big picture. IT-experts and managers have to pool and interrelate their various specific expertise, concerns, priorities, and points of view. The complexity and the ambiguity of the issue are often such that only as a collective can the group grasp the big picture.

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18 There are a multitude of meanings attributed to the concept of 'discourse'. Michel Foucault has mentioned that the term can be used to denominate "the general domain of all statements" or an "individualisable group of statements" or even "a regulated practice that accounts for a number of statements" (Foucault, 1972: 80). We use the term ‚discourse' in Foucault's second understanding to indicate a group of statements which are concerned with a particular subject area, e.g. a discourse on functionality rather than one on productivity.

> "Informatics is a very heterogeneous area. There are so many technologies, so many types of informatics. (..) This makes it very difficult to gain an eagle's view and understand what actually is at stake."

While the big picture challenge is related to the issue that is an object of communication (its complexity), we argue that the challenge is mainly of *procedural* nature (which is why we locate it at the process level of the framework). Weick similarly argues that "the big picture" is a misleading concept as it suggests something static whereas the issue is more one of a "big story" that evolves. (Weick, 2002: S9). The question is whether the communication *process* is such that the interlocutors can see the connections among the various contributions and maintain an adequate level of detail at the same time. In fact, experts and decision makers not only have difficulties in gaining the big picture, they might see it in the beginning, but then loose it underway and digress into (technical) details. In the case of *pom+*, for example, details are often difficult to understand and the client has to invest a considerable cognitive effort to do so. Yet, by focusing on them, he does not see how these details relate to the more general picture.

> "Our IT-specialist sometimes runs into the risk of digressing into technical details that the client cannot follow. Then you have to find a common language in order to make these technical aspects understandable. In other instances, explaining exactly how the technical aspects in the background work does not really serve the client, it rather confuses him. He lacks the connector pieces in order to understand." (A. Pesenti)

The capacity of gaining and sustaining the big picture is therefore also a challenge of m*aking relationships explicit* and showing the interconnections between the concrete details and the more general, abstract notions. An IT-manager of *InSure* illustrates why this is a challenging undertaking:

> "The interconnections among the various business processes and the technical systems are very high and the communication is difficult if someone does not have a broad knowledge and does not know the interconnections. It is as if you were to explain a very small part out of a ball of wool. This tiny part often has so many influencing factors and larger connections that it is often difficult to explain something without going very far afield. (..) If someone would not only do, but also understand, we would have to invest a much more time".

This final quote shows that the big picture challenge is about the seeing and explaining of the multiple connections of an issue. Experts and decision makers have to juggle simultaneously a multitude of causes, (indirect) implications, and contextual factors. In this view, the challenge of creating the big picture is also related to the capacity of sys-

temic thinking and relates to a cognitive capacity (arrow to mental model dimension on Figure 12).

Relational Tensions in View of Knowledge Gap and Lacking Trust

On the level of the group dynamics evolving between experts and decision makers, we can observe in all the three case studies that relational tensions often grow from the knowledge gap between experts and decision makers and represent a major challenge in their communication.

A first issue is that decision makers themselves feel knowledgeable about a certain issue and question the experts' status as such. A critique of this type does not refer to a specific argument an expert puts forward, but more generally questions the legitimacy of the expert as a person. From there, the expert can easily feel hurt in his/her pride and relational tensions can emerge[19].

The knowledge gap can lead to relational tensions also on the side of the decision maker. The decision maker might feel threatened to loose his/her face by admitting his/her own ignorance regarding a particular issue. A consultant of *pom+* reports such an instance:

> "The ignorance of a client sometimes inhibits the knowledge transfer. Once I had to deal with an older, experienced manager who then realized that I – by that time I was still very young – knew a little more in this specific field than he did. And then, his ignorance really blocked the knowledge transfer" (R. Baumann).

In this way, issues of pride and power are often related to the knowledge differences. Decision makers are used to think that they hold a certain power position because of their knowledge and experience. The interaction with the decision maker puts them in a rather unfamiliar and unpleasant situation, in which they have to admit their own ignorance on the issue.

> "Oftentimes, this is a problem of the upper and middle management. They do not ask, 'how should I understand this?' (..) It's not everybody's thing to say: 'This, I really haven't understood.'" (A. Pesenti).

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[19] In this regard, we mentioned earlier (see: Chapter 2) that during knowledge communication, knowledge often is at stake (Carlile, 2002) and that a person accepting a certain knowledge claim needs to question his/her own already acquired knowledge (Baecker, 1999) and might have to discard it. Feeling one's own knowledge to be questioned can be easily understood as a poor acknowledgement of one's value as a person and lead to relational challenges.

At *InSure*, where the knowledge communication takes place within the organizational borders, relational tensions can also grow from the organizational setting since decision makers are in a higher organizational position than experts (the IT-managers are the supervisors of IT-technicians)[20].

In this way, *formal hierarchical levels* can lead to informal dynamics between experts and decision makers, which are problematic for the integration of knowledge. One IT-manager recalls from her experience:

> "Often, there is an inhibition threshold ‚from down to top' in the communication between IT technicians and IT managers or also between IT technicians and the operating managers from the business side. ‚How should I talk with him?' And there it is my task to inquire with the right questions and to insist not to use a too strong technical language. And if the IT-technicians know that they can do it with me then they can also do it with the people from the business line."

Together, the knowledge gap difference and the supervisor-subordinate constellation can lead to considerable relational challenges. An often mentioned issue is trust, as this example of an IT-expert at *InSure* shows:

> "Management should have more trust. We always have to document everything, justify, and make things transparent. This takes a lot of time. In the end, the result is the same. We say, we need that much time, with or without a document outlining the exact evidence. They always require a detailed documentation in order to take decisions and this is quite difficult".

Mostly, such relational tensions do not become explicit topics of discussion. Yet, they build a context, within which it is difficult to criticize constructively, to share and develop knowledge, and to reach new solutions, as one IT-technician expresses:

> "Sometimes, one is so absorbed by the emotional issues so that it is a double challenge to talk about the same issue, even just business-wise".

In part, these relational tensions are reflections of larger organizational developments. *InSure*, for example, lived through a large reengineering process, which led to layoffs, redistribution of existing job-functions, and a more formal definition and execution of processes. In times of such transformations, uncertainties, fears, and resentments are lived intensely.

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[20] Szulanski (1996) empirically showed that 'arduous relationships' – i.e. distant and laborious relationships between individuals - are a main reason why knowledge is sticky and is not transferred between people.

Lack of Common Ground and Too Distant Perspectives

Different mental orientations and a *lack of common ground* appeared in all the three cases as a central challenge in the knowledge communication between experts and decision makers.

Without a sufficient *common ground*, a shared context and a minimal common knowledge base, communication partners are unable to embed their communications in a context that is meaningful to all of them. Continuous (implicit) misunderstandings (as we have described them earlier on) are the result. Yet, as experts and decision makers have different educational backgrounds, lived through very distinct professional experiences and, in most cases, interact only very sporadically with each other, their common ground is often very thin and their mental orientations and perspectives vary considerably.

Different mental orientations means that experts and decision makers not only know different things, but also that they know things differently[21]. One such recurrent difference in mental orientations is that while decision makers are by necessity oriented on finding *yes-or-no* or *go versus no-go* solutions, experts are trained to think: "it depends". Charles Schultze, a senior scholar at *Brookings*, gives an illustrative example to underline this point:

> "It's particularly (difficult) if three or more things interact. You write in terms of: 'now what I am going to tell you is difficult to know, but for God's sake, it is not enough. Therefore, I am going to tell you this. But, by the way, this is only true if..' (..) I just recently remember trying to do some consulting for an investment bank. It had to do with the U.S. trade deficit and what to do about it. For an economist, what really drives the deficit is the national saving and investment. If you invest more than you save, you got to borrow abroad. If you save more than you invest, it's vice versa. However, it is also true, and that is driving the trade deficit in the long run, that there are things happening in international trade itself which feed back to saving and investment. So the influences go both ways."

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21 Dougherty (1992) showed in a qualitative case study of five firms how different "thought worlds" inhibit expertise to be synthesized across departmental boarders in the context of product development. "Thought worlds" differed not only in relation to what things these people know, but how they know them. Each "thought world" has different systems of meaning and people of the different "thought worlds" interpret the same information differently as well as select different information as important. Similarly, Carlile (2002) describes the differences in orientation and perspective between different functional departments in terms of the ends pursued and the objects used in their practices. He claims that the sales work aims at "getting the numbers right", the design engineering at "getting the prototype to pass spec", the manufacturing engineering work at "building a high-volume machine", and the production work at "getting product out the door" (Carlile, 2002: 449).

While the expert often sees an issue to be interwoven with multiple other variables and to be entrenched in various feedback loops, the decision maker looks for "clear-cutting answers even where there really aren't any." (P. Orszag).

This difference in orientation can be beneficial both for the decision makers and for the experts. Decision makers' discourse is nurtured by richer thinking and additional evidence, which allows them to open up to new perspectives. On the other hand, experts risk less to fall into the "paralysis by analysis"-syndrome. Yet, if this difference in orientation is very pronounced, both experts and decision makers will interpret information differently and they will possibly not understand each other and only poorly know how to benefit from the other's perspective. At the end of the day, the decision makers have to take a decision and cannot make use of too much 'it depends'. On the level of the message of communication (see: Figure 12), this implies that the expert has to find an 'in-between complexity', an aspect, which, as we have outlined earlier on, is particularly important during the 'convey insights, suggestions, & solutions'-phase.

In the three case studies, various other differences in mental orientations appeared. In the case of *pom+*, for example, consultants reflect on issues on a more *theoretical, methodological, and procedural level* while their clients are much more *practically oriented*. Clients often are skeptical about this theoretical approach and see it as disconnected from their practical problems.

> "Sometimes, our approach is a little bit too theoretical for certain people. The theoretical path - that we need for the development of a concrete procedure – is for some people too long and too burdensome. (..) Most of the times I am responsive to the client's whish that I become more concrete. Then things start to go upside-down and become chaotic until the client realizes that the theoretical and methodological had its advantage" (N. Merkt).

Another difference is that *pom+*'s consultants are oriented towards *providing comprehensive, integrated solutions,* while clients are often mainly interested in *finding quick fixes and ready-made solutions*.

> "The client had the very strong idea that I would present a ready-made solution that he then could simply implement. I did not present such a ready-made solution because it did not exist." (S. Amsler)

While these differences in perspectives are functional for the expert-decision maker interaction, the challenge is to find a *sufficient common ground* so that experts and decision makers can benefit from their diverging orientations. During one of the interviews for

the case studies, an IT-manager of *InSure* draws two ovals with a very small intersection area and makes this central comment:

> "It is most important that the two sections are not completely disjoint. Intersections are needed and the one has to know something from the other and vice versa. If the knowledge and context are completely different, the translation work is huge. On the other hand, if the intersection is too large, one or the other is superfluous. (..) The intersection of the two understandings of the piece of information is so relatively small and this is really the central point".

Experts and decision makers have to identify this intersection and build on in it in order to further increase it. If experts and decision makers pursue a common overall goal, for example, they already share a very important common ground[22]. At *InSure*, the business line and the IT have a strong shared interest: the business unit can only work with well functioning IT-applications and the IT can only work in collaboration with the business unit. Further developing the existing common ground does not imply that the knowledge differences between experts and decision makers are deemed to be eliminated. Quite to the contrary, it is important to stand for one's own perspective, to keep the differences in orientation, but try to make one's own perspective accessible and interesting to the vis-à-vis.

In sum, a major challenge in the expert-decision maker interaction consists in finding the *right balance within the concomitant polar needs for specialization and common ground*. In the case of *InSure*, for example, specialized knowledge and skills are necessary to inform and implement a decision regarding an IT-application. Yet, in view of the implications of these decisions on the workflows and processes of the business line, the business line needs to be in power of the decision making. In this way, there is a need to functionally separate expertise and decision power. On the other hand, IT-experts and the decision makers from the business line must share some common ground in order to have a sufficient understanding of each other's language, perspective, and mode of reasoning, and ultimately be able to integrate it in decision making.

Many of the practices we will discuss later on provide means to bridge the differences in perspectives and to establish the sufficient common ground that is necessary for a shared understanding.

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22 Carlile (2004) shows that knowledge integration is more challenging if not only meaning has to be translated across the knowledge boundary (semantic boundaries), but also interests have to be negotiated (pragmatic boundaries).

Time Pressure

A final challenge we have found throughout the three case studies is the ever *growing time pressure*. We can attribute it to the outer context of the proposed framework.

Time is a very important contextual constraint of the expert-decision maker interaction as it is, in the first place, a core reason why decision makers build on experts' knowledge. When describing the "articulate need"-phase for the three cases, we have mentioned that decision makers even do not have (or want to take) the time to explain experts in detail what their problems are and what types of solutions they envision. We have also referred to practices that indirectly respond to the increased time pressure: information scaling and pushing standard structures. We have further discussed the issue that they have to release a piece of information in ever shorter time cycles. *Brookings* for example has to publish their articles much quicker than they used to and it has to time its research more narrowly along the policy making process. At *InSure*, certain adjustments within the IT-application have to be completed within one day, as an IT-technician explains:

> "We all have to react very quickly. For example, interest rates for tender offers. They used to be adjusted once a year or every second year and we had three to four months for the decision process. Today, we have to decide within one day."

Time for communication is often very limited, since contextual information is often left away, as this IT-manager mentions:

> "I only give minimal information. I don't have the time to educate the people profusely and as in-depth as I would like. This is another problematic point. (..) I just say what the task is and briefly explain the larger context, but just what is absolutely necessary."

For experts, it would be important to receive such contextual information so that they can better engage in sense-making and understand the reasons behind a certain request or estimate the potential implications of their recommendations.

The discussion of the general, phase-unspecific challenges has shown that three major communicative challenges obstacle the successful integration of knowledge between experts and decision makers.

First, how can experts and decision makers build the necessary *common ground* among them to benefit from their different perspectives, but manage to gain a common understanding and not be troubled with too many implicit misunderstandings? It is inherent in the expert-decision maker situation that they build on a different ground and it is

functional for their collaboration, yet too little common ground implies too much translation work and impedes a common understanding.

The second major challenge is how they can establish jointly the *big picture* of the issue and understand it on an accurate level of detail or abstraction. We have argued that while this challenge is related to cognitive issues, such as systemic thinking, it is mainly related to the communicative process like, for example, how people draw explicit relationships between one and another contribution and do not get lost in detailed "lateral" discussions.

Third, we have shown that relational challenges grow from the knowledge gap and from the hierarchical distance that often reigns in the expert-decision maker constellation.

Structuring this discussion with the knowledge conversation framework helped us single out how the challenges relate to each other. We could show more precisely, for example, how the different discourse patterns relate to differences in perspectives and lack of common ground. In the next section, we will present the most important practices in which experts engage recurrently in the three cases that allow them to address these challenges and to effectively communicative knowledge across its boundaries.

5.2 General Practices in the Knowledge Communication between Experts and Decision Makers

Manifold practices have recurrently become evident in the three case studies, which apply not only to a single phase in the knowledge communication process, but which are of a more general nature. Rather than discussing all of them, we refer the reader to the single case studies in the Appendices 1, 3, 5 and discuss only two meta-practices that subsume many of them. These meta-practices do not reflect only the findings from the purely inductive research of the case studies, but have been discussed in previous research (Arias & Fischer, 2000; Bechky, 2003; Boland & Tenkasi, 1995; Carlile, 2002, 2004; Koskinen, 2005; Star, 1989; Star & Griesemer, 1989; Wenger, 1998). While these conceptualizations helped us structure the phase-independent practices ex-post, the elaboration of the challenges nevertheless followed a very inductive approach. We therefore remain, also in their descriptions, very close to the case study work. When presenting the practices, we aim to show how they address the communicative challenges we have discussed for the expert-decision maker interaction.

The first meta-practice is the *use of boundary objects*, which aims to *overcome the knowledge boundaries between experts and decision makers*. Thanks to the use of boundary objects, experts and decision makers can bridge their two knowledge domains and create a shared understanding across the boundary.

The second practice aims to *transform boundaries by boundary-spanning processes (brokering and boundary encounters),* which turn the knowledge boundaries more flexible, elastic, and permeable. Rather than bridging two knowledge domains, and with this also signaling the distinctness of the two, this second meta-practice leads to an interlocking of two domains.

In the following, we will discuss the two meta-practices in detail.

5.2.1 Using Boundary Objects

Star and Griesemer (1989: 393) coined the term '*boundary objects*' and defined them as flexible epistemic artefacts that 'inhabit several intersecting social worlds and satisfy the information requirements of each of them'. They are flexible in so far as they can have different meanings in different communities, professional groups, departments, etc., yet their structure is common to all these groups so that they are recognizable to them and can serve as a means of translation.

Boundary objects are "*weakly structured* in common use, and become *strongly structured* in individual use" (Star & Griesemer, 1989: 393). Their general abstract structure allows various groups to adapt the object to their local needs. On a geographical map, for example, various expert collaborators of a zoology museum (e.g. conservationists and biologists) can mark their very different domain specific information (e.g. campsites, trails vs. ecological 'life zones') (Star & Griesemer, 1989: 411). The shared basis of the map (e.g. the common conventions) helps the two professional groups to interact and create a common understanding. The map is a relatively flexible structure, on which one can position the most various domain specific knowledge (logistical systems, war strategies, etc.). With this domain specific knowledge positioned on the map, it becomes a specific and strongly structured object. A Gantt-chart, to provide another example, shows a relatively loose structure and arranges time information on the x-axis and activities on the y-axis. A project manager who uses the visual tool to plan a project together with his team, places various information along the two axes and creates a much more concrete and strongly structured object. An auditor uses the same structure and adds information items

specific to his interests, requirements, and domain of expertise. An expert who communicates his domain specific knowledge through the boundary object has to adapt to its loose, but standardized and common structure and, in this way, is guided to communicate at a level of complexity and in a language that is comprehensible to the other side of the knowledge boundary.

In order to reach a shared understanding across knowledge boundaries, it is important that the various groups become aware of the *differences in understanding, perspectives, and approaches*. In fact, by providing a loose, but shared structure and a possibility to adapt it to the local needs of the various groups, the boundary object provides a means "for individuals to specify and learn about their differences and dependencies across a given boundary" (Carlile, 2002: 452). Boland and Tenkasi argue that when communicators do rich representations of their understandings, they can then more easily engage in the perspectives and understandings of others. In this way, boundary objects facilitate perspective taking (Boland & Tenkasi, 1995).

Boundary objects can be ordered in four categories, as proposed by Star (1989) and later Carlile (2002): 1. repositories (e.g. client database), which are adaptable locally as different groups can extract information pertinent to their domain; 2. standardized forms and methods (e.g. shared approach for problem solving, for assuring quality standards), which are relatively abstract structures that help to elicit, document, and organize local knowledge; 3. objects or models (e.g. sketches, assembly drawings, mock-ups), which are developed in specific loci of practice and carry both local meaning, but also meaning that is shared across knowledge boundaries; and finally, 4. maps of boundaries (e.g. workflow matrices, process maps, Gantt charts), which help to clarify dependencies and boundaries among various groups.

Boundary objects can be created collaboratively by representatives from both sides of the knowledge boundary or they can be created unilaterally by one side and then be communicated to the other (Boland & Tenkasi, 1995). In both cases, *it is in combination with the communication that structures around these objects (and not the objects alone) that allows for a shared understanding across the knowledge boundary*. Wenger argues, similarly, that both 'reification' and 'participation' are needed to make learning across knowledge boundaries possible. Boundary objects serve for reification, for holding down something and therewith, as we have discussed earlier, make differences in perspectives apparent. Yet, reification is also functional for coordination if the constituencies work in temporarily displaced areas and interact unilaterally with the object: in claims processing, for example, Wenger showed how the people who process the due payments of medical

services do not have to understand, on a content level, what the provided information on the medical services mean. Thanks to reification through standard forms, contracts, and procedures, this transition of the different types of information process takes place smoothly without the need of a common understanding (Wenger, 1998: 106). This implies also that reification alone does not lead to a common understanding, but serves to manage intersections. Yet, only if combined with participation – like co-located, face-to-face conversations or working together – interactive negotiations of meanings can take place and a common, coordinated, and generative meaning can be developed. For the context of the expert-decision maker interaction, it is this second form of the use of boundary objects, which is of highest importance. The interaction between experts and decision makers aims to create a shared understanding and integrate the experts' knowledge in a meaningful way in the decision making process. Therefore, reification and participation have to be combined and interactive talk has to structure around the boundary objects. In the forthcoming examples from the three case studies, we will show at various instances that the practices of developing and using boundary objects call for the practice of engaging in boundary-spanning activities.

Throughout the three cases, boundary objects of various forms are used to mediate meanings between experts and decision makers and to coordinate their interactions. We give examples of the use of boundary objects such as glossaries, standardized forms, shared methods, visuals, information technology artefacts, and metaphors. We discuss how these objects take over the function of boundary objects and we will therefore both refer to the defining characteristics of boundary objects as discussed in the literature (create awareness of differences in understandings and of the dependencies across knowledge boundaries; provide abstract and loose structures that become concrete and highly structured in their specific instantiations) as well as to the major communicative challenges we have elaborated in this cross-case analysis (overcome the lack of the big picture and of common ground and manage to deal with conflict constructively). In this discussion, we will particularly argue for the importance of combining boundary objects with flexible forms of communication, such as co-located, face-to-face conversations.

Glossary: Discover Differences in Understandings and Negotiate, Document, and Refer to Agreed Understanding

In the case of *InSure*, IT teams maintain glossaries with definitions of terms that are related to the team's area of expertise and that they make accessible to decision makers on the intranet or within reports. In this way, they want to counteract the frequent implicit *misunderstandings* of terms that were often only uncovered late in a project process and led to expensive project readjustments and delays. The head of the workflow team states:

„We started to do a glossary to define the concepts with which we work so that everybody who works with us knows what we conceive of a 'task', a 'process', or a 'work step'. It is important that our interaction partners share the same understanding and speak the same language."

Administration-console

An administration-console is a dialogue, which enables selected people to change the central services.

From a technical perspective, the access mode does not differ from a „normal" pop-up window of an application.

Application with pop-up window for user

Administration console

Access layer of data
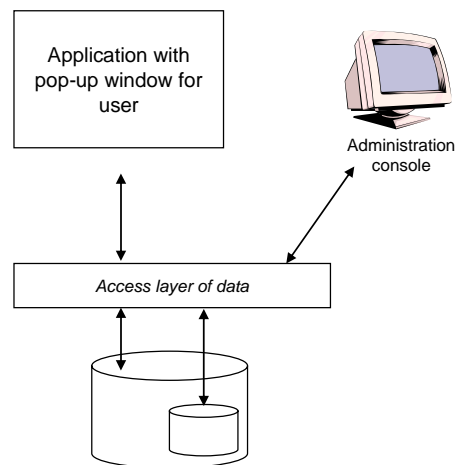
Figure 13: **Excerpt of the Glossary of a Preparatory Study for an IT Application Project at InSure: the Verbal Definition is Supported by a Visual Illustration**
(translation from German by the author)

The definition of a term in a glossary often has to be negotiated between experts and decision makers and is not simply imposed by the experts or the decision makers. The institution of the glossary invites both sides to make their understandings explicit, to discover differences in understandings, and to negotiate meanings. Knowing of the importance of these shared definitions, InSure's IT-experts note them also in their preparatory studies. For more complex concepts, verbal definitions are accompanied by visual illustrations as can be seen in Figure 13. Such visuals give verbal definitions a more tangible character and incite concrete visual imagination. The tangible quality helps to understand

a term on a more concrete level and facilitates the reasoning about the *concrete implications* of an issue[23].

Standardized Forms: Align Complex, Idiosyncratic Knowledge to a Loose Common Structure to Represent it with the Right In-between Complexity

Another boundary object that helps translate meanings across knowledge boundaries are standardized forms. At *InSure*, experts and decision makers also have institutionalized standardized forms that serve as boundary objects among them and make differences in understandings visible. For the ordinary requests, there are simple standardized forms through which the managers from the business line communicate their needs to the IT-specialists and through which the IT-experts note down the technical specifications of an application. Wenger notes that such forms lead to a "standardized reification", which serves as a coordination mechanism between various practices and constituencies without requiring a specific shared practice (Wenger, 1998: 106-107). The coordination between experts and decision makers becomes easier because standardization improves the *consistency and persistency* of the communication (Bregman & Haythornthwaite, 2001) and lowers the risk of misunderstandings. The same conventions, labels, and structures are used both by the IT-experts and the managers from the business side and throughout the various projects. Such standardized forms facilitate both the recognition of a type of information across the knowledge boundary and the possibility to reuse it persistently. A negative consequence, however, is that the more formalization is imposed, the less one has the possibility to express the full *complexity* of an issue as one IT-technician with regard to the intersection between IT-technicians and IT-managers mentions:

> "It is often difficult to convey the entire complexity of an application when writing down the detailed specification. The designer who works on the basis of these detailed requirements might not understand them fully and we have to discuss the issue again."

In this way, the structure provided by the boundary object can result too rigid for the expert who struggles to faithfully delineate the complexity of an issue. On the other side of the knowledge boundary, the object then results too abstract to make sense of it.

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23 Bechky (2003: 324) argued that tangibility is an important aspect of boundary objects. In the context of her study, working machines served as meaningful "tangible definitions" for engineers as they are embedded in the physical locus of practice of the assemblers. They can be touched and their meaning is very concrete and does not depend on verbal language. In this way, the tangibility of the machine helped assemblers to understand the *concrete implications of the abstract concepts* and designs of the engineer.

Therefore, it is important that the structure of the standardized form is loose enough to allow the expert to represent his knowledge on an adequate level of in-between-complexity so that he/she can represent his/her idiosyncratic knowledge with a structure that still allows for faithfully displaying the complexity of the issue, but that is – at the same time – remaining accessible to the decision maker. In the cases examined, we can see that the standardized form alone cannot function as a boundary object, but has to be combined with "participation" and face-to-face interactions (Wenger, 1998). In the case of *InSure*, standardized forms are combined with more flexible forms of communication and IT-managers engage in face-to-face conversations with their IT-technicians in order for the latter to be able to fill in the standardized forms of the technical requirements. Only this combination of fluid interactions around standardized forms allows for an effective translation of meanings. The standardized forms leave trace of a persistent knowledge and that then has to be flexibly contextualized and specified through conversations.

This aspect of the need to combine standardized forms with flexible forms of communication comes out even more clearly in another example of *InSure*: it is the case of the 'business concept' and its transformation into the 'technical concept'. Here again the boundary object is best able to translate meanings across knowledge boundaries if it is combined with very flexible forms of communication. We have described the interactive process through which the IT-experts and the business managers gradually reach a shared understanding of an ever more specific request (see: 'articulate need' phase). Following several workshops and meetings, the business line puts down its request in writing in the so-called "business concept" ('reification'). The experts then do a first analysis on this basis and write the "technical concept". Both the business concept and the technical concept can be understood as boundary objects. They are standard documents that keep track of the differences in perspectives (Boland & Tenkasi, 1995) – one from the business, the other from the IT point of view – and allow for the 'translation of meaning' (Carlile, 2004) in both directions (towards the business and the IT side). In this case, one boundary object alone (one standard concept) would not have been sufficient for the transformation of knowledge. IT-experts and the managers need to engage in a very interactive communication process that is structures around two boundary objects. Meetings with the IT and the business team, interviews with single managers from the business side and interactive workshops are the most important elements of this communication. The combination of boundary objects and flexible and interactive communication processes based on face-to-face conversations fosters precision, reification, and holding down as well as flexibility and alignment. The communication around the boundary object is necessary, to external-

ize implicit knowledge on the one side of the knowledge boundary, and, to concretize it in the specific context on the other side of the boundary.

Shared Methods: Convey own Knowledge through an Abstract Form that Can be Filled with Concrete, Implicit Knowledge

A more complex and abstract boundary object than glossaries and standardized forms are shared methods. Methods often receive tangible forms in visual representations (and therewith have an object character). In view of their loose, abstract structure that can be instantiated and filled with concrete, contextual knowledge, we view it as another important boundary object between experts and decision makers. At *pom+*, a shared method among the consultants and the decision makers at the client side is one of the key elements they use to try to translate and integrate the knowledge of the experts into the decision context of the client. Methods regard, for example, approaches for quality management (i.e. how to assure the quality of a certain process) or for facility management (i.e. how to move from the analysis of the problem to the development of the solution, and to its application). A consultant outlines regarding this:

> "Often, we guide the client on a methodological level and not so much on technical aspects. We have a moderation task and mainly provide the client with methodological knowledge. Also (..) during the as-is analysis, in which we need the information from the client, we give away methodological knowledge" (R. Baumann)

The method permits pom+ to systematically use the client as a source of knowledge:

> "There exists a lot of internal knowledge already. In part, it is only a matter of opening up a problem and better structuring the knowledge" (B. Buser).

The method has an integrating function because it allows the consultants of pom+ to elicit the client's knowledge that is embedded in practice, to embed this knowledge in a more general structure and to combine it with the more abstract and theoretical knowledge of the consultant. From the perspective of the client, the method provides a structure into which he/she can model his/her problems. The method avoids loosing sight of the goal and allows to view the *big picture*, although it cannot yet be envisioned upfront. Only by working with the method and eliciting the contextual knowledge, the big picture – the interplay of abstract and concrete information – can be obtained, but the method provides a meaningful structure for bringing together various types of concrete knowledge and perspectives. The common method also fosters the creation of sufficient *common ground* as it represents a shared platform thanks to which the consultant can grasp the

clients' practices and concerns and the client, on his side, sees a direct application in his context of the consultants' ideas and knowledge.

As is the case for standard forms, also a method can impose rigidity. The client of pom+ might perceive its structure as too inflexible if the consultant is not responsive enough to his particular case or that he is just making issues much more complex than they actually are. Therefore the reification provided by the boundary object always has to be combined with participation. Analogous to what we have mentioned previously, it is not the boundary object alone, it is the combination of the object and the communication that is structured around it, which is most important so that expert knowledge can be integrated in decision making, as this final quote illustrates:

> "I do not start by imprinting someone certain methods. I use them only in the background, to get to know what is important. (..) One needs an approach also so that the client knows the aim of the journey. (..) I first let the people talk and ask some questions. The disadvantage of this approach is that it needs a lot of time. But it also creates the trust that one listens and tries to understand" (C. Kaufmann).

Visuals: Foster Common Understanding and Recall

According to Star and Griesemer (1989) and to Carlile (2002, 2004), drawings, sketches, prototypes, models, and all sort of two or three dimensional visualizations can also take the function of boundary objects. Throughout the three case studies, but particularly in the cases of *pom+* and *InSure*, we have found support for his argument and have seen that visuals serve as a major boundary object in the expert-decision maker interaction. The use of visuals is a particularly rich tool to address a whole set of communicative challenges, which we have discussed earlier: visuals provide a form for representing in-between-complexity (conciseness-completeness), for developing a common ground, for gaining the big picture, and dealing with conflict more constructively. By outlining these functions of visual boundary objects, we would like to contribute to the discourse on the role of visuals in the communication across knowledge boundaries.

During *oral* communications (e.g. meetings, one-to-one conversations, presentations), experts of all three case studies engage in ad-hoc sketching on flipcharts, sheets of papers, and whiteboards. They use slideshows to project not only tables and analytic figures, but also photographs and other (often metaphoric) visual representations. They work with visual software for brainstorming and structuring thoughts like, for example, the MindManager tool. In their *written* communications (such as in reports, articles, etc.)

experts also increasingly use visual forms to represent information, for example, to provide overviews and present summaries.

A first benefit of visuals is that they provide an *additional language for conveying and understanding* the often complex issues. This visual language needs to build on generally accepted conventions and asks for conciseness and simplicity. In this way, it facilitates the bridging of strong knowledge asymmetries that exist across knowledge boarders. A consultant of *pom+* mentions with regard to this:

> "I often use images, symbols, or pictograms. Everybody understands a pictogram, it is universally
> understandable. For clients, I usually work with simple pictograms that do not need superfluous information" (N. Merkt).

Figure 14 shows an example of a visualization of pom+ that works with such pictograms and symbols.
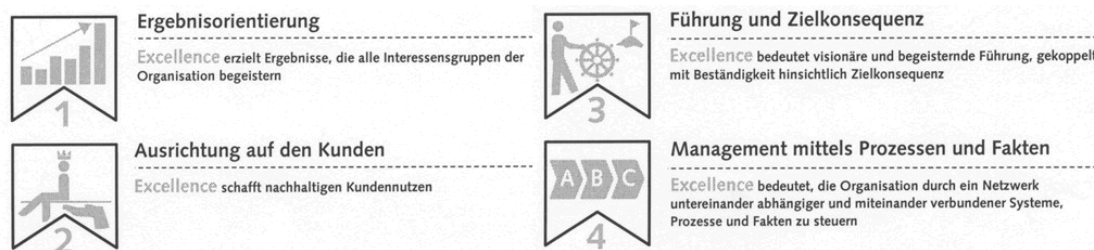
Figure 14: **Visualization is Used to Reduce the Complexity of the Content and to Expand the Existing Common Ground (Example of pom+, which Shows Pictograms that Refer to (Metaphoric) Language that is Understandable Across Knowledge Boundaries)**

The visual language provides additional elements that facilitate the development of a sufficient *common ground* among the experts and the decision makers. Earlier, in the section on the communicative challenges, we have found that, because of the experts and decision makers' distinct perspectives and lack of common ground, they often use language rather differently and have problems of misunderstandings. By supporting talk with instant sketching and drawing, a tangible, persistent trace of the conversation is developed to which the interlocutors can refer (enhanced co-presence) and thanks to which they can review the evolving arguments (enhanced reviewability). Co-presence and reviewability are both central arguments in establishing a common ground among conversation partners (Clark & Brennan, 1991) (for a detailed on this point, see: Chapter 5). The reference to the visual does not only take place by someone pointing at the object, the visual can also become incorporated into the language itself. A consultant of pom+ recalls:

> "For presentations, I work with colors. One alternative gets colored in blue, the other in green, etc.
> The client often starts to talk in these colors" (S. Jäggi).

The common ground is enhanced also because by visually fixing down a certain understanding, the conversation partners might discover differences in understandings and only by understanding these differences they can engage in developing a more solid shared understanding.

Thanks to the visual, an abstract concept, which is difficult to communicate in words, receives a very concrete quality (a visual form, a color), to which the communication partners can more easily refer. In this way, the concrete visual language can be incorporated into the verbal language and give this latter a more concrete quality as well.

Figure 15 shows a particular type of organigram of pom+ outlining its core processes and areas of activity (in green), the support processes or functional structure (in red) and the management processes (in grey). It is a typical type of visualization that helps the client to gain a more tangible idea of what pom+'s main activities are (it is less abstract as it has a visual reality).

Figure 15: Visualization Makes Processes and Areas of Activity More Tangible (Example of pom+ Showing an Extended Organigram)

An additional quality of Figure 15 is that the visual representation incites *metaphoric* allusions and therewith confers certain qualities from the source (or vehicle) domain of the metaphor to the conceptual domain (or tenor) (Inns, 2002). The image reminds us of a football court. In this way, the visual transports certain qualities of a soccer game to the corporation pom+ and the services it provides. This can be, for example, a high commitment, enthusiasm and fun, team spirit. The metaphor further enhances the

development of common ground among experts and decision makers as the 'vehicle' of the metaphor (Inns, 2002) (e.g. football) refers to a world that is known to both experts and decision makers. The following two quotes – the first of an IT-technician of InSure and the second of a consultant of pom+ - both show that metaphors activate the interlocutors' imagination when making sense of an issue.

> "I often need metaphors or images so that one can better envisage what I am talking about. Also, my thinking is oftentimes visual and in front of my inner eye, I see loops that twinkle shortly."

> "Whatever I want to convey, I try to relate it with associations. One creates another access than if one came up with big theories or analyses. (..) In this way, the client can imagine the aspect visually and he often becomes more open to the issue" (N. Merkt).

By working with visual associations, the information not only receives a more concrete quality, but it also becomes *anchored in a context that is familiar* to the addressee.

> „Rather than representing a time chart in a rather vacuous way, I mix it up and relate the single milestones with images. For instance, you then know to drive in a subway and get off at a milestone. Another track can represent another part of a project. I remember another instance when someone explained something with LEGO bricks. One LEGO brick represented a module and with modules one could say what one needed and we then assembled the various modules " (N. Merkt).

All experts and decision makers know underground maps or have played with LEGO bricks. The experts can explain something that is new and complex for the decision makers in analogy to the already known and familiar domain.

A final illustration of how metaphoric visuals can be used in the knowledge communication between experts and decision makers is the case of the "Alinghi". The largest part of the Swiss population remembers with pride that the Swiss "Alinghi" sailing boat won the America's Cup's in 2003. Working with this image, pom+'s consultants refer to a shared national experience and use what they and their clients share in common ground even if they do not know each other yet and even if their perspectives might be very distant. In addition, the boat metaphor ("we are all in the same boat") can be instrumental in addressing sensitive issues like group solidarity and spirit when faced with uncomfortable change. The "Alinghi"-image frames the issue from a positive perspective and helps to get the client "in the boat" for the project.

Visual representations give communicators the possibility to *express the essence of an issue in a very concise way* and help to express an issue on an adequate level of in-between-complexity and to gain the big picture. Figure 16 shows an example such a visual summary.

1. „Operations"
Math-Kernel-remodelling

6. Administration
system NLS

2. Offline-offer-systems
- AD-image
- makler-image
- POST

3. Math-service with
direct control system

5. CS-comparison-
calculator

4. Online-offer-system
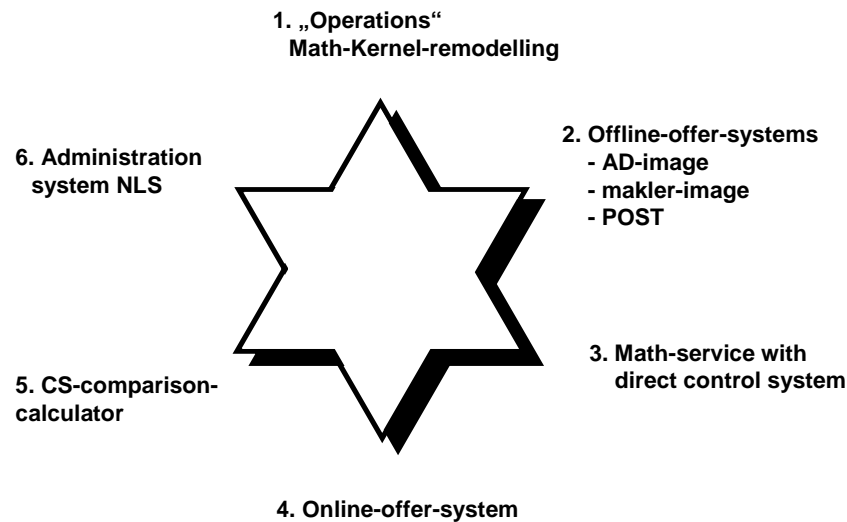
Figure 16: **Visualization Used to Provide a Summary (Example of InSure, with which IT-specialists Aim to Give an Overview on the IT-Applications and on the Technical Process that is Needed for the Calculation of Interests)** (Translated from German)

The integration of text and image can be rather poor, as is the case for an example from InSure (see: Figure 16). The arrangement of the six written elements around the star does not particularly facilitate understanding. Nevertheless, the managers from the business side that were exposed to this information might more easily remember that there were six IT-measures as the star shows six edges, or he/she might be left unconsciously with the impression that the proposed solution is a "star"-solution. We will come back to this mnemonic function of visuals later on.

Figure 17 shows another example, in which the integration between written text and visual elements are more closely interlinked.
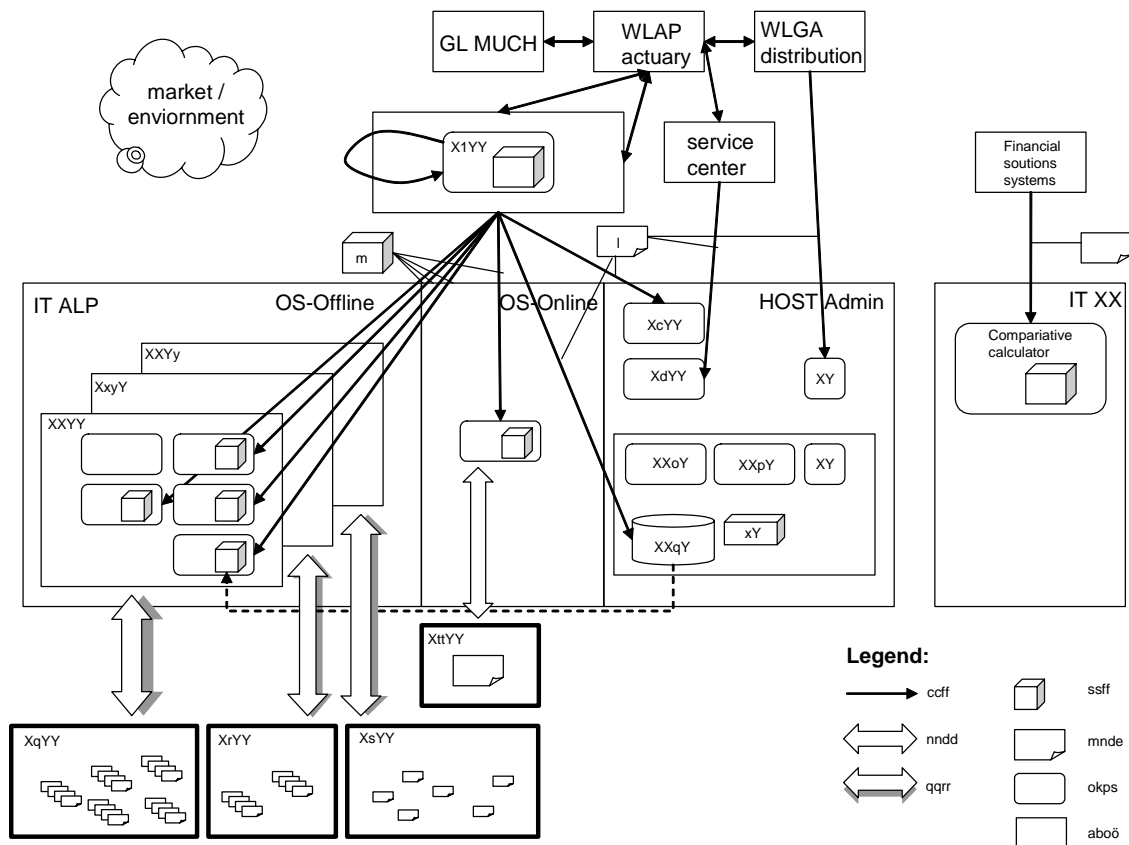
Figure 17: **Visualization Used to Provide Overview (Example of InSure, with which IT-specialists Aim to Give an Overview of the IT-Applications and of the Technical Process that is Needed for the Calculation of Interests** (real designations changed)

"That is why I have brought to you this [a poster, see: Figure 17] as a possible idea on how to discuss and elaborate a topic with the help of a graphical object. It shows interests that have to be distributed quickly. There is a location, where the interest rates are defined. One makes a fixed package and distributes it all over. It is the case that everybody has to test these when one incorporates the package in the application. Nobody had the overall picture of the sum of the places to where the package was distributed. That is why we elaborated this figure and it shows all that is needed in order to change the interest rates within one day. This representation turned to be a powerful communication instrument, first to elaborate the issue, but now also to communicate with the business line. Before, there were so many misunderstandings around this process and with a good figure you can really achieve a lot. And as we have such a limited space and time for our communications, the way we package our information is really central".

The quote illustrates that the elaboration of a visual both helps to *gain the big picture* (among the different IT-teams) as well as to convey and *sustain* it (when communicating to the business line). Without the visual, the different IT-teams did not fully understand which communication processes among the various elements of the architecture are needed to change the interest rates within a day's time. The visual provides this big picture

and makes the IT-teams comprehend which role the single IT-applications play within the overall IT architecture. In this way, each IT-team makes its own sense of the visual as it is mainly interested in how its own IT-application (for which it is responsible) is related to the overall system. The visual allows for different meanings in the different contexts, yet its overall structure provides means for coordination and translation. However, the question is whether the visual helps to bridge the knowledge boundary between the IT and the business department and provides a structure that is meaningful to both experts and decision makers. In fact, one other IT-manager is skeptical on regard: "In my experience, this representation is too technical and complex for the business line."

Not only static and finished visuals help to gain and maintain the big picture. Equally important are visuals that develop steadily by the evolving of a conversation or meeting.

> „In our meetings, I sometimes use the 'MindManager' tool and this works very well. One is concerned more with developing ideas rather than dealing with technical details".

The evolving, collaborative visualization helps to *stay on the more conceptual level* of the discourse and not get lost in a too detailed discussion on technology. In this way, with the support of the visual tool[24], it seems that the risk of loosing the big picture and of getting lost in a sea of technical details is lowered. Keeping track of the main arguments that are made during a discussion further serves to make comparisons and to better understand differences. Stefan Jäggi illustrates this point: "The idea is to retain what is discussed in order to put the different aspects in relation to each other." In this way, non-sequential processing of information becomes possible.

As a consequence, interrelationships, but also differences in perspectives become apparent. This is important not only to gain the big picture, but also to *deal with conflict in a more constructive way*, as this quote of a consultant of *pom+* shows.

> "Once I was in a meeting, in which a conflict arose and I did not know how to react. Fortunately, someone else was there, he went to the flipchart and laid out who said what and which relations existed. This deeply impressed me since one could see that they said the same thing, but expressed it differently. As a matter of fact, both wanted to go along the same way, towards the same goal, just that the one a little bit slower than the other" (N. Merkt).

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24 As the visualization effort here is supported by a software tool, the visualization can be more flexibly handled: "I always have the chance to develop the mindmap exactly in the direction, where I then don't find any more space on the paper or flipchart. This is why I very much like such tools" („Ich habe immer genau das Glück, das Mindmap in die Richtung zu entwickeln, wo ich dann auf dem Blatt oder Flipchart kein Platz mehr habe. Deswegen kommen mir solche Tools sehr gelegen.")

Figures 18 shows an example of a visualization that designates and clarifies differences in perspectives. It is a central function of boundary objects to make differences apparent because only by being aware of the differences in perspective, can experts and decision makers reach a shared understanding and uncover otherwise implicit misunderstandings (see also: Carlile, 2002). Outlining differences visually also helps to deal with conflict more constructively. Communication partners can better comprehend the logic of the divergent view and do not simply perceive it as "wrong" or as the personal opinion of the vis-à-vis.
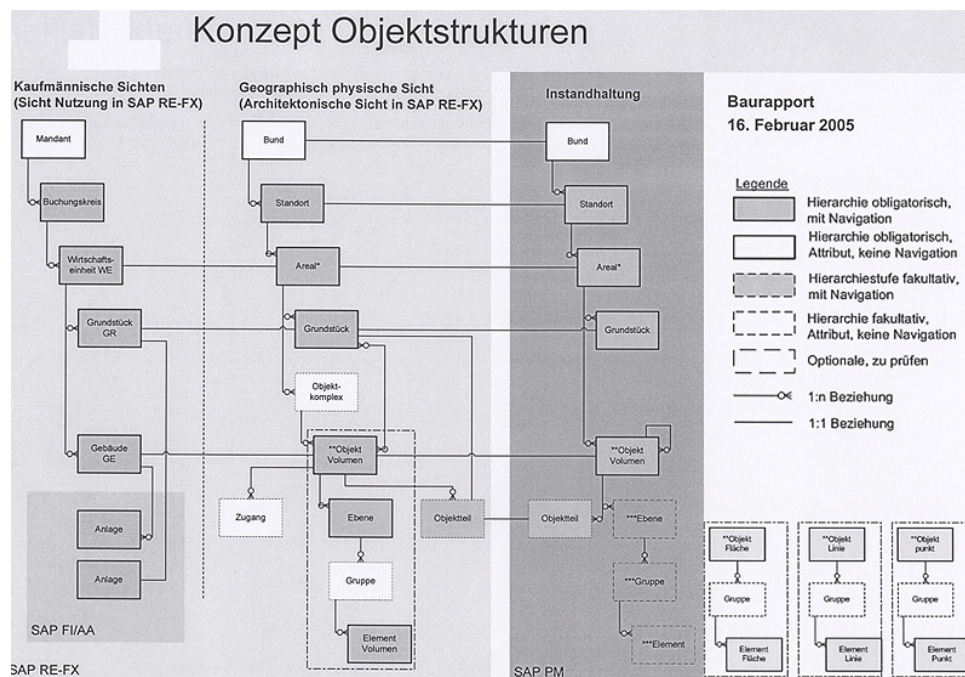
Figure 18: Visualization Used to Outline Differences in Perspectives (Example Drawn from pom+ Showing the Commercial, Geographical (Physical), and the Maintenance Points of View on a Real Estate Object)

Visualizations are further instrumental for integrating knowledge across boundaries because they *activate collaboration*.

> "I have realized over and over again that whenever someone in a meeting starts drawing an image, on a writing pad or anywhere, then people start talking around this drawing. It really helps to isolate the important aspects and to concretize the conversation topic".

Not all types of visualizations foster collaboration in the same way. Spontaneous paper and pencil sketching is often preferable than well designed PowerPoint slides. The latter visually communicates that the image is already completed for that an active collaboration and a joint development of an issue is hindered.

"I believe that it does not have to be such super ingenious PowerPoint presentations. It can equally be a flipchart and four colors. There, you can draw gradually and you can also cross something out. I believe that this is more important to develop something. It incites everybody to collaborate actively. If I just show a slide and ask: 'Do you agree with that?', then everybody says: 'yes, yes.'"

Visualization not only serve for developing a shared understanding across knowledge boundaries (establishing a common ground, gaining and sustaining a big picture, activate collaboration, and deal with conflict in a constructive ways), it also helps as a *mnemonic device* so that the communicated information can be recalled later on and be activated during decision making. In part, visuals can serve as a *concise documentation* of a conversation, of a main idea that emerged in a discussion, or of a written document (see: Figure 16). At InSure, this was mentioned by several interviewees as an established practice: "I often ask people at the end of a meeting to bring me the next time a sketch of this specific aspect we elaborated today." Yet, apart from documenting through visuals, visuals that are used in face-to-face or written communication are often those elements, which are remembered later on. An IT-manager of InSure illustrates this point:

"When I use visualizations, it is often not the topic, but the image, a mental anchor, which is referenced in a conversation. 'You showed there an image, didn't you?' and therewith, the people mean a whole topic. (..) Once I tried to show the complexity of our business, which exists because of the variety of products and sales channels we have. I first showed a surface area of one color and said: 'this is our business seen from far'. Then I have started to show distinctions and divided the area ever further in colored sub-areas. In the end, this became a very heterogeneous patchwork. (..) This image very much impressed the people and became a fixed reference point."

An image can be more easily remembered than an abstract and complex idea[25]. In addition, the interaction with a visual often implicates also an emotional involvement, which fosters an increase of the mnemonic capacity of the people seeing it. Finally, also the facilitated active participation leads to a better remembering of the issues. Facilitating the recall of an information item is an important aspect when decision makers not only have to understand expert information, but also have to activate these insights when actually taking the decision.

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25 The mnemonic capacity is enhanced both if people need to engage into a deep semantic processing or if they are involved emotionally. Images have both qualities. See also Pavio's (1971, 1986) argumentation on visual imagery where he claims that remembrances from images (in relation to verbal text) are more rapid, happen more holistically and allow for freer associations (an image "offers a complex set of spatial arrangements at a glance, showing both the object and its relationship to its surrounding" (Opdahl, 2002: 47))

To conclude, we have shown that visuals serve as an important boundary object in the knowledge communication between experts and decision makers. First, they are instrumental in order to develop a shared understanding between experts and decision makers and to integrate the knowledge from the individual to the group level. In particular, we have shown that using visuals has positive impacts on several of the main challenges of the knowledge communication between experts and decision makers: visuals facilitate the creation of a common ground, they help to gain and sustain the big picture of a conversation, they support a more constructive handling of conflict, and finally, they incite collaboration.

When describing the other boundary objects used by the experts and decision makers of the three case studies, we have stated that the objects alone would not be sufficient to integrate expert knowledge in decision making. The same is true also for visuals. Visuals often are polisemic and ambiguous and allow for various interpretations. A visual alone is also often difficult to understand as it only provides very synthetic information. In fact, an "unaccompanied" visual can result as "empty air" as an IT-manager of InSure calls it. He further outlines:

> "One goes to the flipchart and starts drawing boxes, arrows... But behind each symbol one draws there is also a semantic. And this semantic is not standardized, each one interprets an arrow a little bit differently. I have two systems, system A and system B and I draw an arrow between the two. What does that mean? Does the data flow in this direction or does the system A call up system B? One has to clarify semantics. Of course, if I know the person next to me, I know that he draws principally in this way and I in that way. But if one does not know each other so well yet, it is hard to find out these semantics. An unambiguous notation is very important."

While the loose semantics can be advantageous for experts and decision makers in order to turn tacit knowledge explicit or to jointly develop new knowledge (people can express something by analogy, of which they have more of an intuition), it can also lead to misunderstandings.

Visuals therefore have to be combined with other verbal or written communication. Only in this way, communication partners have an indication, in which direction they should interpret the image and thus they can dig deeper into the issue (see also: 'Convey Insights, Suggestions, & Solutions' phase: Scale Information Within and Across Media). We have mentioned above that a major function of visuals is that they incite conversations and collaboration. It is precisely in combination with these conversations that are structured around the visuals that they become a really powerful mean to communicate knowledge across boarders.

Information Technology Artefacts: Refer to Tangible Objects that are Meaningful in the Loci of Practice of the Addressee

Another object that can take over the function of a boundary object is a three-dimensional artefact that is part of the practice of the decision makers and can be used by the expert to concretely illustrate his/her more abstract ideas and recommendations. We have found this case only at *InSure*, as in this case the IT-application itself takes over the function of a boundary object within the knowledge communication between the IT-specialists and the managers from the business side. The different IT-applications are part of the daily practice of the managers from the business side and they conduct all insurance-relevant operations with them. Seeing the new IT-application developing, they can understand very concretely how the IT-specialists have interpreted their request. In the past, it happened frequently that the managers from the business side were able to precisely formulate their request once they had the concrete boundary object at hand. In this form, such a refinement was too late in the process and the process around the need articulation had to be changed. Yet, IT-specialists have learned to use already implemented parent applications to clarify with the managers what they envision with the new application[26]. In this way, the IT-application serves as a shared artefact to create common ground (Kraut *et al.*, 2003; Olson & Olson, 2000) and around which to organize interaction.

Metaphors: Expand Common Ground to Specialized and Abstract Domains

In the three cases, metaphors play an important role in the expert-decision maker interaction. A metaphor can take over the role of a boundary object as the vehicle of the metaphor (the source domain e.g. military invasion) provides a loose structure that is common to both experts and decision makers and can be turned specific by relating it to a specific conceptual domain (or tenor e.g. internationalization strategy) (Inns, 2002). For this particularity, Koskinen argued previously that metaphors can be viewed as boundary objects. Using metaphors, interaction partners can build on something that is common across the boundaries (the concrete vehicle of the metaphor) and on which basis both parties can further develop their common ground and explore differences in points of view (Koskinen, 2005). The playful language of the metaphor provides a flexible enough struc-

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26 Bechky (2003) made a similar point in an ethnographic study of a production floor, in which she analyzed the communication of knowledge between different occupational communities. While a shared understanding between two communities was difficult because of different conceptualizations and loci of practice, it was facilitated through the fact that both communities had a same work objective (e.g. creating a same product).

ture to elaborate a shared understanding despite the diverse knowledge bases of the inter-locutors. Koskinen exemplifies this idea for innovation processes and shows how the metaphor of the "knowledge navigator" and its gradual transformation into the metaphor of the "knowledge atlas" helped an interdisciplinary team to move from the product idea to the final product (Koskinen, 2005: 332).

To some degree, we are hesitant to expand the idea of the boundary "object" to a type of language use, as is the metaphor, which has no physical reality. Yet, the use of metaphors evokes imagery that is similar to viewing a concrete object. Metaphors can become a concrete reference point, as it is the case for physical objects. For these aspects, together with the capacity of metaphors to provide a flexible structure that becomes more concrete in the single instances, we consider metaphors to have the potential of being used as boundary objects.

In the three case studies, metaphors play an important role in the expert-decision maker interaction. In the case of *Brookings*, for example, books, articles and policy briefs often have metaphoric titles such as "Sisyphus Revisited" (Closa, 2005), "Leaving Money (and Food) on the Table" (Fellowes & Berube, 2005), or "A Guns and Caviar Approach" (Gale & Orszag, 2002). With the title "guns and caviar approach", for example, the Brookings' experts describe President Bush's politics of war spending and simultaneous tax cuts for high income-households and refer to an older metaphor that was developed in the 1960s to designate President Johnson's politics to simultaneously expand war and domestic spending, which was then discussed as the "guns and butter" politics. The example shows well how metaphors become meaningful reference points for both the policy makers and the experts. The experts can refer to them, and as the metaphor is a flexible construct, they can adapt it to today's circumstances and fill it with slightly different meanings.

At *InSure*, metaphors that have become important points of references are for example 'the awakening of the sleeping beauty'. This image has become an organizational myth and an image for how the organization and the whole insurance industry work today at a much faster speed. Other examples of such metaphors are the image of a 'driver who used to stroll in the streets with his Renault 4 and now has to run formula one races' or the image of the 'elk test of the Mercedes A class' to illustrate the importance of quality controls and of their meticulous execution. These images are again and again used during the interaction between IT-experts and managers from the business line and their meanings are adapted to the changing circumstances. In this way, they simultaneously refer to

what is *common ground* between the employees and new elements and ideas that are to be conveyed through the vehicle of the metaphor.

Metaphors are used by experts to gain some similar benefits in the knowledge-intensive communication as the ones we have discussed for the use of visuals: metaphors not only facilitate the understanding by referring to what is already *common ground* between the interlocutors and further developing this common ground to more abstract and specific knowledge domains, they also enhance the mnemonic capacity of the communication partners. The following quote of an IT-manager of *InSure* illustrates this point:

> "It is important that the counterpart in the communication can recall the few important aspects of one's communication. This is why I often work with images, establish analogies, and use my quote library. For example, to illustrate the importance of maintenance work within the total tasks of an IT-specialist, I often use the image of brushing one's teeth. If one does not brush one's teeth every day – and that costs five minutes each time – it can be that 10 years later, the teeth fall out. Then the costs and the pains are much more substantial".

One difficulty with metaphors is that the analogy is suited only to illustrate part of the issue and is problematic for other aspects of the same issue. In addition, people might focus extensively on the metaphor rather than on the issue that it stands for, as is expressed in the final quote of an IT-technician: "The stupid thing with metaphors is that I mostly find the error in the metaphor and not in the problem". Yet, finding out in what sense the metaphor does not help to explain the issue, can help to better understand what the issue at hand is and what it is not[27].

Overall, metaphors have again and again been referred to in the interviews as important instruments in communicating knowledge between experts and decision makers.

In the description of the various boundary objects that experts use to communicate their knowledge to decision makers, we have continuously mentioned that it is not the objects alone, but it is them in conjunction with the communication processes that are structured around them and with a set of boundary-spanning processes, which makes the integration of knowledge between experts and decision makers possible. In the next section, we will discuss these boundary-spanning processes more in-depth, that is the second meta-practice we could observe in the three case studies.

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27 von Ghyczy has argued that it is not the metaphors that work are best to explain a phenomenon or concept, but that it is those that break down, which induce most novelty in thought. Innovative reasoning happens when developing "a suite of promising" metaphors rather than working with the "perfect" one (von Ghyczy, 2003).

5.2.2 Engaging in Boundary-spanning Processes

The practice of engaging in boundary-spanning processes aims to soften the knowledge boundaries existing between experts and decision makers and to turn them more elastic and permeable. Wenger (1998) distinguishes between two major boundary-spanning processes: brokering and boundary encounters. We have observed both cases recurrently in the three case studies. Below, we will show how they serve to align the language between experts and decision makers and to develop a sufficient common ground among them.

Brokering

One boundary-spanning practice is "brokering", which Wenger defines as "the use of multi-membership" of a person in various practices so that she can introduce elements of one practice into another (Wenger, 1998: 109). A broker finds him/herself at a periphery of various knowledge domains and has the role of coordinating, translating, and transforming the knowledge between the various domains and perspectives (Carlile, 2004). Bechky, in the context of a production floor, described how technicians serve as important middlemen that span the boundaries between engineers and assemblers (Bechky, 2003) and translate back and forth both in verbal and in visual language.

At *InSure*, brokering is a very important practice in facilitating the successful communication between the IT-specialists and the managers from the business line. In the context of the definition of the requirement, for example, the S*upport* desk has a "broker" function as one IT-technician mentions. "We have a Support desk, which is the interface between us, the IT-specialists, and the client, the people from the business line. They support both us and the business people". The people from the Support desk have previously been working in the business line, but have done an additional education in IT management or programming. The Support desk translates in both directions and helps in defining the request.

The *IT-management*[28] itself has a broker function and translates back and forth between the business line and the IT-technicians. Their double qualification in IT and business administration and their daily work, which engages them more actively in the busi-

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28 According to Wenger (1998: 109), a central role of managers is to broker across knowledge boundaries and between practices.

ness decisions, helps them have a better understanding of the business context. An IT-manager mentions:

> "A big challenge is really the comprehension between the IT-people and the people from the business line. In this regard, I play an important interface role: the communication of the IT needs to be well aligned to the specs of the business line. But this is true also the other way round: when the business develops strategies, I have to be able to translate them so that my people can understand them. 'What does that mean for our company, what does it mean for me as a programmer?' (..) I am sort of a translator and only in this way can I effectively create sense."

Brokers not only have an important *translation function* (e.g. formulate the implications of a piece of information in another context), their double qualification allows them also to introduce some *lateral thinking*.

> "Thanks to my experience and to the fact that I am more distant from the daily programming, it makes it more possible for me to break up the tunnel view and the focus on details, and to show other possibilities"

At *Brookings*, we have shown that many scholars have previous experience in Government and that there is an almost continuous in-and-out-flow between the administration and the think tank. These scholars have a broker role within Brookings and the Brookings organization as a whole has itself a broker function between the daily policy business world and the more theoretical, academic research.

Boundary Encounters

Another boundary spanning activity are *boundary encounters*, which can be one-to-one conversations across knowledge boundaries, the immersion into the other's mode of working and thinking, for example, through visits, or delegations (Wenger, 1998). We have found various such boundary encounters to be major practices in the knowledge communication of the three cases.

In the case of *InSure*, for example, IT-specialists are sent to the business line for *internships*.

> "[During these internships] my people really learn how the business works. For two, three, or four weeks they go to the business unit and work together with the people there. They might not be a 100% productive, but they see very specifically on what the business unit is working. That is really a very important key success factor for the comprehension."

During these internships, IT-specialists can grasp not only some basics of the insurance business, but more importantly, they get to know also the business' mode of work-

ing, its people's main concerns, the issues which put them off, the stories that become lo-
cal myths, and the language they talk amongst each other[29]. By knowing these aspects, it
is easier for them to enhance the mutual understanding between the two parties.

Similarly, at *pom+*, the consultants *work at the client's site* for several weeks to un-
derstand the client's working mode, the working processes, and to solicit more implicit
knowledge. This close collaboration has a central role because it induces trust and helps to
establish real partnerships and amicable relationships.

> „If you get to know the client better, things in the communication become easier. He lets one ex-
> plain to him what is exactly meant by something, what it is all about, what advantages it brings,
> and what consequences it has" (A. Pesenti)

Care and trust are particularly important when communicating highly complex and
domain specific knowledge and when trying to externalize tacit knowledge (von Krogh,
1998). Knowing the client on a personal level further helps to establish common ground
and the consultant can more easily embed the information in a context that is meaningful
to the client.

> "Knowing private issues of the client helps to make conclusions by analogy. What type of car does
> he have, how does he make decisions? It also helps in order to explain something technical with the
> help of his hobby".

Finally, the interpersonal dimension is important also for dealing with political is-
sues. In cases of problems and escalations, these trusted people are very important to re-
solve conflicts and to successfully resume the project work.

Next to these rather time-engaging practices (internships and on-site collaborations,
which last several weeks), we can observe throughout the three cases a variety of shorter
boundary-encounters. At *InSure*, IT-specialists invite the managers from the business line
to selected IT meetings to sensitize them with the concerns and reality of the IT teams.
There are the meetings of the steering committee where delegations of the IT and the busi-
ness side convene and there are more informal meetings and workshops between the IT
and the business teams. *Brookings* organizes informative luncheons, conference retreats
over the weekend, or invites policy makers to informal meetings or more formal policy

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29 Nonaka and his colleagues make a similar point when underlining the importance of direct and shared
   experience for the sharing of tacit knowledge. They claim that since this type of knowledge is very
   hard to put into words, people can mainly share it by engaging in personal observation and doing
   (Nonaka, 1994; Nonaka & Konno, 1998; Nonaka & Toyama, 2002).

briefings. At *pom+*, there are the more formal milestone presentations, the workshops, the interviews, and the one-to-one interactions. In general, face-to-face encounters occupy a very central role in all three cases. These various forms of face-to-face communications represent the briefer boundary encounters between experts and decision makers and are an important complement to the more time-intense internships and on-site collaborations. Face-to-face communications, such as meetings, workshops, events, presentations, or one-to-one conversations, have a central role within the expert-decision maker interaction and fulfill a variety of functions.

Table gives an overview on these. For each function, the table shows in which case it was discussed and provides a quote from the interviews to concretize the function in the context of the relative case. We have inductively structured the functions in three categories: 'access knowledge', 'develop a shared understanding', and 'nurture relationship'. These three categories show that face-to-face interactions play a central role in three fundamental aspects of knowledge integration: providing access to the relevant information, co-creating a shared meaning out of the various perspectives and insights, and finally, fostering trustful inter-relational bonds (as we mentioned earlier, this is a central aspect for successfully implementing knowledge in the actual decision making and action).

The first rows of Table 11 show functions of face-to-face communications that are related to the *access to knowledge*: face-to-face encounters, such as events, are useful to *gain the attention* of the decision makers as events can be more advertised than an article or another written communication. They are more attractive also because they include a social element and give the decision maker the possibility to meet an expert and ask him/her very specific questions regarding a pressing problem. Face-to-face interactions further allow for *coincidental contact* with information. During a presentation, a decision maker might stumble upon apparently irrelevant information, which he will use, given his current concern, for solving the problem and create innovative associations and solutions. Finally, in a meeting, *all relevant information can be assembled around a table*, which leads to a more enhancing dynamic for developing novel solutions as opposed to a situation in which the necessary information is found only after various back and forth communications displaced in time.

The second set of functions is related to the *elaboration and development of understandings and ideas*. In all three cases, meetings, bilateral talks, workshops, etc. are central to develop a common understanding of an issue. A presentation or meeting can provide a *good first overview* of an issue and give a general orientation about the various aspects that are related to it. At *Brookings*, face-to-face encounters are also used to *overcome bi-*

polar positions and to more collaboratively develop solutions. By engaging in interactive means of communication and participating in the decision makers' work environment, the experts are further better able to *elicit knowledge* that is embedded in practice and of a more tacit nature. They do not simply superimpose their own knowledge, but adapt their expertise to the specific context of the decision makers. Interactivity and co-presence allow for continuously adjusting one's communication mode to the specific characteristics of the conversation partners, that is to their ways of speaking (e.g. vocabulary), their level of knowledge, their humor, etc. (Krauss & Fussell, 1998; Schober & Clark, 1989). Ongoing face-to-face encounters, spending time together, grasping a lot of non-verbal cues, and being exposed to the other's thinking gradually builds relationships (Wenger, 1998: 114) and people get to know each other on a more personal basis. These are very important elements in order to establish a common ground that is sufficient for creating a shared understanding between the expert and the decision maker. This understanding transcends a shared understanding of terms, but includes an appreciation and understanding of the reciprocal perspectives and leads to better aligned objectives.

	Functions of face-to-face:	Brookings	pom+	InSure
Access knowledge	**Gain attention**	"What we will be doing more of is organizing events up at Congress, because (..) [policy makers] don't have any time to come off the hill. They don't only not have the time to read anything, they don't have the time to take the cab and come here."		
	Foster coincidental contact with information	" I guess the key thing was that we had a lunch on the hill and fifteen key staffers of the Congress came. Of those also some moderate Republicans who were looking for something that would make the bill less aggressive. They essentially took our proposal. (..) They stumbled across it almost by coincidence."		"I believe that communication is something chaotic, but one always tries to structure it. (..) Something that I have forgotten, I will only think about it if I grasp the word by chance during a break. 'What are you talking about?' Then it is also the right moment. The piece of information has to reach me at the right moment in order for me to be able to anchor it."
	Assemble all the pertinent expertise around a table			"Issues deal often around technical aspects, which I personally cannot and do not want to evaluate. In such occasions, I normally assemble all the people from my sector or from other sectors around a table and we start discussing the issue. I have realized that this is much more efficient than if each one prepares a preparatory study in his on cubby-hole"

Functions of face-to-face:	Brookings	pom+	InSure
Develop a shared understanding — Provide overview on an issue	"There is an enormous amount of written information (...) and policy makers cannot possibly assimilate it all. One way to do that is to hear it first, and then get some more information with more depth that is in a written format. So one function of oral communication is shortcuts, to gain attention."		"If the topic is complex, a meeting is good so that everybody receives a basis and understands what the issue is about. It is also possible to very specifically outline what are the implications of a project"
Elicit tacit knowledge (not to superimpose own ideas)		"The client is our major source of information. (..) During the project, there is an interactive exchange going on. The consultant has to learn from the client. One has to understand what exactly the problem is, why the problem exists, and what the client's situation is."	
Create a common understanding	"Explaining it face-to-face to a policy maker and hearing them: 'Oh yeah, I get it and it makes sense', that helps a whole lot."	"If you flood people with documents at the beginning of a project, it is very possible that they understand them differently than how they were actually intended. (..) Therefore, in the beginning, interaction is key."	"To avoid misunderstandings (..), we usually start the project with a series of workshops." "If you make everybody sit around a table (..), you can simply be more certain that there won't be any misunderstanding."
Bridge partisan debates (convening function)	"We had dinners in the evening and a lot of time for talking. (..) Our objective was to find areas where there were agreements across partisan boundaries, so they could start to think of agreements for policies, rather than getting barged down by partisan debates."		
Nurture relationship — Create a sense of belonging, trust and an amicable and collaborative relationships	"Another function of face-to-face encounters is to create a community, and a sense of belonging."	"If we are two days out in the countryside, then this has a methodological relevance, but the other thing is that you get closer on a personal level. Maybe you start to address each other in an informal way and slap each other on the shoulders."	"It is the personal contact in the coffee break or in meetings, which allows the communication to flow. (..) It is important to get to know the people personally in order to better understand the other side. This helps to limit the misunderstandings and also to use the time more effectively."
Facilitate the dealing with difficult or delicate issues		"The moments of crisis of a project are those instances that can have large consequences. Here, the personal contact, being present on the spot, and being knowledgeable how to communicate are really central."	"We speak of 'reorganization' and not of 're-dimensioning'. For the employees this is an important difference because they know that nobody gets laid-off. These are types of information, which one prefers to communicate orally. The spoken word is more ephemeral than the written text."

Table 11: Functions of Co-located, Face-to-Face Communication (e.g. Meetings, Events, Conversations)

Finally, a last set of functions of face-to-face communication is related to *relationship*. By engaging in informal talk and spending time together, conversations nurture an *amicable and trustful relationship* between the experts and the decision makers. We mentioned that trust is very important in the expert-decision maker situation: the decision makers only build on the insights of the expert if he/she considers him as a credible and

trustful source. Trust is equally important when the decision maker has to find words for what is cloudy and not well defined, when something is complex, and when one has to explain something he/she feels embarrassed about (e.g. admitting errors). The face-to-face communication engages the person as a whole and not only what he/she writes or thinks. For this reason and also because it is highly flexible, it is the preferred mode of communication when needing to address and clarify *delicate or difficult issues*. Finally, showing commitment through physical presence is particularly important in situations of crisis.

Amidst all these important functions that have emerged in the case interviews, there are also important limitations of this form of communication for the interaction between experts and decision makers. Oral forms of interaction such as meetings, presentations, workshops, etc. are *volatile* and it is challenging to retain the knowledge created, shared, and integrated through and within this form of interaction. An IT-manager of *InSure* mentions on regard:

> "If one does a lot in a spontaneous way, then only a little is documented and this can lead to misunderstandings. (..) A conversation… it emerges and then disappears again. One has to retain it in some way. Otherwise, you go out of the meeting, the one person has understood it in this way, the other in another. And both have the idea that the other is in charge of the issue."

Conversations and talk are also limited in the *structural precision*. Their flexible form usually goes at the expense of a clear structuring of the issue with which conversers are dealing. Conversers jump from one aspect to the other, follow immediate associations, and do not structure the issue in a thought-out manner.

> "The conversation is only the beginning, like the draft for an essay. From there a structure has to be developed and it has to be defined; how exactly will I proceed?"

Yet, in combination with the use of boundary objects, e.g. developing visuals during conversations through the MindManager tool, conversations become less volatile. The flexibility of talk has to be combined with a more stable object that allows for 'retention' and that can lead to more precision and persistence. The two meta-practices of using boundary objects and engaging in boundary-spanning activities have to be combined to successfully overcome the communicative challenges that persist in the interaction between domain experts and decision makers.

6   Section Summary

In this chapter, we have drawn on three case studies – The Brookings Institution, pom+, and InSure – in order to gain a better understanding of the knowledge communication between experts and decision makers in various contexts. In the analysis, we have particularly focused on the communicative challenges and practices that emerged across the various contexts of the cases.

In a first step, we have found that the phase model for knowledge communication (exposed in Chapter 2) provides a useful structure for analyzing the expert-decision maker interaction, in particular for communicative situations, in which decision makers explicitly ask for the insights of experts (pull situation: pom+, InSure). By identifying specific phases, we could refine our understanding why looping behavior of refinement and alignment processes (feed forward and feedback loops across the various phases) are necessary in the interaction between experts and decision makers. In particular, we have seen how experts try to assure that these refinements and alignments happen early in the process and how costly late-stage readjustment cycles can be avoided. The combination of flexibility – through face-to-face talk – and holding down or 'retaining' (Wenger, 1998) is thereby central. In view of the ASK-problem (Belkin et al., 1982) and sense-making dynamics (Weick, 1995; Weick et al., 2005), the precise and unequivocal need of the decision maker can only be defined gradually. Flexible and rich face-to-face conversations have to be combined with action and putting down in written formats. In the 'convey insights, suggestions, & solutions'-phase, similarly, only by 'scaling' information across various media formats, can experts find a balance between conciseness and comprehensiveness and can convey a complex issue on a level of a meaningful in-between complexity.

In a second step, we have discussed the major communicative challenges that are not specific to a particular phase of the knowledge communication process. In particular, we have elaborated on the challenges of a lack of big picture, lack of common ground (and implicit misunderstandings), and unconstructive handling of conflict. We have shown that also these challenges can be addressed by the same principle of a combined flexibility and retention. In particular, we have presented two meta-practices, the use of boundary objects and boundary-spanning activities. While the boundary objects are useful to retain, boundary-spanning practices allow for the necessary flexibility.

In resuming these major findings of the case work, we would like to pinpoint also two major limitations of the presented analysis. A first limitation of the cross-case analysis

is that we have worked with relatively few cases. We have distinguished between situations of knowledge communication within and across organizations and between situations in which the knowledge was pushed by experts and those in which decision makers specifically sought for a certain type of insight or expertise. Basing the analysis on merely three cases, we only have one case (Brookings) for the push situation and equally only one case (InSure) for the within-organization communication. Furthermore, we have varied the context also by using cases from the private and from the public sector. There again, we only have one case in the public sector. Case study work does not strive for statistical generalizations, however working with more than one case per condition would have allowed us to sharpen our analytic generalizations (Yin, 2003).

A further limitation of the case studies on the level of the measurement is that we have conducted qualitative interviews merely with experts and only a few with decision makers. This allowed us to describe the knowledge communication mainly from the standpoint of the expert providing knowledge and expertise and less so from the decision maker's point of view. While access to decision makers was difficult, it would certainly have led to a more complete understanding of the knowledge communication process if we had taken into account their perspective more fully. In particular, the insights from the decision makers would have been necessary to gain a better understanding of the second phase of knowledge integration and of why knowledge could not be incorporated into the decision making.

In the next two chapters, we build on the inductive findings of the cross-case analysis to conceptualize them more systematically in a model for knowledge integration. We analyze, more specifically, how the major phase-unspecific communicative challenges that we have discussed – lack of big picture, lack of common ground, unconstructive handling of conflict – manifest themselves in face-to-face conversations. As we have seen, the principle of combining reification (through boundary objects) and participation (through boundary-spanning processes) turned out to be a central element in the effective integration of knowledge across knowledge boundaries. In this discussion, the role of visual boundary objects and face-to-face conversations has emerged in particular and triggers further questions. In what way do visual boundary objects impact the process that sees experts and decision makers integrate knowledge in their co-located face-to-face conversations? In the following two chapters, we will address this question in particular with regard to the use of a software-supported tool for collaborative knowledge visualizations that is designed for the support of face-to-face conversations.

Chapter 4

A Communicative Model of Knowledge Integration in Decision Making and the Role of Knowledge Visualization

Outline

1   A Communicative Model for Knowledge Integration in Decision Making

This chapter aims at synthesis. It presents a communicative model for knowledge integration in decision making following the discussions from the previous chapters. The model is inspired by prior research on knowledge integration (Chapter 2, point 1), but it more directly reflects, first, the insights of the literature review on conversations from a knowledge perspective (Chapter 2, point 4) and, second, our findings from the cross-case analysis regarding the phase-independent, more generic communicative challenges of the experts' and decision makers' interactions (Chapter 3).

The second aim of this chapter is to gain a more precise understanding of how the use of versatile, collaborative visualizations impacts the way experts and decision makers integrate their knowledge in decision making. The discussion of the case studies has shown that boundary objects – in combination with flexible forms of communication - are of particular importance in order to overcome knowledge boundaries and to integrate knowledge among experts and decision makers. In particular, we have focused on the role of visuals in supporting face-to-face conversations. In this chapter, we will refine our hypotheses regarding the impact of collaborative visualization on the knowledge integration in decision making.

When presenting the communicative perspective on knowledge (Chapter 2), we have argued that knowledge is developed and shared in social interactions and that we can therefore understand social knowledge processes as communication processes. The model for knowledge integration is communicative in this understanding. More specifically, it says that the overcoming of certain communicative challenges specific to the expert – decision maker situation reflects the successful integration of individual specialized knowledge into systemic group knowledge (Alavi & Tiwana, 2002). This integration from the specialized individual knowledge into systemic group knowledge structures is what we have defined the first phase in the knowledge integration process (see: Chapter 2, knowledge integration as a two-phase-process). In a second phase, the group knowledge is integrated into the actual decision making. The following model (see: Figure 19) shows these two levels of the knowledge integration process.
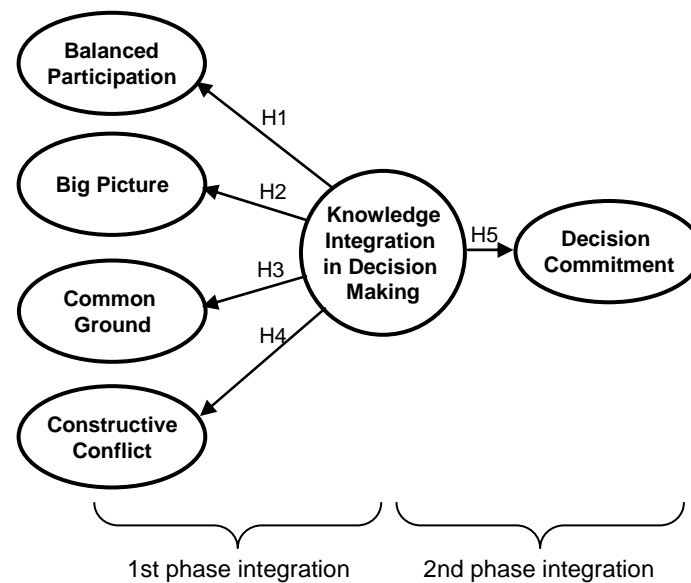
Figure 19: A Reflective Model for Knowledge Integration in Decision Making

We argue that if domain experts and decision makers manage to overcome four central communicative challenges, which are balanced participation, big picture, common ground, and constructive conflict, they are more likely to be successful at integrating their specialized, individual knowledge into synthetic common group knowledge structures (1st integration phase). Secondly, we stipulate that if specialized individual knowledge is successfully integrated in group knowledge (1st phase integration), a stronger decision commitment is the result. Decision commitment is an indicator of the integration of knowledge in action and decision making (2nd phase integration).

In this form, the model we present is an indirect reflective model with multiple mediating constructs (Edwards & Bagozzi, 2000). As a reflective model, the measures "represent reflections, or manifestations", of the construct and are not viewed as the causes of the construct (Edwards & Bagozzi, 2000: 155). We therefore would not say that knowledge integration is caused by balanced participation, the establishment of a common ground and a big picture, and finally by the presence of a constructive construct. Rather, the conjoint manifestations of the said variables are reflections of the occurrence of knowledge integration. It is an indirect model insofar as the variables reflecting 'knowledge integration' are mediating variables that cannot be observed directly and 'knowledge integration' can be understood as a second order factor.

Subsequently, we will present the single order constructs of knowledge integration one by one. We do so by referring, on the one hand, to the insights we have gained from

explorative case study work, and, on the other, to the existing communication and knowledge management literature.

1.1 Balanced Participation

Groups often fail to maximize the contribution of all members (Stasser & Stewart, 1992). Certain participants in a conversation, often subordinates, feel inhibited to expose their own ideas to management for fear of criticism (Dixon, 1997). In other instances, management has a rather autocratic style and does not actively seek for the contribution of others (Eisenhardt *et al.*, 2000). Unbalanced power structures lead to instances in which conversation partners participate in an unequal manner in the conversation process so that the various perspectives on an issue are not brought up and considered equally (Ellinor et al., 1998). In Chapter 2, point 4, we have shown that the balanced participation of all conversation partners is an important pre-condition for knowledge processes, such as knowledge integration (see: Table 4, in Chapter 2). The literature stresses that effective knowledge-intensive conversation are those in which participants alternate their contributions in balanced ways and actively engage in participation and collaboration (Barge & Oliver, 2003; Beer & Eisenstat, 2004; Dixon, 1997; Eisenhardt et al., 2000; Ellinor & Gerard, 1998; von Krogh et al., 2000). Von Krogh et al., for example, argued that conversations in which people can share tacit knowledge need to be characterized by active participation of all conversation partners and an atmosphere, which invites open and unstructured contributions (von Krogh *et al.*, 2000: 144). In a situation in which not all participants of a conversation can participate in the collaborative co-construction of knowledge, the specialized knowledge of all members will not be integrated. Without the balanced participation of all conversation partners knowledge integration is impossible at its basis.

In the discussion of the case studies, we have seen that both experts and decision makers are aware that an important part of their job is to actively incite the participation of the other party. We have shown that the expert tries to actively involve decision makers, to solicit their knowledge, to develop an understanding of their perspective, to countervail possible fears related to change, to discover the hidden causes of a problem, and to prevent possible misunderstandings. To do so, they use interviewing techniques and work with methods to solicit and structure the decision maker's knowledge. Arguing that balanced participation is a pre-condition for knowledge integration, we claim that:

H1: the balanced participation of all participants in a conversation positively reflects the process of knowledge integration.

1.2 Big Picture

In the cross-case analysis, we have shown that a particularly difficult challenge of the expert-decision maker interaction and an important indicator of knowledge integration is the fact of gaining and sustaining the 'big picture'. For the experts and decision makers, a major difficulty of their interactions is not to loose track of the overarching thread of an issue, but to integrate their various points of view and the range of pertinent aspects in order to finally understand how these different elements interrelate with each other and form an integrative whole. They often had the feeling of being stuck in a sea of technical details of which they did not know how they related to the more general issue that was the object of decision.

From the case studies, we have learned that the big-picture challenge is related to the capacity to see and draw *interconnections* and to find an adequate *level of detail or abstraction*. We define the big picture challenge as the difficulty to gain and keep an adequate overview of a complex issue by identifying its main drivers and the interconnections between them, while paying sufficient attention to its relevant details.

Experts and decision makers have to see the *interconnections* between the various perspectives they bring into the discussion, between the specific issue on which they have to decide and the larger context in which it is embedded (e.g. related issues). Experts and decision makers have a very specific view on the issue and often are not able to envision the big picture of a solution or decision on their own, but have to integrate both perspectives. In this situation, the challenge is to be open enough for another perspective and to see the interconnections between the different perspectives and points of view. Second, experts and decision makers have to understand how a specific technical aspect that an expert mentions relates to the more general discourse of the issue. Harkins defines "big-picture thinking" as the "ability to conceptualize underlying or systemic causes driving a problem or issue" (Harkins, 1999: 34). In this light, the capability to gain and maintain the big picture is strongly related to the ability of systemic thinking. Senge advocates that while traditional analysis focuses on separating out different pieces, the holistic perspective of the systems thinking approach focuses on how things are interrelated and how they form an

overall system (Senge, 1990). The challenge is to connect isolated pieces into recursive causal chains and to develop a more dynamic view of a system[28].

Next and related to the issue of interconnections, the big picture problem is also about the adequate *level of detail or abstraction*. Too much detail leads to disorientation (how does the detail relate to the more general issue?) and a feeling of a loss of time and of a lack of pertinence. It has been argued that "creative processes involve first envisioning 'the big picture' and then working out the details at a later stage. A sculptor, for example, starts by carving out a rough outline and then progressively adds finer detail" (Ringach, 2003: 7). Yet, in many cases, experts and decision makers cannot simply adopt such "a top-down (or coarse-to-fine) method" (Ringach, 2003: 7), but "the big picture is formed by small details" so that the challenge is not simply to understand the big threads of an issue, but also the small details of which they are made (Sull *et al.*, 2005: 37). Providing details is often necessary to understand a more abstract concept, to see the implications of an issue, and to comprehend whether a certain solution is feasible or not. Rhodes argues on this purpose that "one of the most common reasons for being off the mark is operating on the wrong level or scale" (Rhodes, 1991: 162-163) and not marking clearly on which level of detail one is operating. It is not self-evident to judge upon the importance and pertinence of a piece of information and to determine the adequate level of detail. Experts, with their very domain specific, but profound knowledge (Hoffman *et al.*, 1995), perceive something as still quite abrasive and superficial while for the decision makers it is already extremely specific and too rich in detail.

With regard to the interconnectivity-capacity and the level of detail/abstraction, we can understand the big picture challenge as related to the *issue* upon which decision makers have to decide and for which they ask for the experts' advice. Alternatively, we can understand the problem as related to the *process of the conversation* itself. The interconnection issue, for example, refers to the challenge to see the links between the causes of an *issue*, or between the causes and their symptoms. But the interconnection issue can refer, also, to the challenge of drawing the connection between what X said five minutes ago and what Y said just a moment ago and whether there are explicit links among the single contributions or phases in a conversation, which facilitate the creation of the bigger picture.

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28 In the realm of systemic thinking, the big picture challenge has been discussed mainly as an individual challenge and not as a social and communicative one as proposed here. Other authors who conceived this problem on an individual level, have further argued that certain cognitive styles (e.g. the 'imaginist') are better suited to see the big picture than others (Graetz, 2002). While for them, the capacity to see the big picture is innate and stable for a person, Gasper and Clore have shown, in contrast, that the individuals' mood impacts on his/her capacity to see the big picture; if people are happy, they tend to be more oriented on the forest, if they are sad they merely look at the trees (Gasper & Clore, 2002).

We believe that the big picture of the issue and the big picture of the conversation process are very much interlinked so that a more explicit structure of the conversation process also makes it easier to gain the big picture on the issue. In a conversation, in which it is clear how a certain statement relates to another and on what level of abstraction one is moving, it is also easier to understand how a certain technical detail of the problem refers to one of its more general drivers. In order to keep the 'big picture' construct as clean as possible and not to mix it up with the other constructs of our model, we focus entirely on the process level of the conversation process itself. We claim that:

H2: successfully coping with the big picture challenge positively reflects the process of knowledge integration.

1.3 Common Ground

Alavi and Tiwana argued that 'mutual understanding' or mutual knowledge – understood as the knowledge that is shared among people and that is known to be shared - represents one of the key challenges of knowledge integration. They say that "it lies at the intersection of the specialized knowledge sets that a virtual organization must integrate" (Alavi & Tiwana, 2002: 1033). Similarly, Carlile (2004)and also Bechky (2003) refer to the importance of 'common knowledge' or 'common ground' for managing knowledge integration across knowledge boundaries. In communication theory, this is best known as the 'common ground' challenge, as proposed by Clark and his colleagues (Clark, 1996; Clark & Brennan, 1991; Clark & Marshall, 1981). Common ground is defined by the context that conversation partners can reasonably assume to be sharing among them. It includes their background knowledge, beliefs, current interpretations, goals, values, but also their social and physical context and more personal attributes as speech style or emotional state (Krauss & Fussell, 1991). It is said that communication is more efficient and productive when people share greater amounts of common ground (Olson & Olson, 2000). At least, participants of a conversation need to share a minimal common ground in order to understand each other and to take informed decisions. Fahey and Prusak outline for example: "In the absence of shared context, individuals' differing perspectives, beliefs, assumptions, and views of the future are most likely to collide and thus immobilize decision making" (1998: 258). They believe that without the needed shared context, people will not reach a deeper understanding through dialogue and will not be able to traverse the difficult path from information to knowledge and neither from knowledge to decision making. A related concept to the one of common ground is "ba", which has been intro-

duced by Nonaka and his colleagues. They understand "ba" as a shared physical, virtual, and mental space, "a 'phenomenal' place" (Nonaka & Konno, 1998: 41), which is necessary in order to create new knowledge. Although the concept of "ba" is larger than the one of common ground, it stresses the same idea that, in order to engage in processes such as knowledge creation or knowledge integration, it is necessary to share a certain common space, in which the knowledge to be integrated can be embedded. It is a space that involves shared experiences, ideas, values, but also common physical and virtual rooms, which include artifacts and universes of meaning.

Interaction partners engage in grounding (activities to build common ground) by using the sources of community membership, linguistic co-presence, and physical co-presence (Clark & Marshall, 1981). If people know that they belong to a same group or population, they can assume that the peculiarities of this group can be considered to be common ground (community membership). Second, if they had prior interactions (linguistic co-presence), they then have established certain aspects and relations to be common ground (they have agreed in earlier communications that when X is true then Y). Finally, if they share the same physical setting (physical co-presence), they can use it in the form of deictic speech (by pointing and using words like 'that' or 'here') and non-verbal communication (e.g. gestures) to build common ground (Clark & Marshall, 1981).

In the expert-decision maker situation, these sources of common ground are often sparse; communication partners do not belong to the same professional community and have a few knowledge on the peculiarities of the other community, they have few interactions with each other (lack of linguistic co-presence), and communicate in written formats (lack of physical co-presence). In fact, many interviewees of the here reported case studies referred to the common ground challenge: Experts, when preparing their reports or presentations, often have difficulties in assessing the decision makers' knowledge and even in evaluating their own knowledge in relation to the others: What should they expose that is valuable to the decision makers? What can they take for granted? The common ground challenge also comes to play when experts and decision makers have to deal with implicit misunderstandings. They are often unaware of using specific terms (e.g. process management) in a completely different way (e.g. as a management versus a support process) and realize that they have misunderstood each other only much later. This can lead to considerable consequences such as late redefinition of project scopes and consequent project delays. The fact that experts and decision makers use language differently implies not only that they have different understandings of terms, but includes also different ways of ex-

pression, the use of different jargon, and other conventional features (differences in pho-
nology, morphology, syntax, semantics, and pragmatics (Clark, 1996)). It emerged several
times in the interviews that underlain to language, experts and decision makers have quite
different perspectives and modes of thinking, which makes a shared understanding quite
challenging. While economic experts, for example, are inclined to think that when 'all else
being equal, the partial equation of changing this is changing that', policy makers often
infer from the concomitance of two events that they must be casually interrelated. Inter-
viewees reported throughout the various case situations that if the lack of common ground
is very apparent (for example if the expert's knowledge is very specific and technical or if
experts and decision makers interact for the first times), it is particularly important to in-
teract frequently, meeting physically and informally, and rely on face-to-face conversa-
tions.

The concept of "common ground" comprises not only the idea that the communica-
tion partners share a common understanding of an issue and a joint vision of what they are
aiming to achieve. As the first examples from the case studies have shown, it also means
that the experts and decision makers have a sense of the reciprocal knowledge and perspec-
tives (they know what and how the others know)[29]. Only with a sufficient common
ground, the communicator is able to adjust his/her messages to the receiver: What does he
know and where is he ignorant? What level of complexity will be suited to assure his/her
understanding? Krauss and Fussell call this activity 'reciprocal perspective-taking', in
which one tries to experience the situation as it is lived by others and adapt the content
and form of the message to it (1998). The reciprocal perspective-taking is an important
aspect in forming common ground among communicators. If it is missing, people ulti-
mately have to draw on their knowledge of the more general social categories to which
their vis-à-vis belongs (e.g. car fan, engineer, New Yorker) and from which they can induce
certain general characteristics (Clark, 1996; Krauss & Fussell, 1998). As the conversation
partners go on in the interaction, they receive continuous verbal, para-verbal, and non
verbal feedback and this additional information allows them for gradually fine-tuning their
assumptions of the perspectives and information needs of the others (Krauss & Fussell,
1998; Schober & Clark, 1989). In this way, the more the experts and decision makers in-
teract, the more they establish a common ground between them, and the better they can
adjust their mode of interaction. Conversations are a communicational form that allows
participants for sharing experiences and therewith is especially important in creating 'per-

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29 This aspect of having a sense of what knowledge is shared among experts and decision makers and
   what is unique to each party, is similar discussed in the literature under the concept of transactive
   memory (Hollingshead, 2001; Piontkowski et al., 2003).

sonal common ground' (Clark, 1996). Common experiences are "powerful sources of shared meaning because it is possible to reference the experience and thus to bring to mind for everyone a meaningful image" (Dixon, 1997: 32).

The critical reader might legitimately ask if there is not an apparent contradiction between the here proclaimed necessity of a common ground, on the one hand, and, on the other hand, the growing necessity for strong specialization of functions and roles (it is the very scope of experts and decision makers to have different perspectives, backgrounds, priorities). Deetz, for example, describes the sustaining of differences (and the therewith going creativity) as an altogether opposite objective of dialogue than aiming for common ground and value consensus (Heath *et al.*, 2006). Similarly, Dyer and Nobeoka could show in a different context (they analyzed the sharing of knowledge on a company network level) that "strong ties" (i.e. a lot of common ground) are well suited for the diffusion (exploitation) of existing knowledge rather than for the exploration of new knowledge, which is the strength of "weak ties"-relations (Dyer & Nobeoka, 2000: 364/365). Translated to the context of experts and decision makers, this means that strong ties and a lot of common ground would lead mainly to status quo-oriented decisions, which are rather problematic in complex, ambiguous, high-velocity environments. We see this apparent stretch between common ground and specialization not as dualisms, but as dualities. The common ground challenge really is a question of balance. Too much common ground would render the separation of the expert and decision maker roles obsolete, too little common ground would render their communication extremely difficult if not impossible. The aim in the collaboration of experts and decision makers therefore must be to assure a necessary common ground, but not to have too large overlaps. For groups who have just been formed, as is the case of the experimental setting of this study, the risk of having too much common ground and not enough specialization is relatively small. We claim that:

H3: *establishing a common ground among the conversation partners positively reflects the process of knowledge integration.*

1.4 Constructive Conflict

Conflict is both necessary and threatening for the integration of knowledge. In Chapter 2, we have argued that conflict, on a content level, has an important function in developing novel approaches and integrating knowledge (Argyris & Schön, 1978; Eisenhardt et al., 2000). On the other hand, if interpersonal conflict arises, conversation partners are

mostly unable to deal with it in a constructive manner so that it mostly has a detrimental impact on the advancement of ideas (Gratton & Ghoshal, 2002; Weeks, 2001). In the case studies, a recurring issue has been that the knowledge gap between experts and decision makers led to such unconstructive relational tensions and conflict (Chapter 2, point 4). Conflict has been mentioned with regard to reciprocal negative prejudices (e.g. experts believe that the decision makers will never be able to understand the engineering aspects the decision involves), to lacking trust (e.g. decision makers calling systematically into question experts' knowledge), or to the fear of loosing face and therefore pretending to know. On the other hand, conflict arises not only on a relational, but also on a content level. The differences in perspective lead to important discussions and arguments on the content. Experts and decision makers tend to weight issues differently and have different time horizons. The experts' bias in proposing accurate, thorough solutions might stand in conflict to the decision maker's need for pragmatic, quick fixes. The focus on more systemic, integrated views might be counterintuitive for someone who is used to think at one thing at a time. The interviewers reported that such differences in orientation often required long discussions in order to achieve a shared understanding.

The subdivision of conflict into relationship and task conflict was systematically proposed by Jehn (1995). He made two claims when proposing this distinction. On the one hand, *relationship conflict* – understood as an emotional conflict and a perception of an interpersonal incompatibility - is detrimental for team effectiveness, decision quality, and decision commitment. People feel stressed and anxious and they perceive the conflict as a threat to their identity and their feelings of self worth (Jehn & Mannix, 2001). In such a situation, people are hesitant to expose their ideas, to inquire collaboratively into new solutions, and to integrate their knowledge. Jehn and Mannix (2001) argue that their ability to process information is reduced since they spend most of their energy focusing on each other. For these reasons, relationship conflict negatively reflects knowledge integration.

On the other hand, *task conflict* – a perception of disagreements (in terms of viewpoints, ideas, opinions) regarding the content of a decision - can have important positive effects (Jehn, 1995). Advantages of task conflict are that people scrutinize task issues and engage in a deep and deliberate processing of the available information. It encourages a greater cognitive understanding of the issue (and therefore leads to a better decision quality). Finally, it fosters learning, the development of innovative insights, and a stronger decision commitment (Simons & Peterson, 2000). These are all important aspects for the process of knowledge integration. Similarly, Eisenhardt and her colleagues argue that task con-

flict is important for developing a more complete understanding of the choices and for creating a richer range of options (Eisenhardt et al., 2000: 77). Finally, task conflict is said to foster innovation because it makes people consider the perspectives of others and create new understandings of apparently known issues (De Dreu, 1997). Yet, a very strong task conflict is said to have negative effects on member satisfaction, or on the commitment to the team and decision (Amason, 1996; Simons & Peterson, 2000). People feel frustrated when some people continuously take their chance to disagree and oppose and therewith
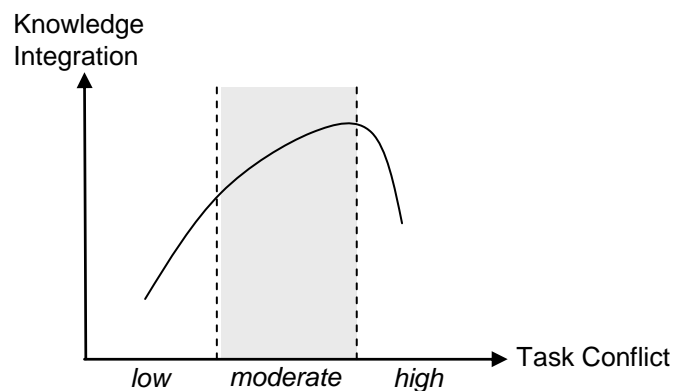
**Figure 20 : An Inverted-U-Relationship of Task Conflict
and Knowledge Integration (Proposition)**

delay the decision (Peterson, 1999). Similarly, we argue that in presence of a too high level of task conflict, conversation partners have difficulties in integrating knowledge. However, if the perspectives, points of view, and opinions are very far away from each other, content based argumentations are not reflecting a real integration of knowledge. People will continue to believe their point of view. They might acknowledge the opposite opinion to have a reason of existence, but remain far from seriously considering it for the further development of their own point of view. We will therefore stipulate that the relationship of task conflict and knowledge integration is one of an inverted U-curve: in the presence of a low or very high level of task conflict, knowledge is not integrated (see: Figure 20). A moderate level of task conflict best reflects knowledge integration. *Task conflic*t (that increases group's effectiveness) and *relationship conflict* (that reduces it) are not independent, but *strongly correlated with each other*. Rather, more task conflict leads to more relationship conflict (De Dreu & Van Vianen, 2001; De Dreu & Weingart, 2003; Simons & Peterson, 2000). Simons and Peterson (2000) report eleven studies that could show that content conflict is highly correlated with relationship conflict (range r = -.17 to .88, mean r = .47). As argued by Eisenhardt et al. (2000) and much earlier already Argyris and Schön (1978), a plausible explanation for this is that people often understand a critique, that is intended on

a content level, as a personal attack. Simon and Peterson call this a misattribution of task conflict, in which the participants of a conversation engage in biased information processing and self-fulfilling prophecies. They induce intentions and hidden agendas and see them confirmed in their interpretations of the others' ambiguous behaviour (Simons & Peterson, 2000). Such a misattribution more easily takes place if conversation partners express their content conflict poorly and use harsh and homonym language. On the other hand, a misattribution of relationship conflict as task conflict is equally possible. People masquerade their inter-relational problems as task issues and continue to sabotage a person by bringing up hesitations and critique on a content level (Simons & Peterson, 2000). It is for all these reasons that substantive issues can no longer be separated from those based on personalities.

This correlation between task and relationship conflict poses a dilemma in dealing with conflict. If we aim to have a moderate level of task conflict to create a deeper understanding and a better integration of knowledge, we risk, at the same time, that the task conflict is (mis)understood on a relational level (as a relationship conflict) and that the overall outcome in terms of team performance, decision commitment, or decision satisfaction is negative.

Thus, three conflict conditions have to be present in order to allow for knowledge integration: 1. a moderate level of task conflict; 2. a low level of relationship conflict; 3. a low correlation between task conflict and relationship conflict. We define the concomitant occurrence of these three conditions as a situation of *constructive conflict*. We stipulate that:

> *H4: constructive conflict positively reflects the process of knowledge integration.*

1.5 Decision Commitment

In order to conceptualize the second phase of knowledge integration, that is the integration of the systemic group knowledge into decision making and action, we include the variable *decision commitment*. The more the participants of a conversation are successful in integrating their individual specialized knowledge into systemic group knowledge (i.e. occurrence of first level knowledge integration), the more they will feel committed to the decisions taken. Decision commitment leads, as is discussed in the literature (see for example: Dooley *et al.*, 2000; Janis & Mann, 1977; Priem *et al.*, 1995; West & Schwenk, 1996),

to a more successful implementation of decision and, as Habermas claimed, knowledge can be considered to be mutual and shared, not simply if the participants agree in their opinions, but if they reach an inter-subjective acknowledgement of demands of validity, i.e. if they accept something as binding for their future behaviour (Habermas, 1984: 573-374). In this understanding, the requirement is rather high for what is considered to the result of knowledge integration. Yet, this view draws the link between knowledge and the commitment to action. In other words, it implies that if knowledge really is integrated we can expect a stronger commitment to the decision taken. On the other hand, if the decision is not based on a real integration of knowledge, but rather on a unilateral exertion of influence, then also the commitment for the decision taken should be smaller. We therefore include 'decision commitment' as a dependent variable of our model, while clearly maintaining the central interest for the construct of 'knowledge integration'. Prior research could show that a stronger decision commitment leads to a more successful implementation of the decision in action (Dooley et al., 2000). We claim that:

H5: decision commitment positively reflects the second phase of the knowledge integration process (integration of group knowledge into decision making) in that the better the knowledge integration of individual knowledge into group knowledge in the first phase, the higher the integration in the second phase (i.e. the higher the decision commitment).

Having outlined a communicative model for knowledge integration in decision making, we will discuss, in the second part of this chapter, *how the use of a software-based, interactive visualization tool impacts on the process of how people integrate their specialized knowledge in systemic group knowledge and decision making*. In the discussion of the case studies (Chapter 3), we have shown that decision makers and experts use visual support as boundary objects (Carlile, 2002; Star & Griesemer, 1989) in elaborating a shared meaning among them. We have seen that knowledge integration in decision making requires both persistence and flexibility in the communication process. While face-to-face conversations are very flexible and make it possible that experts and decision makers iteratively develop an ever more refined and shared understanding, visuals – particularly flexible or versatile visuals that develop with the ongoing interaction – account for persistence and instant documentation. Below, we would like to render this discussion more precise and outline in what ways versatile, collaborative visualization moderates the way how experts and decision makers integrate knowledge in decision making.

2   The Role of a Collaborative Visualization Tool within the Process of Knowledge Integration

The idea of using *interactive visual support* in conversations to enhance understanding is very old. Stafford refers to the frequent use of visuals to accompany conversations on knowledge-intensive issues already in the eighteenth century: Instruments, images, toys, preparations, cosmorama, or frontispieces were used as "interactive and flowing systems for understanding which were based on an ephemeral act of creation and which we now know as conversations" (Stafford, 1994: 25). Stafford outlines that the modus operandi of a conversation is very close to the one of the interaction with a visual.

In today's conversations and meetings, thanks to the recent improvements in information and communication technologies (ICT), communication partners have additional possibilities in supporting their conversations through visualization. Next to handouts, sketches on flipcharts or blackboards, printed images and figures or physical models, participants of a conversation use media as overhead projectors, computer beamers, interactive softboards, touch screens, (streamed) audio-video, etc. Visuals have become more dynamic and can be easily constructed in a collaborative and interactive manner. In addition, conversation partners can switch back and forth between electronic and physical presentations and therewith mark subtle changes in fluidity (in the electronic format, issues can be easily changed, if printed out, they become more official, decided and binding). Finally, an instant visual documentation of meetings and conversations and a company-wide distribution of these visual-minutes has become possible (Mengis & Eppler, 2005). Figure 21 shows an example of an interactive visual tool, which is designed to support the knowledge creation (idea generation) and structuring in conversations.

Figure 21: **Example of a Collaborative Visual Tool -**

Mindjet MindManager Pro 6 (www.mindjet.com)

In spite of these new possibilities in enhancing conversations, the scientific discussion on the use of collaborative visuals for face-to-face conversations has remained rather limited. Researchers have mainly focused on computer mediated communication (CMC) and on conversations of geographically dispersed interaction partners (i.e. online conversations through chat applications). In this context, a main interest has been to find ways to make up for the lacking visual and social cues by leaving a persistent trace of the conversation and allowing for correctibility (Bregman & Haythornthwaite, 2001). Also in the face-to-face context, there are few examples of gaining persistence in conversations by using visualization (Lyons *et al.*, 2004; Waibel *et al.*, 1998). However, the major reasons for visualizing face-to-face conversations are to display the "thinking" of the conversation partners, respectively to depict casual arguments and relationships of concepts (Conklin, 2006; Conklin & Begeman, 1988). Visualization can also be used to make peripheral social information tangible (DiMicco *et al.*, 2004), or to visualize the human voice (Levin & Lieberman, 2004).

Subsequently, we will discuss the role of collaborative visualization for the presented model for knowledge integration. In particular, we will refer to a type of interactivity and visualization as it is provided by the software suite *let's focus* (for a more detailed description of this tool, see: Appendix 10). We do so since we have worked with *let's focus* for the empirical evaluation of the model for knowledge integration and for assessing the moderation effect of the tool.

We claim that the use of the visual tool has a positive moderation effect on the model for knowledge integration (see: Figure 22) and propose four moderation hypotheses. In particular, we propose that experts and decision makers, who use an interactive visual tool (like *let's focus*) for their conversations, rely more on the creation of the big picture (Hm1) and the common ground (Hm2) in their knowledge integration efforts and less so on conflict (and if it arises, they manage to deal with it in a more constructive way) (Hm3) and balanced participation (Hm4). Instead, in the non-supported condition, experts and decision makers, when aiming to integrate their specialized knowledge by unsupported conversations, the challenges of creating a big picture and a common ground are only difficultly to be met so that conversation partners rely more on balanced participation and conflict in their attempts to integrate knowledge. Yet, they do not manage to handle conflict in a constructive way, which is why, overall, their integration capacity is smaller in the non-supported condition than for conversation partners working with an interactive visual tool. We therewith claim that the use of an interactive visual tool has a positive moderation

effect on a relational level of the presented model for knowledge integration (and not on a
level of the means).
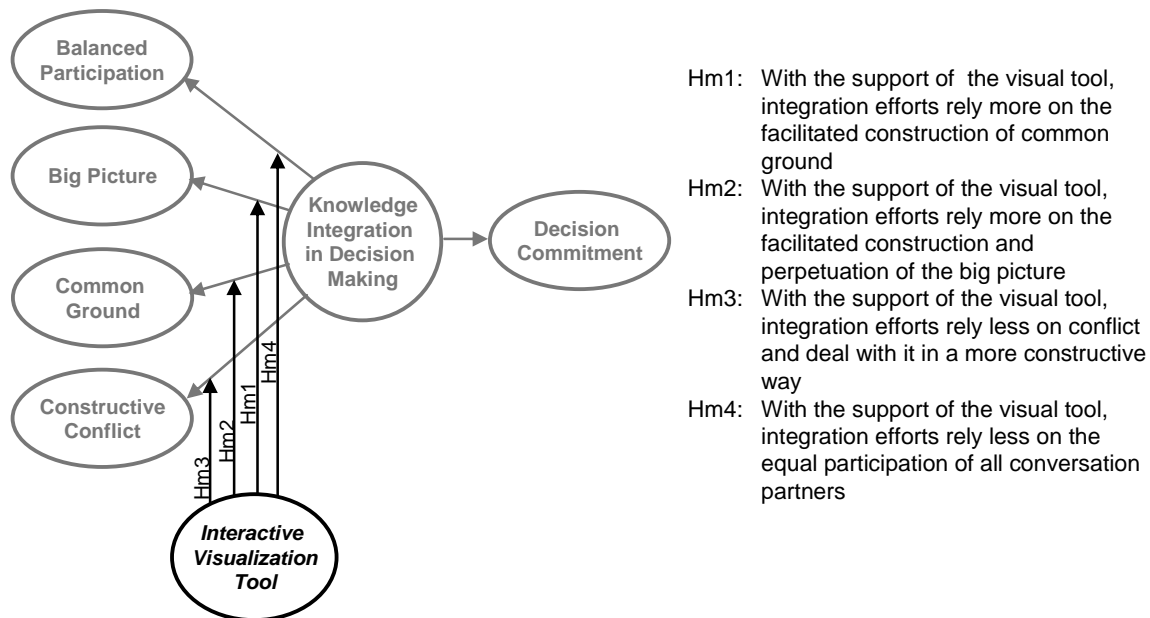
Figure 22: **Moderation Effect of the Use of Interactive Visual Tools (Hm1, Hm2, Hm3, Hm4)**

In the following, we will outline all four moderation hypotheses.

Moderation Hypothesis One (Hm1): With the support of the visual tool, integration efforts rely more on the facilitated construction of common ground

Several studies have argued for the importance of shared visual spaces in creating
common ground among interaction partners who need to integrate knowledge (see for
example: Bechky, 2003; see for example: Carlile, 2002). According to Carlile, a visual
(which in his view is a specific instance of a boundary object) can become a shared re-
source and a common reference point and can help to establish a shared language among
people and represent their knowledge so that they can better understand differences and
communalities of their understandings (Carlile, 2002). Other studies focus more explicitly
on conversations and discuss the role of visuals in establishing a common ground (Kraut *et
al.*, 2003; Olson & Olson, 2000). They found - by confronting co-located interaction situa-
tions with geographically dispersed settings – that communicative grounding is facilitated
significantly in the dislocated situation if interlocutors can use visual support (e.g. through
video communication systems) (Kraut *et al.*, 2003; Olson & Olson, 2000). We believe that
also in the co-located situation, the use of interactive visuals facilitates the construction of

common ground since they provide additional physical co-presence. Conversation partners will therefore rely more on this facilitated construction of common ground in their attempts to integrate knowledge.

Interaction partners can refer to these shared visual objects by using deictic speech (words like 'this' 'there' 'I' 'then' that have no fixed meaning, but that point to a person, place, or time and are conferred with meaning by the communicative context, Jesperson called them 'shifters' (Jespersen, 1922)). Since the visuals are dynamic and can be changed throughout the conversation process, the refinement and correction processes (that are most important for grounding activities) can be achieved not only through verbal communication, but are also supported through the interactively developed visual. Reviewing the current state of the visual, a conversation partner might see that an identified problem (e.g. technological change), which was categorized as an external problem, should instead be viewed as an internal problem (e.g. the real problem is that they do not have processes in place that are flexible enough to swiftly adapt to technological change). The interactive visual permits interlocutors 'reviewability' (i.e. they can re-examine each other's messages), which is an important aspect for building common ground (Clark & Brennan, 1991). In addition to reviewability, these authors listed a set of characteristics of communication formats (e.g. co-presence, visibility, audibility, contemporality), which allow for the construction of common ground (Clark & Brennan, 1991; Kraut et al., 2003). These are:

- Co-presence: interlocutors share the same physical environment

- Visibility: communicators are visible to each other

- Audibility: interlocutors can communicate through speech

- Contemporality: message is received the moment it is sent

- Simultaneity: all communicators can send and receive at the same time

- Sequentiality: turns cannot get out of sequence

- Reviewability: communicators are able to re-examine each other's messages

- Revisability: one can modify messages before they are sent

Clark and Brennan argued that while face-to-face conversations are characterized by most of the above listed aspects (and therefore represent a very apt communicational form for building common ground), they do not allow for reviewability and revisability (Clark & Brennan, 1991). Yet, when working with interactive templates that visually summarize

the arguments and topics that are brought in during the conversation, interaction partners have the possibility to review others' arguments and refine their understanding even at a later stage.

Next to enhancing the referencing to physical objects and to providing reviewability, interactive visuals facilitate grounding also because they provide communicators with an *additional, often metaphoric language* (Kraut *et al.*, 2003). Visual language can help conversation partners to articulate aspects that are implicit and hard to define (Meyer, 1991). This is especially the case for visuals that rely on metaphors. Nonaka and his colleagues argue that the use of metaphors is key in the externalization phase (i.e. when people engage in the difficult process of giving an explicit form to tacit knowledge) since metaphors permit to understand one thing by imagining another (Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995; Nonaka *et al.*, 2000). When having a visual metaphor at disposition (i.e. a bridge, a labyrinth, a scale, or a ruler), interlocutors refer to an already existing common ground between them. The attachment of abstract, unknown, and complex concepts and relationships (i.e. the topic (Lakoff & Johnson, 1980)) on the visual vehicle of the metaphor represents a clever way to use the existing common ground in order to extend it. In this way, conversation partners can communicate something which is domain specific, abstract, or something that is hard to grasp with words by using the specific and well known concept of the metaphoric vehicle (Inns, 2002). They can use the visual language and the conceptual domain of the metaphor, which are common ground to all participants. Participants of a conversation can, for example, place an identified problem at the very bottom of an iceberg or put two solutions close to each other. In these examples, the interlocutors can express the difficulty to access a particular problem or the relatedness of two types of solutions through the visual positioning of the concepts on the visual metaphor. The visual language helps them to express aspects, which are difficult to put into words.

Finally, the visual language provides not only additional means for the expression of difficult issues; it also facilitates the understanding process. Images are said to afford a more direct access to meaning (Meyer, 1991). If information that is unfamiliar to people is visualized on a well-known object (like, for example, on a funnel, a boat, or a ladder, and, to less extent, also on a diagram like the Ansoff-matrix or a Strategy Map), people can quite intuitively explore the meaning of the unfamiliar and of the aspects that are not yet common ground (see also: Inns, 2002).

The use of visuals in conversations gives interlocutors the possibility to use the existing common ground among them and to extend it to new conceptual domains. In doing so,

visuals facilitate both the expression of issues that are abstract, complex, and hard to express in words and also their understanding. Because the use of visual tools makes it easier for experts and decision makers to construct a common ground among them, they will give more weight to it when integrating their knowledge than those interacting without a visual support.

Moderation Hypothesis Two (Hm2): With the support of the visual tool, integration efforts rely more on the facilitated construction and perpetuation of the big picture

Interactive visuals (as the ones provided by the software suite *let's focus*) allow conversation partners to visually document the synthesis of important arguments of their conversations and to structure them through the categories provided by the image. At the same time, the participants of a conversation also have the possibility to link, to this synthetic overview, more detailed information through the comment function of the tool. In this way, the visual tool helps to keep the difficult balance between overview and detail, which is necessary for the creation and perpetuation of the big picture.

Visuals that are developed within the course of the conversation help participants to keep in mind the current state of the conversation and serve as a *mnemonic device* of what has been discussed earlier on and what are the themes still missing in the conversation. Kraut, Fussel, and Siegel state that "visual information helps people maintain up-to-date mental models or situational awareness of the state of the task and other's activities. This awareness can help them plan what to say or do next and to coordinate their utterances and actions with those of their partners" (Kraut et al., 2003: 15). Dynamic visuals serve as an artefact around which interlocutors can coordinate their contributions, both in terms of time and content. They are constantly reminded of the overall picture to which they contribute with their single statements. They can see what has been said before and what topics have not been touched so far in their discussion. In this way, the visual helps to maintain the big picture and the participants of a conversation can understand how the specific contributions relate to the overall topic.

Visuals are important for gaining and keeping the big picture also because they support *systemic thinking* and focusing on the *interconnections*, rather than the parts. Dimond and Beaumont (1974), Kosslyn (1978), and Maruyama (1986), as quoted by Meyer

(1991), all argued that cognitive operations on images do not require their decomposition into single elements. In view of an image, people are inclined to think of the interrelationships between components rather than engaging in fragmentary thinking (Meyer, 1991). In a visual, the logic of presentation is not sequential. Various information elements are outlined in space and presented simultaneously. Meyer therefore argues that visuals serve for simultaneous processing of a variety of information and help to keep more information items in mind (Meyer, 1991: 222). Seeing various elements placed next to each other, conversation partners are invited to think whether there is a relationship between these and what the nature of such a relationship could be. If this visual is a framework that provides an all-embracing structure (which can be based on a metaphor or on a more abstract representation) along which interlocutors can position their contributions, the capability to interconnect and see the big picture is even more strongly enhanced (Vincent & Rosse, 2001). Finally, the work with interactive visual tools is a mapping activity of a sort, in which the important arguments are placed on visual metaphors or on other visual support such as diagrams, tables or coordinate systems. Huff and Jenkins (Huff & Jenkins, 2002) mentioned that working with mapping techniques brings advantages such as, among others, connecting and organizing knowledge, or representing knowledge on different levels of abstraction. Using visual tools thus helps to interconnect, to think systemically, to better differentiate between the various levels of abstraction, and to create and maintain the big picture of a conversation. Being the creation of the big picture facilitated in the tool condition, experts and decision makers rely more on the big picture in integrating their knowledge.

Moderation Hypothesis Three (Hm3): With the support of the visual tool, integration efforts rely less on conflict and deal with it in a more constructive way

Conversation partners, who manage to have a necessary common ground among them and, second, are capable of seeing and maintaining the big picture of the issue of decision throughout the conversation process, need to refer less to conflict when integrating their knowledge. For example, if an interlocutor A holds another opinion or view than interlocutor B, but if both of them see the big picture of the issue, they have a better chance to see that their opposition might be resolved at a higher level of abstraction. Similarly, if A knows interlocutor B well (that is they share a large common ground), but, on a specific issue, B disagrees with A, A might easily induce the reasons and motivations behind B's disagreement and develop an understanding for it. He/she can also more easily refer to

these reasons and motivations and resolve the disagreement at this level. In this way, conversation partners who are interacting with the help of the tool, mainly integrate their knowledge through common ground and big picture and task conflict is a less important element in the integration process.

We claim that, in the tool condition, conflict is not only less important for the integration of knowledge, but interlocutors are also capable of dealing more constructively with arising conflict[30]. This means that conversation partners will report a moderate level of task conflict and will not mistake it for relationship conflict (low correlation). Star and Griesemer state that "when participants in the intersecting worlds create representation together, their different commitments and perceptions are resolved into representations (..). This resolution does not mean consensus. Rather, representations, or inscriptions, contain at every stage the traces of multiple viewpoints, translations and incomplete battles" (Star & Griesemer, 1989: 412). The activity of representing the various perspectives makes it possible for the interlocutors to, first, more explicitly acknowledge and understand these differences and, second, to dissociate the differences from the people. The developing visual provides a resolution for the differences without forcing consensus. Cecez-Kecmanovic and Dalmaris (2000) found similarly that when people can see the representation of a collective understanding or opinion, they can recognize the possible discrepancies with their own understanding. Such differences in opinion and inconsistencies in understanding are usually quite hard to detect, but become more apparent through the visual depiction. Participants can critically review the various elements and the relationships among them if they are visually outlined in front of them. Instead of an uncritical acknowledgement of facts, the visual leads to a certain amount of task conflict. Yet, the handling of this conflict is collaborative. The framing that the interactive visual provides is one of integration: all contributions are potentially part of the same image. There is nothing beyond that image that could not be integrated and disagreements are only different perspectives of the same picture. In a subtle way, such an integrative image creates a more collaborative spirit among the conversation partners. Dichotomous (either-or) reasoning (Tannen, 1999) and defensive arguing (Argyris, 1996) can be contained and with that the non-constructive handling of conflict. What in addition fosters a constructive handling of conflict is when conversation partners switch from one visual support to another. They can frame, for ex-

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30 Other important factors for dealing more constructively with conflict are the creation of intragroup trust (Simons & Peterson, 2000) or introducing interactional rules as focusing in the debate on facts and multiplying alternatives and to enrich the level of debate (Eisenhardt et al., 2000). Furthermore, specific tools, like the self-assessment-tool proposed by Drucker, are said to help communicators to more openly listen to each other and to deal more constructively with conflict (Drucker, 1994).

ample, a negotiation situation as a pie for which the total value is defined upfront and of
which each party tries to get the biggest piece. Alternatively, the same situation can be
viewed as a bridge. In this frame, each party starts with a departing situation and can cre-
ate additional value by building on the bridge, common interests. A change in the visual
support permits conversation partners to alter their perspective on the issue and to re-
frame their thinking (Inns, 2002). By doing so, they realize that their perspective is, to
some degree, contingent, which leads them to approach differences of opinion in a more
collaborative spirit.

Finally, by visualizing arguments and standpoints, these concepts receive a certain
physical reality and are to some extent dissociated to the people who put them forward.
The risk is thus lower to take a critique on an issue personally and to misunderstand a task
conflict on a relational level. The correlation between relationship and task conflict is
therefore lower. In sum, we claim that interlocutors, who interact with the support of a
visual tool, refer less to conflict in order to integrate their knowledge and if they do so,
they deal with it in a more constructive manner.

Moderation Hypothesis Four (Hm4): With the support of the visual tool, integra-
tion efforts rely less on the balanced participation of all conversation partners

We have argued that a balanced participation of all conversation partners is a basic
reflection of knowledge integration. In both conditions (tool and non-tool), if a certain
conversation partner does not participate in the conversation process, his/her knowledge
cannot be integrated to a group knowledge. In this sense, balanced participation remains
important in both conditions. There are visualization tools for face-to-face conversation
that visualize the peripherical social cues of the conversation like for example the amount
of contributions of each interlocutor (DiMicco & Hollenbach, 2006; DiMicco et al., 2004;
Sack, 2000). DiMicco and her colleagues (2004) found that in a co-located setting, provid-
ing visual cues on the amount of contributions of each conversation partner made much-
talkers limit their amount of contributions and *equilibrated participation*. Since the visuali-
zation tool that was employed for this experiment does not visualize such social cues, we
did not expect such an effect. Yet, we stipulate a similar effect as the one for the conflict
construct. If the participants of a conversation do see the big picture of an issue, they more
or less know which aspects they still need to discuss, which information is missing, and
where they have to develop novel approaches. In this sense, even if there were some much-
talkers and little-talkers in the discussion, this is not forcibly seen as a threat to knowledge

integration. The orientation on the conversational process is thus tightly bound to the content and scope of the discussion so that the strict distribution of the turns taken by the conversation partners is perceived to be less important for the integration of knowledge than without the tool. Without the visual tool, conversation partners are more sensitive to interactional justice, i.e. balanced participation (Bies & Moag, 1986).
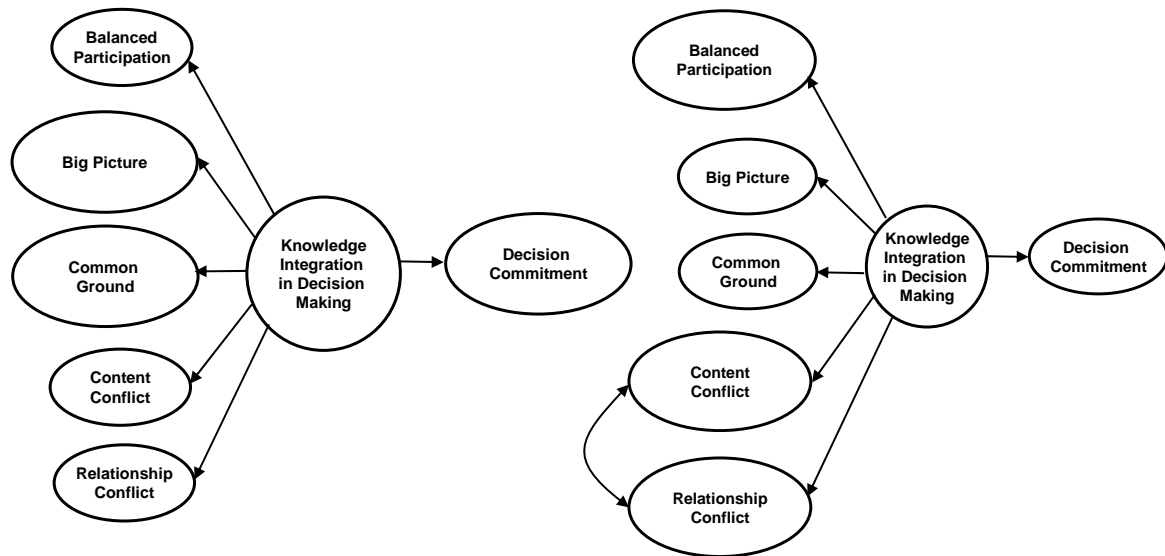
Figure 23: **Tool Condition**: **Conversers, who Aim to Integrate Knowledge, Mainly Rely on the Construction of the Big Picture and of Common Ground**

Figure 24: **Non-Supported Condition**: **Conversers, who Aim to Integrate Knowledge, Mainly Rely on Balanced Participation and Conflict**

To summarize, we stipulate that the visualization software has a positive moderating effect on the level of the relationships of our model and not on the level of the means. We claim that, in the tool condition, conversation partners integrate their knowledge mainly through the establishment of 'big picture' and a 'common ground' and that conflict and balanced participation carry less weight (see: Figure 23). For the non-tool condition (see: Figure 24), we find the opposite situation. Because of a lack of common ground and big picture, interlocutors give more importance to conflict and balanced participation. We further claim that, in the non-supported situation, interlocutors deal with conflict in a less constructive way and that relationship conflict and task conflict are more strongly correlated (above, we have defined constructive conflict as the co-occurrence of moderate task conflict, low relationship conflict, and a low correlation between the two). Finally, there is a stronger relation between knowledge integration and decision commitment in the tool condition (2nd level integration).

In the following chapter, we will provide empirical evidence from an experiment for the proposed model of knowledge integration and discuss a first test of the moderation hypotheses.

Chapter 5

A First Empirical Evaluation of the Model of Knowledge Integration Considering the Role of Collaborative Knowledge Visualization

Outline

1   Methods

In this chapter, we will present a first empirical evaluation of the communicative model for knowledge integration and of the proposed moderation effect of the use of the collaborative visual boundary objects on the model (precisely the impact of the use of computer-supported, versatile visual tools on knowledge integration), which we have discussed in Chapter 4. For this first evaluation, we conducted a classroom experiment.

1.1 Design and Participants

The classroom experiment involves a preference task (DeSanctis & Gallupe, 1987), in which subjects have to make a selection of alternatives for which there is no objective criterion of a correct answer. We use a between-subjects single factor group design (Keppel & Wickens, 2004) by varying only the mode of communication (tool groups and non-tool groups). We have worked with a total of 64 respondents (32 per condition), forming 16 groups of four subjects each (8 groups per condition). Each group consists of two "experts" and two "managers" and students are randomly assigned to the groups and their function within the group. Participants were undergraduate students in communication science that follow a strategy or knowledge management course.

1.2 Task

The preference task is based on a hidden profile scenario[31] (Stasser, 1992; Stasser & Stewart, 1992), in which there exists an information asymmetry between the single members of the group. In order to make satisfying choices and to have enough information on the presented alternatives, conversation partners have to pool the unshared items.

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31 The hidden profile setting, i.e. the information asymmetry and explicit role assignments (Stasser et al., 2000) had the mere function to establish the role of the expert and the one of the decision maker. We did not pursue the classical objective of hidden profile studies, which is to analyze whether conversation partners have an inclination to share and consider information that is already shared among them (and to consider uniquely held information to a lesser extent). The mere difference in information and the explicit attribution of roles do not make a person an expert or a manager. In fact, the language, mental models, past experiences, and the implicit knowledge of these 'experts' and 'decision makers' certainly do not differ in the way they do in a natural condition. Such a procedure though has been used in other experimental settings (Stasser et al., 2000) and we could suppose that if we can observe the said communicational challenges of knowledge integration already in this attenuated situation, they would be more blatant in a "real world" context.

Students receive a case study[32] about a small-medium enterprise (SME) and its knowledge management projects, some of which it intended to implement. On the basis of the case study, students have to decide which three of the five project proposals they would choose for actual implementation. Half of the students receive a version of the case that provides more information on the knowledge management projects (expert version) whereas the other half obtains more strategic, corporate information (decision maker version) (see: Appendices 7 & 8 for the two case versions). In total, the cases contain 12 information cues on corporate and strategy issues (of which only 3 are exposed in the expert version) and 52 cues on the knowledge management projects (of which only 11 are included in the manager version; see: Appendix 9 for a comparative listing of the information cues for both case versions). Each group is formed of two experts (students who have read the expert version of the case), and two decision makers (who have read the management version). During the one hour experiment, students are asked to identify with the roles attributed to them through the case study and to imitate a one hour meeting.

In this meeting, two experts present five knowledge management measures and the CEO with another manager decide, which three of the five measures to actually implement. In the first half hour, in order to better understand the context, into which the knowledge management measures shall be implemented, the groups are asked to discuss the corporate objectives and problems of the company. They have to elaborate four criteria by which they will evaluate and choose the knowledge management measures. In the second part of the meeting, the students have to present, discuss, and evaluate the five proposed knowledge management measures. Finally, the two managers have to decide (by consultation of the experts), which three of the five measures to further pursue and implement. Figure 25 and Figure 26 outline exemplary solutions for the first and second part of the task, yet there is no one best solution for the given task. We used the software tools, with which half of the groups worked, as a visual support for the presentation of these solutions.

The task we developed for the experiment had to satisfy the following criteria. First, the task needed to well imitate a real world problem and represent a good instance of a domain expert-decision maker interaction. It needed to be a problem, in which, decision makers typically draw in experts for consultation. In such a situation, neither the experts nor the decision makers alone could have taken an informed decision. Decision makers

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32 For the original case study, see: (Eppler, 2002).

call in experts only if they have to take a decision in a rather complex and uncertain environment where there is no one best solution. The task therefore needed to show a considerable level of complexity. In addition, we wanted to imitate the time pressure aspect, which is a major challenge in the expert-decision maker interaction. Finally, we were looking for a task, in which subjects already had some prior knowledge so that they can potentially bring into the discussion somewhat more implicit knowledge and not only report the explicit items from the case study. Since the respondents would be students that follow either a knowledge management or a strategy course, the task had to do with knowledge management, project management, and with strategy implementation.

1.3 Tool

The software tool we were using for the experiments is called *let's focus Positioner* and is part of the software package *let's focus*. The objective of *let's focus* is to support knowledge processes of individuals or groups by using interactive visualization methods. In particular, all applications of *let's focus* are thought to support face-to-face conversations as also computer mediated interactions.

The software has been developed conceptually by the authors and by the Reflact Inc., a German company developing and using new media for organizational development, which technically and graphically developed the tool. The software is based on Flash und Java technologies and uses XML standards for data formats and format conversions. It has been used in various organizations, including reinsurance groups, logistics providers, banks, and universities. Conceptually, *let's focus* is based on approaches of knowledge visualization, metaphor theory, Gestalt theory, and also on morphological research (let's-focus, 2006).

let's focus can be used as a support in various settings. It is said to support the facilitation of workshops, virtual meetings, interactive presentations, training seminars, and can also be used in more individualistic problem-solving situations (let's-focus, 2006). As a communication device, the producers claim that the tool helps to overcome communication fallacies as "circular discussions, suboptimal use of time, insufficient fact-checking and hazardous and rashly conclusions, misunderstandings, and unfruitful conflict" (Reflact & Eppler, 2005). Yet, the aim of *let's focus* is not only to serve as a communication device, but also to provide frames and conceptual structures for approaching specific task types like evaluative tasks (e.g. client- or competitor assessments, option evaluations)

or more general analytic tasks (e.g. problem analysis, stakeholder analysis) and also planning tasks (e.g. project or campaign planning meetings). In order to support these various tasks, the software package includes four tools: the *let's focus Timeliner*, the *let's focus Ruler*, the *let's focus Tracker*, and the *let's focus Positioner* (for an overview on the various tools, see: Appendix 10).

The *let's focus Positioner* is the tool we used for the experiment. The Positioner is intended to support groups to share information, analyze complex issues and to structure the integration of various types of information. The tool provides a large library of interactive and in part animated templates of diagrams and metaphors along which the user can position objects such as textboxes and symbols and visually underlie the relation between them. The tool includes functionalities of clustering, annotation, replay, levelling, and overlaying, all of them using simple drag and drop logics and which allow users to visualize their thinking and communication processes.

A description of the specific features of *let's focus Positioner* can be found in Appendix 11. We will limit ourselves to present only one distinguishing feature of the application, which is that its user (e.g. the moderator of a meeting) can choose between a variety of *backgrounds and templates*. These represent diagrams (i.e. Fishbone, Balanced Scorecard, Five Forces, Value Chain, or Ansoff Matrix) or visual metaphors (i.e. a radar, an iceberg, a bridge, geographical maps, a ladder, a pyramid, a wheel, or a funnel). The templates combine such a background visual with some default text-fields and objects and provide more guided structure in approaching specific tasks such as, for example, a stakeholder analysis. The idea is that the individual or group selects a visual guideline or cognitive and communicative frame with which to approach and structure an issue or conversation. Since these frames are visible to all conversation partners, they are likely to provide a common ground and language to all the participants of a conversation and facilitate understanding.

For the experiment, we prepared two templates, one for the corporate discussion and elaboration of evaluation criteria, the second for the evaluation of the proposed measures.
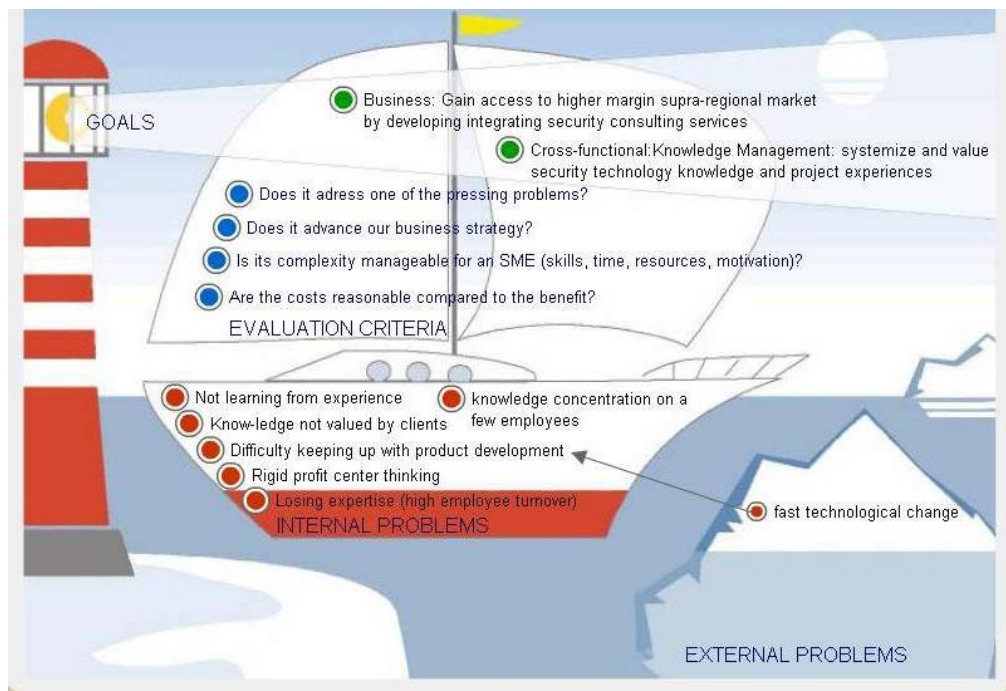
Figure 25: Template (Based on a Compound Metaphor) and Exemplary Solution for the First Part of the Task: Understanding Corporate Objectives, Problems and Defining Evaluation Criteria

Figure 26: Template and Exemplary Solution for the Second Part of the Task: Evaluating Proposals of Five Knowledge Management Projects

The first template (see: Figure 25) is based on the visual metaphor including a sailing boat that is floating in the sea. It is guided by the light of a lighthouse and is threatened by underwater icebergs. The template invites interlocutors to place the organization's internal problems in the bow of the ship, the external threats on the iceberg, the objectives of the company on the lighthouse's light beam and, finally, the criteria for the evaluation of the knowledge management measures in the middle of the picture, on the sails.

The second template (see: Figure 26) is more analytic and includes a table that allows for evaluating how good each knowledge management measure corresponds to the previously developed evaluation criteria. On the left row of the table of Figure 26, evaluation criteria are transferred and on the upper cells.

1.4 Setting

All groups are sitting in a small lecturing room on a square table, the two 'experts' on one side, the 'managers' on the other, but all facing each other. The groups of the tool-supported condition have a notebook and a mouse placed on the table, which can be handled by one of the group members (see: Figure 27). To facilitate the visibility of graphic template, the computer screen is projected by a beamer. All groups are audio and video-taped during the one hour interaction.

Figure 27: Group Conversing with the Use of let's focus Positioner

1.5 Pretest

The initial questionnaire was reviewed by an expert on experimental design and was tested on five people before we conducted the pre-test experiment. First changes were taken into consideration.

In order to test the design, procedure, and questionnaire of the experiment, we conducted a pre-test with an executive master class of 32 students (8 groups). At this stage, we handed out the case study just 30 minutes prior to the experiment and gave only a very brief introduction to the tool. Also, the task was more complex and involved an hour discussion that was divided in three parts: 1. sharing corporate information and elaboration of evaluation criteria for the knowledge management measures (with the support of the *let's focus* Positioner); 2. sharing of project information and deciding three knowledge management measures to implement (with the support of the *let's focus Positioner*); 3. planning action steps for implementing the decision (with the support of the *let's focus Timeliner*). The students had 20 minutes for each task.

At the end of the experiment, we held a plenary discussion with all the participants and asked feedback on the task, on the use of the tool, and on the questionnaire. We analyzed the questionnaires and changed the few questions to which several people hadn't responded. We also analyzed the outcome of the questionnaires and found moderate confirmatory results on most variables.

From the insights gained through the observation during the task, the results of the questionnaires and the plenary feedback session, we slightly changed procedure, task and questionnaire of the experiment. First, we determined that students should be more strongly familiarized with the tool. We decided that all students (the ones who will use the tool and the ones who will not) would receive a brief conceptual and practical introduction to the tool and they would use the tool in a task in the days and lesson previous to the experiment. Second, we would make them read the case study not right before the experiment, but would give it as homework for the day of the experiment. In the pre-test, the overall time schedule was very tight and the overall time request quite long (together with the reading of the case and the plenary discussion). We realized that students were quite tired and less motivated at the end. For the same reason of time and motivation, we shortened the task of the experiment and skipped the third part. That also brought the advantage that students had to use only one tool of the *let's focus* suite (Positioner) and were able to focus more on the task and less on the learning of the tool. Finally, we made

some changes in the questionnaire, we added some questions for the big picture construct, the common ground construct, and included some control questions on the level of familiarity with the task.

1.6 Procedure

After pre-testing questionnaire and procedure, we conducted the experiment in the following way. By email or in a lesson prior to the training for the experiment, students were asked to confirm their participation at the experiment. Two lessons before the day of the experiment, all students (independently of whether they were part of tool or non-tool group) received a brief introduction to the tool (ideas behind it, possible uses, how to use it). Students also had to do an exercise for homework with the tool that they then had to present in class. In this way, we were able to assure that students have some familiarity in the use of the tool. A day or maximum a week before the experiment, the students received the 5- respectively 8-page case study, which they had to read for the day of the experiment. They were urged not to share information among them prior to the experiment.

The day of the experiment, students were split into groups and received 10 minutes to again scan through the case study. The single groups were reminded that they were now part of a living case study and found themselves in a one-hour meeting in which they had to share information and make several decisions. For the tool groups, the supervisor also showed which visual template to use for the first part of the meeting and which for the second part. The groups working with the tool chose one participant of the conversation to handle the tool and visualize the contributions of all members along the discussion. After the one hour discussion, the groups were asked to collectively fill in a form in which they had to outline which projects they had chosen and argue why they had chosen them. In addition, they were asked to fill in a questionnaire, which took 15 minutes for compilation.

1.7 Operationalization of Research Variables and Measurement Model

All research variables are measured using multi-item scales (see Appendix 13 for original scales and Table 12 for adjusted scales after assessment of psychometric properties).

We developed our own scales for the constructs of Common Ground, Big Picture, and Decision Commitment and relied on already developed scales for Balanced participation (Murthy & Kerr, 2003) (to which we added some additional items), Content and Relationship Conflict (Pearson, 2002).

Balanced Participation

We measured the balanced participation construct with a 3-item scale including the following items:

1. There was an adequate participation from all members of the group
2. There were one or two people who dominated the discussion
3. The other members of my group paid attention to the comments I made

We borrowed item 1. from Murthy and Kerr (2003) and added 2. and 3. We introduced item 3 since balanced participation is not only about making turns and actively contributing to the conversation. It is also about whether these contributions are actually considered and whether participation on behalf of the listeners (not only the speakers) is equal. If all participants engage in equal turn taking, but nobody listens or takes into account what participant A says, the turn taking might be equal, but not so the participation.

Big Picture

To our knowledge, the big picture challenge has not been object of empirical studies that applied quantitative measurement methods. For this reason, we have developed a 6-item scale based on the insights we gained from the explorative case studies from the conceptualization in the existing literature (Gasper & Clore, 2002; Harkins, 1999; Rhodes, 1991; Ringach, 2003). The scale reflects a communicative, process oriented view on the big picture challenge and consists of the following items:

1. The conversation process was very clear
2. We never lost time on discussing irrelevant issues
3. We never lost time on too detailed discussions
4. I always knew how a specific contribution related to the more general topic of the discussion
5. At every point in time I knew why the group was discussing a specific issue
6. I knew at every point in time where we were in the discussion

As a response scale, we used the 5-point Likert scale ranging from (0="strongly agree") to 4 (="strongly disagree"). The scale was pilot-tested using a sample of 32 respondents and fine-tuned in the following.

Common Ground

As is the case for the big picture construct, we are not aware of an empirical study in which common ground was measured quantitatively. Again, on the basis of the insights drawn from our explorative case studies and of the existing literature (Clark & Brennan, 1991; Clark & Marshall, 1981; Krauss & Fussell, 1991), we have developed an own measurement scale. We wanted it to reflect three elements that we think are important for the common ground construct. First, the differences or communalities in *language* use were often reported in the case studies as a proxy for a whole set of differences such as knowledge background, training, everyday context, personal perspectives and values. Second, the concept should enclose whether the participants managed to enlarge the intersection of their specialized knowledge sets and integrate it in order to create a *shared understanding*. Finally, the scale should reflect the interlocutors' capacity to put themselves in the perspective of the others (Krauss & Fussell, 1998) and adapt their messages to it. We formulated the resulting 3-item scale as follows:

1. During the conversation, the group developed and shared a common language to deal with the task
2. During the conversation, the group created a shared and deep understanding of the topic
3. I could now better adjust my communication style to the other members of the group

As a response scale, we worked with the 5-point Likert scale ranging from 0 (="strongly agree") to 4 (="strongly disagree").

Constructive Conflict

We have bound constructive conflict to three conditions: 1. moderate task conflict (inverted u-curve relationship), 2. low relationship conflict, 3. low correlation between task and relationship conflict (see: Chapter 4). In order to avoid a third order latent variable, we do not introduce constructive conflict as a second order latent variable for the statistical analysis, but work directly with task conflict, relationship conflict, and the correlation between this two constructs.

For the measurement of the two interrelated conflict constructs, we relied on Pearson, Ensley, and Amason's (Pearson, 2002) 6-item scale. They developed their scale on the basis of Jen's famous Intragroup Conflict Scale, who developed a measurement for the two discussed dimensions of conflict (Jehn, 1995). Pearson et al.'s scale for *relationship conflict* consists of three items, which we took over: In one relationship conflict item "How much tension was there in the group during decision?" we replaced "during decisions" with "during the exercise" as our focus was on the whole one hour group interaction and not merely on the moments people took decisions. In the task conflict item "How many disagreements regarding different ideas were there?" we added "during the one hour discussion". For both task conflict and relationship conflict, the responses were recorded on a 5-point Likert-type scale ranging from 0 (="none") to 4 (="a great deal"). In order to model the curvilinear relationship (inverted u-shape) for task conflict, we introduced a quadratic component to the linear function (x^2) (Backhaus *et al.*, 2003).

Decision Commitment

We measured the level of 'decision commitment' with a 3-item scale we developed ourselves:

1. I feel confident that our group made the right decisions;
2. The group was better at making the decision than I could have done by myself;
3. The decisions were unanimous
4. There was a lot of agreement in the group.

As a response scale, we have used the 5-point Likert scale ranging from (0="strongly agree") to 4 (="strongly disagree").

1.8 Mode of Analysis

The model we have presented for knowledge integration is an indirect reflective, second order model with multiple mediating constructs. In view of the type of model, but considering our limited sample size, we will do a combination of structural equation modelling (SEM) technique and traditional confirmatory factor analysis. SEM allows for the simultaneous analysis of all relationships in a model (and not merely the linkage between two constructs at a time), and, more importantly for this study, for the analysis of models that include second order latent variables. Yet, an important drawback of SEM is the need

for a large minimal sample size. While traditional regression analysis requires a minimum of only 30 cases to obtain robust results, in SEM, accepted minimal samples size range from 50 (if we operate with loading factors of more than 0.75) (Hair *et al.*, 1998) to the more accepted 100 to 150 cases (Gefen, 2000). In view of models with second order latent variables, authors even mention 200 as an accepted minimal (MacCallum *et al.*, 1996). Other scholars define minimal sample size in terms ratio of observations to parameters to be estimated (Jackson, 2003) and fix the ratio at 10:1 or even 20:1 (Kline, 1998). Barclay and his colleagues state, for example, that the sample should have at least ten times more data-points than the number of items in the most complex construct in the model (Barclay *et al.*, 1995).

In view of our small sample size of 64 respondents (32 for each condition), we can obtain relatively robust results only when performing traditional regression analysis. Yet, since this type of analysis is not possible for the model we have proposed, we have opted for a combined approach (Hair et al., 1998; MacCallum et al., 1996; MacCallum *et al.*, 1999). We first conducted a confirmatory factor analysis (with the support of the software package SPSS) for the first order latent constructs, then introduced those constructs – in the form of indicators - in the AMOS program and treated them as observed variables. Even approaching the analysis this way, the problem of minimal sample size is not fully resolved so that this analysis can only be seen as a first inconclusive analysis that helps us to refine the model and our hypotheses for further studies that allow for an analysis with more statistical power.

Structural equation modelling (SEM) was used to examine the construct of knowledge integration and its hypothesised dimensional indicators: balanced participation, big picture, common ground, constructive conflict (low level of task conflict, lack of relationship conflict). In addition, it aims to understand the moderation effect of the use of content-specific, interactive visualization support on the model of knowledge integration.

2   Results

2.1 Descriptive Statistics

In this section, we will present the results of the descriptive and factorial analysis. Since our hypotheses are on a structural level, we will not discuss distributions, frequen-

cies, or central tendency in detail. Instead, we limit ourselves to briefly address issues concerning the normality of distribution, the results of the confirmatory factor analysis, the mean and standard deviation of the latent variables and the discussion of the qualitative questions of the questionnaire.

In total, 64 people participated at the experiment, that is 32 respondents for both the tool and non tool condition and a total of 16 groups (each of which consists of four people). The unit of analysis was set at the individual level. 23 of the participants were men, 41 were female. We have 4 missing data, but in view of our already small sample size, we decided not to proceed with a listwise, but with a casewise exclusion of the cases that showed missing values. The discussion of the normality of the distribution can be found in Appendix 15.

Table 12 shows the results of the confirmatory factor analysis that is the *psychonometric properties of the adjusted scales* assessed in terms of the item loadings, the eigenvalues, the percentages of explained variance, and the Cronbach alphas. We conducted a principal component analysis with a varimax rotation. For the factor loadings, we used a cut-off criteria of 0.60 and for the Cronbach alphas of 0.70 (Devellis, 1991). The original scales with their psychonometric properties can be seen in Appendix 13.

We were able to maintain the original scales for most of the constructs, but had to adapt them for 'balanced participation' and 'decision commitment'. With regard to 'balanced participation', we had to drop the item that checked for the equality in participation not with regard to the speakers and their turns made, but with regard to the listeners and their active consideration of what is said (The other members of my group paid attention to the comments I made.).

The 'decision commitment' construct showed Cronbach alphas below 0.70 for the original 4-item scale, as well as for the various 3- and 2-item scale versions. Even though we have significant correlations for example between questions 1, 2, 4 (I feel confident that our group made the right decisions; The group was better at making the decision than I could have done by myself; There was a lot of agreement in the group) and factor loading of above 0.70, we have insufficient Cronbach alphas. Apparently, the items, even if correlated do not measure the same characteristic of the decision commitment construct. Question 2 points more versus group performance, and agreeing is not the same as committing. Von Krogh et al. (2000: 134) for example made the argument that agreeing

Factor	Item	Factor Loading	% of variance explained	Cronbach alpha	Mean (S.D.)
Balanced partici-pation (EP)	1. There were not one or two people who dominated the discussion	.891	0.79	0.74	1.04 (0.85)
	2. There was an adequate par-ticipation from all members of the group.	.891			
Big Picture (BP)	1. The conversation process was very clear	.806	0.48	0.78	1.23 (0.57)
	2. We never lost time on discuss-ing irrelevant issues	.724			
	3. We never lost time on too detailed discussions	.602			
	4. I always knew how a specific contribution related to the more general topic of the discussion.	.603			
	5. At every point in time I knew why the group was discussing a spe-cific issue.	.774			
	6. I knew at every point in time where we where in the discussion	.632			
Common Ground (CG)	1. During the discussion the group created a shared and deep understanding of the topic.	.879	0.77	0.70	0.95 (0.56)
	2. During the conversation, the group developed and shared a common language to deal with the task	.879			
Task Conflict (TC)	1. How many disagreements regarding different ideas were there during the one hour dis-cussion?	.838	0.65	0.73	2.60 (0.56)
	2. How many differences about the content of decisions did the group have to work through?	.749			
	3. How many differences of opinion were there within the group?	.837			
Relationship Conflict (RC)	1. How much anger was there among the members of the group?	.854	0.78	0.85	3.60 (0.65)
	2. How much tension was there in the group during the exer-cise?	.898			
	3. How much personal friction was there in the group during decisions?	.901			
Decision Com-mitment (DC)	1. I feel confident that our group made the right decisions	-	-	-	0.92 (0.63)

Table 12: Factor Loadings, Percentages of Variance Explained, Cronbach Alphas, Mean Values, and Standard Deviations of First Order Latent Variables
Notes regarding the mean values: All constructs are measured with five-point Likert scales with the anchors 0 = strongly agree, 2 = neither/nor, 4 = strongly disagree, except for Task Conflict and Relationship Conflict that have five-point scales ranging from 0 = none, 4 = a very great deal

does not equal understanding. Rather, agreeing is a commodity, which does not require understanding. Similarly, we could say that an agreement without a full understanding does not necessary lead to more commitment. Out of this factorial analysis, we had to decide to work only with one item and have chosen the most straightforward one: I feel confident that our group made the right decisions. Overall, the choice to work with a pre-established scale for decision commitment, as for example the one proposed by Earley and Lind (1987), would have been preferable. The fact that we can use only one indicator for the decision commitment construct confronts us with an important weakness of the evaluation of the proposed model for knowledge integration.

From the mean values and standard deviations we can see that, as is true for the singular items, also most latent variables are positively skewed (see: Appendix 12). Mean values show that respondents reported participation to be generally equal, that they managed to gain a pretty good big picture, created common ground, that task conflict was low, relationship conflict almost non-existent, that they were pretty satisfied with their performance as a group, and, finally, that they felt quite committed to the decisions taken. The results of the mean comparison between the two conditions (tool vs. non-tool) can be seen in Appendix 14.

For a better understanding of the use and perception of the tool, we added some *quantitative and qualitative control questions* to the questionnaire, which can provide first indications. When asked to describe the two major advantages of working with the tool. People responded most frequently that the tool allows for gaining an overall idea, for keeping in mind the global outlook, and for visualizing schematically the major issues of the topic and thus providing a useful summary (see: Table 13).

In contrast to these positive quotes, 33% of the respondents felt that the tool was an obstacle for the flow of the conversation and almost 30% said that it hindered a balanced participation at the conversation (cumulative percentage of respondents who answered with "strongly agree" or "agree"). People reported that the handling of the tool made them loose time (formulation problems) and interrupted the flow of the conversation (see: Table 13). In addition, the person handling the tool became either very dominant in the conversation or acted as being relegated to the silent secretary that takes minutes. Spending time on detailed discussions how to word an issue certainly is problematic for maintaining the big picture. One reason for this sensation of loosing time with the handling of

Advantages		Disadvantages / Difficulties	
	No.		No.
General Impression		**Hampered conversation process**	
• practical/useful/effective	**19**	• **loosing time (because of formulation problems, handwriting is more immediate), interruptions in conversation flow**	**10**
• simple & easy to use	**18**		
• immediate, quick	4	• low correspondence between what is said in discussion and what then has to be filled in on tool (use the tool after the discussion)	1
• open, generic, flexible	4		
• colored	2		
• innovative	2	• breaks in conversation	1
		• **person who handles mouse is out of discussion and distracted (unbalanced participation)**	**5**
Provides big picture (overview and precision in detail)			
• allows for gaining overall idea/global outlook/summary (schematic visualization of major points)	**20**	**Difficulty to adapt to predefined categories, modes of thinking, and format**	
• helps to stay in the discussion "great for knowing what we are talking about and where we are going"	**7**	• **being forced to reason in the provided limited categories and metaphors - lacking flexibility**	**5**
• helps not to loose track of the objectives of the discussion	1	• packed templates do not provide enough space	3
• allows for major precision	1		
Provides structure		**Excessive focus on technology**	
• **turns issues explicit and clear**	**12**	• handling problems due to low acquaintance with software	2
• provides clear categories and structures	3	• focus on the tool instead of looking at the group members	3
Provides flexible persistence		• too much concentration on the tool instead of on the task (focus on the how (how to approach issue) rather than the what)	3
• gives possibility to cancel, change and update with the unfolding of the conversation	3		
• documents the findings and decisions taken	3		
• helps to remember precedent decision	1	**Forced consensual representation**	
• simplifies the reaching of conclusions	1	• **being forced to write also the aspects on which the group has not found a consensus**	**1**
Provides common ground			
• provides common ground "everybody has got the same in front of the eyes"	2		
• offers common discussion structure	3		
• unifies	1		
• facilitates sharing of information	1		
Fosters reflection and changes in perspective			
• activates reflection	1		
• fosters alternative perspective in thinking	1		
Supports the simultaneous juggling of large amounts of information items			
• allows for having at disposition all the information	2		
Fosters commitment			
• allows for major concentration and commitment of all group members	2		

Table 13: Results of the Two Qualitative Questions: "What are the two major advantages/disadvantages of the use of the visual tool during the exercise?"
Note: No. indicates for the numbers of times a specific answer was given

the tool can stem from the interlocutors' relative unfamiliarity with the tool. As discussed earlier (see: Pretest), we tried to assure a sufficient familiarity with the tool in various ways. First, the tool is quite easy to use and resembles in its mode of operation very common software programs (i.e. drag and drop). Second, students had to do an individual exercise with the tool prior to the experiment for a first familiarization. Third, the members of each group could decide themselves who should be appointed with the role of handling the tool during the discussion. It is therefore most likely that they chose a person who is quite adroit in handling software instruments. In spite of all these facts, students might have known the functionalities of the tool, but nevertheless did not feel very familiar in using the tool. In fact, observing the adoptions and appropriations of the tool (DeSanctis & Poole, 1994) were quite insightful. Most groups used only a very limited range of the functionalities the tool offers. Many, for example, did not work with colours for clustering, they did not use the comments for adding more detailed information and did not add new textboxes. In addition, groups differed quite significantly in the way they used the tool. Some drew on it while conversing as an ongoing visualization of what was discussed; others used the tool only every five minutes as a summary device. In this latter case, it is clear that using the tool interrupts the conversation flow. Similarly, some groups gave the tool-handler more autonomy and let him/her document the conversation rather quickly, others decided in rather long collective processes what to write and how to formulate each single statement. While each form of adoption has its advantages (e.g. collective formulation might turn tacit misunderstandings or task conflicts more apparent), it is most likely that the groups had not found out yet how to best make use of the tool. *Familiarity with the tool* might therefore be an important issue when stating that the tool hampered the conversation process. In spite of these reservations, only 9% of the respondents stated that they would have preferred to complete the task without the tool and only 11% reported that the tool added complexity to the task. Similarly, some people felt uncomfortable to reason in the provided categories, metaphors and perceived those as an inflexible additional structure to th task. The perception of additional complexity is correlated to the impression that the tool hampered a balanced participation (.71*). Secondly, individuals who reported that they were used to solve case studies, tended to state also that they would have preferred to work without the tool (correlation of .64*). It seems that if individuals were familiar with the kind of task, they did not need the structure the tool provides and perceived it therefore as less useful.

Finally, we controlled for satisfaction with performance using 3 items of Murthy and Kerr's (2003) four item scale (one item was specific to their research context). Satisfaction with performance measures the positive feelings and attitudes members of a group have toward a decision taken or a performance reached by the group (Keyton, 1999). Satisfaction is an important control variable out of various considerations. Previous research could show that the sharing of information leads to a greater group member satisfaction (U-shaped relationship: Mennecke, 1997), that there is also a positive relationship between members' participation and satisfaction (Fisher & Ellis, 1990; Olaniran, 1996), but that both content and relationship conflict lead to less satisfaction (De Dreu & Weingart, 2003). Knowledge integration, as we have conceptualized it, involves balanced participation, the exchange of information, but also the examination of this information with a constructive level of conflict. For this reason, it is particularly interesting to measure this outcome variable as a control measure[33]. We found, comparing the tool with the non-tool condition, that there is no significant mean difference between the two conditions. Pearson correlations show that the satisfaction with the group performance positively correlates with the creation of the big picture (.70**) and with the creation of common ground (.52*) and negatively with relationship conflict (-.40*) (see: Appendix 15 for inter-construct correlations). The creation and perpetuation of the big picture in a conversation seems thus to be an important aspect for the satisfaction with group performance and has to be further researched in future studies. With regard to balanced participation and content conflict, we were not able to confirm findings of previous studies as we did not find significant correlations between these constructs and the satisfaction with the group performance.

In summary, from the first descriptive and factorial analysis, we have gained the following insights. The descriptive analysis has shown that we have slightly abnormal distributions both on the level of the items and on that of the latent variables. Conducting the factorial analysis, we were able to confirm many of the original scales we used in the questionnaire. Only for the constructs of balanced participation and decision commitment, we had to adjust the originally proposed scales. Finally, the discussion of the qualitative questions has shown that conversation partners using the visual tool perceived it as helpful and easy to use and that it allowed them to more easily gain a global overview on the topic, as well as making issues explicit. It was problematic though that the tool forced them to

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33 Other outcome variables like decision quality are more problematic in a study which works with a preference task and which views communication not simply as a medium for decision making or knowledge integration, but as the constitutive element of these processes (Poole & Hirokawa, 1996).

spend a lot of time on formulating and documenting and stopped the natural conversation flow. Such drawbacks are most likely to be lessened once the conversation partners are more familiar with the tool.

Next, we will present our structural analysis of the knowledge integration model and later discuss the moderation effect of the software based visualization tool.

2.2 Structuration Analysis: Testing the Knowledge Integration Model

The structural analysis is geared towards the evaluation of the following two claims. First, we aim to evaluate the proposed model for knowledge integration (hypotheses H1-H5) and, second, we want to test the hypothesis whether the interactive visualization tool has a moderation effect on the relationships of the model for knowledge integration (Hm1-Hm4).

Before presenting the results of the structure equation modelling analysis, Table 14 presents the inter-construct correlations of the latent variables.

	EP	BP	CG	TC	RC	DC
Balanced participation (EP)						
Big Picture (BP)	.36**					
Common Ground (CG)	.31*	.34**				
Task Conflict (TC)	-.33**	-.20	.07			
Relationship Conflict (RC)	-.19	-.31*	-.22	.26*		
Decision Commitment (DC)	.21	.38**	.04	-.38**	-.15	

Table 14: Pearson's Inter-Construct Correlations
** Significance at .01 level, * Significance at .05 level

Various correlations are insignificant and the significant ones show low correlations ($0.2 < r \leq 0.5$). In view of our proposed second order reflective model, low correlations among the reflective constructs are expected (Edwards, 2001; Edwards & Bagozzi, 2000).

Figure 28 shows the results of the structure equation analysis we have conducted with the help of the software package Amos 5. The *latent variables reflecting knowledge integration* are all – with the exception of task conflict - *going in the direction we have claimed*: balanced participation, big picture, and common ground reflect knowledge integration positively, while relationship conflict reflects it negatively. Again with the exception of task conflict, we have satisfactory and significant regression coefficients for the loadings (above 0.5) and the variances explained (above 0.3) for all the latent variables. Most im-

portant for knowledge integration and most positively related is the big picture construct (with a loading coefficient (L) of 0.68***[34] and an explained variance (EV) of 0.46) (H2 supported). Balanced participation (L= 0.64***, EV= 0.42) is similarly important (H1 supported), followed by common ground (L= 0.56***, EV= 0.31) (H3 supported). This means that if conversation partners manage to create and maintain a big picture over the decision that has to be taken, i.e. they know how single aspects and contributions relate to the more general issue and do not get lost in discussions on details or irrelevant side-issues, then one can be quite confident that they manage to integrate their knowledge. Yet, also common ground and balanced participation are important reflections of the whether knowledge integration has taken place. On the other hand, as expected, relationship conflict reflects knowledge integration negatively (L= -0.57***, EV= 0.33). Regarding the second phase of knowledge integration – the integration of the group knowledge into the decision making process – we equally have satisfactory results with a coefficient of 0.50**. Yet, the explained variance of 0.25 is fairly low. A successful first-phase integration of individual knowledge into group knowledge explains only a fourth of why people feel committed to a decision (H5 weakly supported).

The results for *task conflict* do not meet our previsions entirely. We have made the hypothesis of an inverted U-curve relationship between task conflict and knowledge integration and have claimed that a moderate level of task conflict positively reflects knowledge integration. As mentioned earlier, we have operationalized this curvilinear relationship by squaring the task conflict concept (Backhaus *et al.*, 2003). Yet, even when modelling such a curvilinear relationship, we find a negative coefficient of -0.39* (which is, as expected lower than for relationship conflict). In addition, task conflict explains only 15% of the variance of knowledge integration. Testing for the alternatively possible linear relationship, we find a -0.45 loading coefficient with an explained variance of 0.20. We interpret these findings in that even a low or moderate level of task conflict reflects knowledge integration negatively and that a negative linear relationship is more likely (together with positive results for relationship conflict, H4 is supported). This finding stands in line with the recent quantitative meta-analysis on the literature on task conflict of De Dreu und Weingart (2003). In contrast to the general view of the positive effects of a moderate level of task conflict and the negative ones of relationship conflict, De Dreu and Weingart showed that task conflict actually has strong, negative effects on team effectiveness. They

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34 *** = significance at 0.001 level (99.9% of cases, ** = significance at 0.01 level (99% of cases), * = significance at 0.05 level (95% of cases), n.s. = non significant

found this result to be true even if the correlation between task and relationship conflict was low. They concluded, conflict should not to be considered inherently as non-functional, rather, future research should study the circumstances, in which conflict can have positive consequences (De Dreu & Weingart, 2003). It will therefore be particularly interesting to see whether the use of the tool creates a circumstance in which the relationship of task conflict and knowledge integration is less negative or even positive.
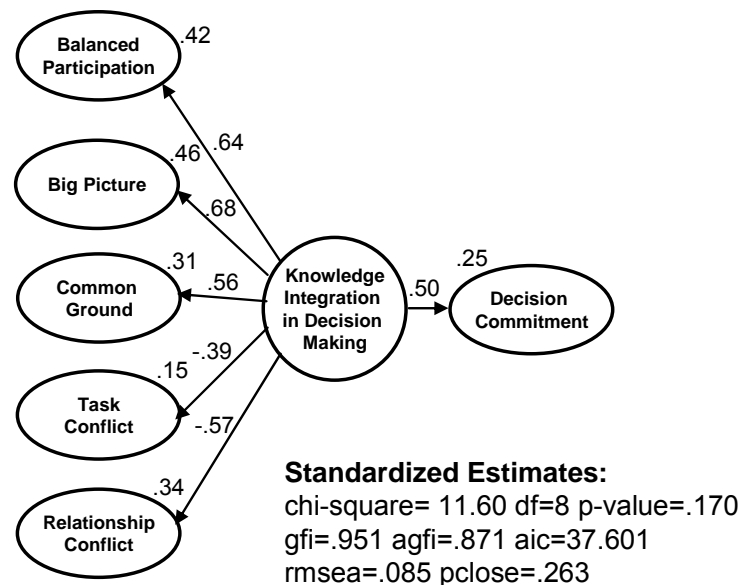
Figure 28: Results of the Structural Equation Analysis for the Knowledge Integration Model

The model we have proposed can be confirmed not only with regard to each single hypotheses. We have positive results also for the overall model as the general model of fit measures are positive: we have satisfactory results for AIC (37.601) and CAIC (78.666), as well as for BCC (40.851) and BIC (65.666), since their numbers are lower for the default model than for the saturated model. These information theoretical measures are most important to confirm our model for knowledge integration, given the non-randomized selection of the sample. We gain additional support for the model, presenting the following descriptive measures: the GFI (0.951) is higher than 0.95, and AGFI (0.871) misses by a few points the 0.9 threshold. Furthermore, the chi-square (11.601) in relation to the degree of freedom (8) indicates a good model of fit, even a slight overfit. Finally, the measures of approximate fit, pclose (0.263, should be above 0.5) and RMSEA (0.263, should be smaller than 0.05) are not satisfactory.

The small degree of freedom shows the limited power of this first test of the model. MacCallum and colleagues, for example, argued, that when *the degree of freedom* is small, the confidence intervals will be very wide and the test will be subject to considerable imprecision unless N (the sample size) is extremely large (MacCallum et al., 1996). In view of the very limited power of this first empirical test, the most important measures of model fit indicate to tentatively confirm the model, while other important ones (such as pclose and RMSEA) remind us to remain cautious.

One final comment on a measurement level is necessary. We needed to introduce one *residual correlation* (of 0.46) between common ground and task conflict in order to obtain the reported results. Apparently, people perceive a positive connection between task conflict and common ground. An explanation for this result is that task conflict can, under specific circumstances, lead to a more in-depth and richer understanding of the issue (Eisenhardt et al., 2000). While arguing on a content level, interlocutors develop a richer common ground among them.

Having discussed the mostly positive results for the general model for knowledge integration, we now are going to present the results for the group comparison in order to see if the modality of conversation (supported by a visual tool – natural condition) impacts the way experts and decision makers integrate their knowledge.

2.3   Testing the Moderation Effect of the Interactive Visualization Tool

The general aim of this second structure equation analysis is to show that, introducing a group comparison, we obtain a better model fit for knowledge integration and that we have a significant moderation effect on a relationship level of the model. In other words, we will show that conversation partners, interacting with the support of a visual tool, rely in their attempts to integrate knowledge more on the establishment of the big picture and the common ground, and less so on conflict.

Figures 29 and 30 show the *significant moderating effect of the use of the interactive visual tool on our model for knowledge integration.* The figures illustrate the single standardized coefficients and explained variances for the knowledge integration model, both for the tool and non-tool condition. Comparing the loading coefficients and the explained

variances[35] among the two situations, we can see that people, interacting with the support of the visual tool, rely mostly on the creation of a big picture (L= 0.73**, EV= 0.53) and a common ground (L= 0.75*, EV= 0.57) to integrate their knowledge and much less on balanced participation (L= 0.51***, EV= 0.26) and conflict (task conflict: n.s; relationship conflict L= -0.67*, EV= 0.45). In the non-supported situation, the image is reversed: interlocutors account to a great extent on balanced participation (L= 0.70***, EV= 0.51) and conflict (task conflict: L= -0.66**, EV= 0.43; relationship conflict L= -0.74***, EV= 0.55) to integrate their knowledge and less so on the creation and perpetuation of a big picture (L= 0.56**, EV= 0.32) and a common ground (n.s.). Since conflict is reflecting knowledge integration negatively, we can say that in the non supported condition, interlocutors have more difficulties in integrating their knowledge. To visualize this overall finding of a parallel reversed image between the two conditions, we have drawn the sizes of the circles around the constructs corresponding to their importance for knowledge integration (see: Figure 29 and 30). The moderating effect of the tool use on the model for knowledge integration is significant as we find a p of 0.010. The CMIN of 15.057 further indicates that we have a considerably better fit assuming that the two conditions are different rather than assuming the contrary.
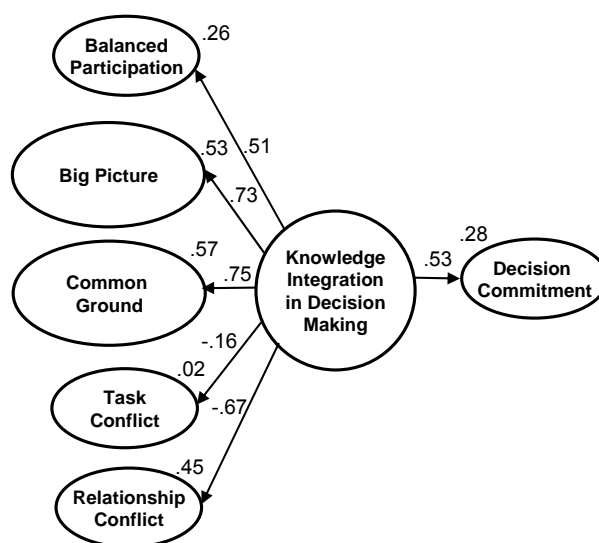
Figure 29: Knowledge Integration for Groups Interacting with the Support of the Visual Tool
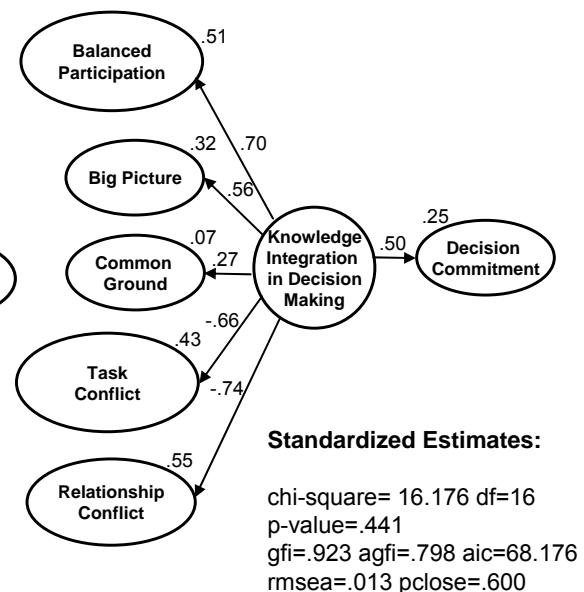
Figure 30: Knowledge Integration for Groups Interacting without a Visual Support

Standardized Estimates:

chi-square= 16.176 df=16
p-value=.441
gfi=.923 agfi=.798 aic=68.176
rmsea=.013 pclose=.600

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35 We report standardized values even if it is custom for group comparisons (multiple-sample analysis) to report unstandardized values (Kline, 1998). Yet as we are doing a measurement model and have to fix one parameter to one (we selected balanced participation), we cannot see the changes for this parameter in the unstandardized values, but only in the standardized. For completion we therefore report the unstandardized values in Appendix 16.

In more detail, we can observe the moderation effect of the tool most dramatically in the changes between common ground and task conflict. In the tool supported situation, common ground loads with a coefficient of 0.75* and explains 57% of the variance of knowledge integration. Task conflict, on its part, plays absolutely no role for knowledge integration. Its coefficient is no longer significant. On the other hand, in the non-supported condition, the situation is exactly the opposite. Here, common ground does not explain knowledge integration in any way (coefficient is non-significant, yet the impact of task conflict is strongly negative (loading of -0.66**) and the explained variance is considerable (0.43). This reversed picture and the apparent relationship between common ground and task conflict is further supported by the behaviour of the residual correlations. While in the general model, we have found correlations between the residuals of common ground and task conflict, the group comparison shows that, in the non-tool condition, the correlation is of only 0.14, whereas in the tool condition, the correlation is 0.61 high. The reversed picture in the tool situation versus non-tool situation with regard to common ground, task conflict, and the residual correlations leads us to the following interpretation. People perceive these two constructs to be interrelated in the sense that task conflict can – if conversations are supported by the visual tool - lead to a deeper understanding of the issue and to a greater common ground. For the interlocutors interacting without the visual tool, the condition is not given for that they conceptually interlink task conflict to common ground. In other words, in their attempts to integrate their knowledge, when lacking common ground, people start arguing about the issue. Carlile deliberates similarly on the challenges in knowledge integration: „In circumstances of strong specialization individuals who do not share enough background or common methods may have difficulty setting conflicts that arise across knowledge domains" (Carlile & Rebentisch, 2003: 1182). We have seen that the tool facilitates the establishment of a common ground between the participants of a conversation, which makes task conflict become less important for the interlocutors' endeavours in integrating their knowledge. We further see that, in the tool supported situation, conversers manage to deal more constructively with conflict.

We have claimed that *constructive conflict* is defined by three conditions: 1. a moderate task conflict; 2. a low relationship conflict; 3. a low correlation between task and relationship conflict. Comparing the model for knowledge integration between the two groups, we can find that, next to the already discussed differences concerning task conflict, relationship conflict loads strongly negatively on knowledge integration in both cases. In the tool supported situation, the loading coefficients and the explained variances are to some extent lower, but we can say that the use of the tool limits, but does not

eliminate relationship conflict to be a negative cause of knowledge integration. What about the correlation between task conflict and relationship conflict? Conducting a classical correlation analysis in SPSS and controlling for the two conditions, we find, in the non-supported condition, that task conflict and relationship conflict are significantly positively correlated by a coefficient of 0.50**. On the other hand, if interlocutors are supported by the visual tool, there is no significant correlation between the two constructs (Pearson's correlation coefficient: 0.05 n.s.). This means that, for the interlocutors interacting without the support of the visual tool, whenever they perceive a task conflict, they also perceive a relationship conflict. The interpretation is likely that, without a visual support, whenever conversation partners perceive content conflict, they understand it on a relational level, feel attacked personally and react on a personal level. Alternatively, it could also be that, in the non supported condition, interlocutors instrumentally use task conflict to fight out relational tensions among them. In both cases, a constructive handling of conflict is not possible. In sum, we can say that the use of the visual tool permits conversation partners to deal more constructively with conflict: first of all, it cancels out the commingling of task conflict and relationship conflict. Secondly, the weight and negative impact of relationship conflict can be lowered. Finally, we have found that also a moderate task conflict does not reflect knowledge integration positively. Yet, we have seen that, in the tool condition, task conflict does not play an important role for knowledge integration. Its role is positively substituted by the successful establishment of a common ground and, as we will see in the following, by the creation and perpetuation of the big picture.

For conversation partners interacting with the support of the tool, creating and sustaining the *big picture* is much more central for knowledge integration than for those interacting in the natural condition. In fact, in the tool condition, the big picture construct loads with a coefficient of 0.73** on knowledge integration and explains 53% of its variance. In the non-tool condition, it loads with a lower coefficient of 0.56** and explains the variance only by 32%. This confirms our hypothesis that the tool facilitates the perpetuation of the big picture since the tool helps conversation partners to better tackle the difficult balance between detail and general overview: it provides a dynamic visual summary so that interlocutors can position the main arguments, findings, questions that are emerging in the conversation, but can also deposit more detailed considerations thanks to the comment function.

With regard to balanced participation, we see an opposite trend. While in the tool condition, balanced participation loads with .51** and explains 26% of the variance of

knowledge integration, in the non-supported condition, it loads with a high coefficient of .70*** and accounts for 51% of the variance of knowledge integration. As we have stipulated, balanced participation remains important in both conditions. Yet, if conversation partners are not supported by an interactive visual tool, they are more sensitive to interactional justice (Bies & Moag, 1986) and attribute more importance to balanced participation for the integration of knowledge. On the other hand, if they are supported by an interactive visual, it is easier for them to see which aspects receive less attention and still need to be discussed, which areas have to be developed further and for which aspects they have already found a sufficient agreement. They might be focused more on what is said rather than on who says what. For this reason, the balanced participation of all interaction partners becomes less central in the tool condition.

We have argued that knowledge integration is a two phase process, in which, first, the specialized knowledge of the individuals has to be integrated into group knowledge, and secondly, knowledge has to be integrated and transformed into the decisions to be taken. First, conversation partners share their insights and their specific perspectives on an issue and develop a more complete understanding of it. Once they have developed such an understanding, they have to integrate and apply it in the decisions and actions to be taken. We have said that we measure this second phase of the integration process with the construct of decision commitment. We have claimed that if the participants of a conversation are successful in the first phase of the integration process, this would lead to a better integration in the second phase and thus to a better commitment to the decision taken. We were able to show above that in the tool condition, conversation partners were more effective in integrating their individual knowledge into a group knowledge, which is why we also expected a better integration into decision making in the second phase, i.e. a stronger correlation with decision commitment. Yet, the numbers show that the correlation is more or less the same for the two situations. For the tool condition, we have a loading coefficient of 0.53* and an explained variance of 0.28. Similarly, in the unsupported condition we have slightly lower L (0.50*) and EV (0.25). Working with the tool in the decision making process does not make people feel more committed to the decisions taken. We can conclude that the work with the visual tool supports the first phase in the knowledge integration process (the integration of specialized individual knowledge into group knowledge) as it facilitates big picture and common ground, but it seems not to facilitate the application of this knowledge into decisions and actions.

Finally we do find support not only for the single moderations, but we see also that the overall model of fit measures become better by introducing a group comparison in the structure equation analysis (tool versus non-tool). In fact, the information theoretical measures, (AIC 68.176) and BCC (83.343) are lower for the default model than for the saturated model. We find additional support for the model by the descriptive measures: GFI (0.923) is over the 0.9 margin, not so, for a few points, AGFI (0.798). The chi-square amounts to 16.176, which results in a slight overfit in relation to the degree of freedom of 16. The important measures of approximate fit, pclose (of 0.600, should be and is above 0.5) and RMSEA (of 0.013, should be and is smaller than 0.05), show also satisfactory results. We find that, controlling for the tool use, we have better overall model fit measures and that there are actually structural differences how people integrate their knowledge when conversing in the unsupported or visually supported condition.

3   Section Discussion: Implications and Limitations

Understanding knowledge integration as a communication process, we have defined – on the basis of existing literature (Chapter 2) and the discussion of three explorative case studies (Chapter 3) – a communicative model for knowledge integration. Consequently, we have argued that the communicative setting changes the importance of the constitutive elements – balanced participation, big picture, common ground, constructive conflict - of knowledge integration. In particular, we have claimed that interactive visualization can facilitate the communication across knowledge boundaries as communicators rely in their integration efforts more on the facilitated construction of common ground and big picture, manage to deal with conflict more constructively, and are less sensitive to interactional justice (Bies & Moag, 1986) such as balanced participation.

The aim of this chapter has been twofold: 1. provide a first empirical support for the model of knowledge integration in decision making, and 2. test whether the mode of communication moderates the way people integrate knowledge or not; more specifically, test if supporting conversations by interactive visual tools motivates conversers to adapt a different strategy to integrate knowledge and rely less on balanced participation and conflict, and more on the establishment of common ground and big picture.

In a first step, we have tested and found support for the reflective model for knowledge integration presented in Chapter 4. In particular, we could confirm hypotheses H1, H2, H3, H5, and partially confirm H4. With regard to constructive conflict (H4), we have found that while relationship conflict does reflect knowledge integration negatively, a moderate task conflict does not reflect knowledge integration positively (confutation of inverted u-curve hypothesis as proposed in Chapter 4). This is an interesting finding also for the established discourse on conflict in decision making as it contradicts the long held belief that content conflict can have a positive effect on decision making (a result, which finds support by the meta-study of De Dreu & Weingart, 2003). One major critique to which the presented model is susceptible is that one could argue that the model actually shows a measurement rather than a structural model as it consists only of components reflecting the construct and no component impacting on the construct. We nevertheless have presented it as a structural model because we conceptually make a difference between the first phase knowledge integration and the second phase integration, which is why the arrow of Figure leading to decision commitment is a structural and not a measurement arrow. One minor limitation of the model is, in addition, that although the results for decision commitment are positive (H5), the first phase of integration (when the specialized individual knowledge is integrated to a group knowledge) explains only 25% of the variance in decision commitment. Although the aim of this study was not to provide an exhaustive explanation for decision commitment, we have to acknowledge that the integration of individual knowledge into group knowledge accounts for relatively little and that our support for the second phase of knowledge integration (integration of group knowledge into actual decision making) is not very strong.

With regard to the use of interactive visuals to support face-to-face conversations, we have found that the modality of the communication has an impact on the presented model for knowledge integration on a structural level and we could confirm all four moderation hypotheses Hm1 - Hm4. If the conversers lack the common ground among them and the big picture of the issue, then they are more sensitive to balanced participation in their knowledge integration efforts and rely more on conflict. Yet, they are not able to constructively deal with conflict, which is why their attempts to integrate knowledge are less successful. In fact, we could show that in the situation where people interact without a visual support, not only both task conflict and relationship conflict strongly negatively reflect knowledge integration, also do task conflict and relationship conflict significantly correlate with each other and conflict cannot be handled in a constructive manner. Supporting conversers through an interactive tool helps them to gain the big picture on an

issue, establish a common ground and to more constructively deal with conflict. Next to these positive accounts of the use of cooperative visual tools, we have equally discussed some drawbacks: It can interrupt the flow of the conversation when the moderator needs to document what has been discussed and the group waits for him to have finished[36]. Observing the various groups interacting, we find that this aspect depends considerably on the skills of the moderator and his familiarity with the tool. The work with the tool can also add complexity to the task by imposing an additional analytic frame, which further might be lived by conversation partners as limitative and adding a rigid frame of thinking. There might be additional problems related to the use of the visual tool for the integration of knowledge, which are not so easily observable by conversation partners. Visualization leads to a reification of abstract concepts in perceivable objects. This might facilitate, on the one hand, understanding, on the other, it can aggravate the tendency of people to cling to an inappropriate mode of approaching an issue (Eppler, 2003) and impede perspectives changes.

Overall, the results from the group comparison suggest that there are important *dependencies among the various constituting elements of knowledge integration*, which we upfront conceived as independent. When presenting the model for knowledge integration, we have identified four major communicative challenges present when experts interact with decision makers and aim to integrate knowledge in the decision process. Yet, we have not discussed eventual correlations amongst the various challenges. On the basis of the present literature and the insights we gained from the explorative case studies, we believe that it is already an important step to isolate some key knowledge integration challenges and gain an understanding of their importance for the phenomenon. The numbers of the group comparison (visualization support/natural condition) then have shown an exactly reversed picture in the two conditions and have led us to interpret the data in a direction where dependencies among the major four knowledge integration challenges are assumed: In the absence of a sufficient common ground and the lack of a big picture of the issue, conversation partners compensate with conflict and become highly sensitive to equal turn taking. These interpretations are somewhat daring as we have just observed a decline/increase of certain constituting elements of knowledge integration, but have not actually tested for their dependence. Future research should therefore be more explicit about the interrelationships among the elements, which constitute the knowledge integration

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36 We have found support for this interpretation not only from the open-ended questions, but also from the fact that the overall explained variance is lower (.22) for the non-tool condition than for the tool condition (.22) (see: Appendix 16).

process. Our interpreted interrelations are also still somewhat unspecific and future re-
search should analyze more precisely whether it needs the creation of both big picture and
common ground conjointly so that conflict becomes less important in the knowledge inte-
gration process or whether one of them is sufficient.

A second limitation of the presented model for knowledge integration in decision
making, which is generally true for models of all sorts, is that it *is not comprehensive and
misses out variables* that might be crucial for the explanation of the phenomenon. In fact,
we found a compound explained variance of knowledge integration only of .30. Thus,
future research has to inquire which other variables have a major weight in explaining
knowledge integration. One such variable could be the degree of novelty and variability
inherent within the decision to take or task to confront. Scarbrough et al. for example
state that the higher the novelty or uniqueness of a project task, the higher is the potential
but also challenge for knowledge integration (Scarbrough et al., 2004). Similarly, Carlile
refers to the knowledge's nature of being path-dependent, which makes it particularly
difficult for interlocutors to give up their knowledge and accept or develop new knowl-
edge: "The most challenging aspect of the relational nature of knowledge at a boundary is
that for each actor there is novelty to share with others and novelty to assess from others"
(Carlile, 2004: 557). Next to this aspect of novelty, there are other aspects that we have
not taken into account. These might not be directly related to the communicative situation
of experts and decision makers, but are present in the organizational context and have an
influence on the interaction. Alavi and Tiwana for example discuss the inflexibility of or-
ganizational ties, which represents a challenge to knowledge integration efforts (Alavi &
Tiwana, 2002). Hargadon and Sutton (2000) mention the rate of employee turnover to be
another challenge for knowledge integration and which in fact is an element that impacts
on the challenge of establishing a common ground. In this way, there are various exten-
sions possible for the model of knowledge integration we have presented. Yet, we have
outlined that the model presented is a communicative model and aims to capture only the
interactional, communicative challenges present at a knowledge boundary. In this way, its
focus is more micro and it deliberately misses out larger organizational aspects already
fairly well discussed in the organizational literature (De Boer *et al.*, 1999; Dougherty,
1992; Eisenhardt & Santos, 2000; Grant, 1996; Huang & Newell, 2003; Ravasi &
Verona, 2001; Scarbrough et al., 2004). We have argued that if we adopt a relational,
contextual, practice-bound understanding of knowledge and if we agree that knowledge is
created, shared, integrated, or applied in social interactions (Nonaka & Takeuchi, 1995),
it is important to study the communicative challenges present in the primary form of these

interactions, which are conversations. In this way, the presented model on knowledge integration represents an attempt in this direction. It singles out major obstacles that are present in conversations and which inhibit the integration of knowledge across knowledge boundaries. Future research could aim to address more specifically the interrelations of such micro-communicative challenges with more macro-organizational aspects that challenge the integration of knowledge in decision making.

Next to these limitations regarding our model, this study also has several limitations regarding its methodology. First and foremost, we have mentioned the small N of our data for conducting structure equation modelling analysis and we have discussed the limitations this poses to the external validity and robustness. Second, we have seen that the respondents were only semi-familiar with the visualization tool in spite of the pre-arrangements we have made (presenting students the use and functionality of tool, making them work with the tool for a course exercise prior to the experiment). Third, the hidden profile situation might lead to an information difference, but not to a true difference of knowledge within the group. The in-depth knowledge of a knowledge management expert and the mode of thinking of a decision maker cannot be simulated fully in this way. Forth, the reliability of self-reporting (through questionnaires) on conversational processes is questionable insofar as conversation partners are not fully aware of their conversation behaviour and there might be important differences between their espoused theories (self-descriptions of one's behaviour, values, beliefs) and the ones in use (more implicit values, beliefs, and assumptions manifested in practice) (Argyris & Schön, 1978). Fifth, with the two step approach we have chosen for the statistical analysis (in view of the small sample size), that is doing the first factorial analysis in SPSS and only then introducing these first-order factors in the structural equation model, we are unable to see in the structural analysis whether the two measures have been perceived differently in the two conditions or not (tool vs. non-tool). Sixth, with the statistical evaluation we have conducted, we were not able to show the overall strength of the moderation effect of the tool, that is we could only say that the model differed significantly, but we could not say how strongly the model differed in the two conditions. Yet, we believe that in view of the state of research, it is already an important step to show that the modality of the communication – in particular the use of visual tools - impacts the strategies people use to integrate knowledge in decision making. Finally, a general critique on the experimental design we have used is that we have worked with students as respondents for the experiment (Gordon *et al.*, 1986).

Future research can address these limitations in various ways. The experiment could be replicated by using – instead of students - two groups of professionals, between which a clear difference in specialization exists and can be assessed through knowledge tests and tests of thinking styles (Sternberg, 1997). Researchers could combine methods that rely on self-reporting and those that permit observation of communicative behaviour directly. Questionnaires could be complemented by recorded conversation analysis. A larger sample would permit to include directly the observed indicators in the structural equation model, instead of the first order factors. By doing so, more transparency of a possible moderation effect on the measurement level could be gained.

To address the important issue of tool familiarization, more embedded and longitudinal studies have to be conducted. Scholars could study in a mid-timeframe how collaborative visual tools are appropriated by certain organizational teams or departments. They could also examine if a recurring use of the tool would lead participants of a conversation to change the way they deal with the identified challenges of knowledge integrating conversations, such as balanced participation, common ground, big picture, or constructive conflict. In addition, institutional aspects such as are discussed in Orlikowski and Barley (2001) have to be considered and need to be further investigated in future research endeavours.

A more embedded study would allow to pursue a less deterministic view on technology (for an overview, see: Bimber, 1998) and adopt theories of social construction (Pinch & Bijker, 1992). In the latter perspective, technology is viewed as an artefact and an outcome of social interactions and is only mediating, and not determining, social processes and structures. Along this second stream, structuration theory (Giddens, 1984) is among the most widely used theories to study the interactions between information systems (IS) and organizational structures and processes. In this view, the technological artefact does not carry interpretive schemes and social norms (it does not carry social structure) and does not impose them on its users (Orlikowski, 2000). Users, depending on their needs, their knowledge and skills, but also depending on situational factors (e.g. accessibility of recipient, diffusion and acceptability of technology within community or organization) (Markus, 1994), develop their own way of how to make use of the technology. In would therefore be more reasonable to study in an embedded mid-timeframe investigation how collaborative, versatile visual tools are enacted and appropriated by conversation partners. Such a study would permit to understand which communicative structures emerge from the recurring conversations that are supported by the visual tool. From a knowledge per-

spective, as we have pursued it, this would allow for understanding the social interpretive schemes within which experts and decision makers integrate knowledge in decision making.

Finally, *practitioners* and decision support developers can gain the following insights from this study. First, we have seen that even simple tools need a certain time for appropriation and familiarization. The benefits that a collaborative visualization tool can provide for a decision making meeting depend on the skills of the facilitator using it. If he/she is capable of summarizing a five minute conversation on a certain issue in one sentence and position it meaningfully in a visual template, the tool will not slow down the speed of the conversation, but help to structure it and help interlocutors in creating the big picture of an issue. Practitioners, who want to introduce a new collaboration technology in their organization, are therefore well advised to introduce the technology together with a meeting facilitator, who is not only trained in the functionalities of the technology, but who is also knowledgeable about meeting facilitation and who has a knowledge on which visual templates are useful for which task type. We have further learned from the qualitative and control questions that using a visual tool can not only facilitate knowledge integration in decision making, but that the provided visual frame can also add complexity to the decision task or provide a perspective, which is not always beneficial. In practice, a facilitator should therefore realize when to change from one visual template to another, or when to stop using the visual tool altogether. There are moments in a meeting or there are entire meetings, where the use of a tool is counterproductive and inhibits what Gratton and Ghoshal call the trust-building or emotional 'intimate exchanges' (Gratton & Ghoshal, 2002).

Chapter 6

Concluding Discussion and Outlook

Outline

1 Resuming Major Findings

The presented research has shed light on the knowledge communication between experts and decision makers and we have applied a variety of conceptual and empirical perspectives to engage in this investigation. A similarly variegated set of findings has emerged from it. In the following few paragraphs we will summarize the major findings.

The first perspective was *procedural*, with which we aimed to find answers for the first sub-question of this research: *Which communicative challenges and practices are of particular significance at which moment of the overall knowledge communication process?* The diachronic view allowed us to identify five phases along which experts and decision makers structure their communication: (1) a phase when decision makers have to identify the relevant expertise and when the experts, on their side, struggle to gain the attention of decision makers ('identify experts & expertise'), (2) a phase when the need of the decision makers has to be articulated in a clear and precise manner ('articulate need'), (3) a phase when experts analyze the issue and develop possible courses of action, (4) a phase when experts 'convey insights, suggestions, and solutions' to decision makers, and finally (5) a phase when the experts' insights and proposed solutions aim to be applied and implemented by the decision makers. With the help of this analytical subdivision into five phases we were able to see the cyclical nature of the knowledge communication process. In fact, we found across the different expert-decision maker contexts that the phases do not progress linearly, but are connected by a multitude of feed-forward and feedback loops. We have qualified the feedback loops in constructive refinement and alignment loops and in more problematic readjustment loops. We have further seen that, across the various case contexts, there are similar challenges and practices specific to each phase in the knowledge communication process. In particular, we have focused on the ASK-problem during the 'articulate need' phase and on the difficulty to present an adequate 'in-between complexity' (or the risk to misrepresent complexity) during the 'convey insights, suggestions & solutions' phase.

The *ASK-problem* (anomalous state of knowledge) is a situation in which the decision makers, though they realize that they do not dispose of the necessary knowledge to take a decision and that they need to call in experts to support them, lack the sufficient knowledge to expose clearly to the experts what kind of insight or solution they need. To avoid the consequent risks of unspecific requests and misunderstandings, experts and decision makers engage in an interactive process of communication aiming at a continuous

refinement and alignment of their understandings. In this process, informal, face-to-face communication is combined with the marking down of more formal, binding agreements. The flexibility of face-to-face conversations is necessary to gradually develop a shared und refined understanding of the decision task. On the other hand, formally holding down the progressing understandings (even if intermediate) and keeping hold of binding agreements, guarantees the advancement in the process. Marking down formally helps to define responsibilities more clearly and to better manage the respective expectations. This process is further characterized by an alternation of talk and action and highly resembles processes of sense-making (Weick, 1995; Weick *et al.*, 2005) for which the decision makers can only know and express what they specifically need once they see what is possible. For this reason, decision makers cannot define a very clear request at first go, but only after extensive interactions with experts and after having viewed results of first broad analyzes conducted by the experts, they can gradually refine their need.

Another major phase-specific challenge in the knowledge communication process is for experts to communicate their analysis of a complex issue and their recommendations in a way which adequately represents the complexity, yet outlines it in a way that is meaningful also to the non-expert decision makers who only have little time at disposition to digest the proposed analysis and insights. In order to find the right level of this '*in-between complexity*' and the right balance between conciseness and comprehensiveness, experts and decision makers engage in the practices of information scaling (within and across media) and of using standard structures and presentation principles to arrange a piece of information. These practices help to inform the decision makes on a level of detail which best suits them and allows them for a quicker orientation and an easier comprehension.

The second perspective under which we approached the knowledge communication between experts and decision makers was *structural* and shed light on the second sub-question of this thesis ('*Which communicative challenges and practices generally characterize the expert – decision maker communication that are not specific to one phase of the overall communication process and that impact on the single interactions?*'). We aimed to structure these challenges and practices along different dimensions to which experts and decision makers refer when making sense and integrating knowledge in their communications. We therefore proposed a framework for the management of conversations from a knowledge perspective that outlines six dimensions: (1) the message, (2) the process of the communication, (3) the communicational intent, (4) the group

dynamics between the communication partners, (5) the mental models of the communication partners, (6) and the outer context of the communication. Analyzing the case studies with this analytical lens, we found that three challenges make the effective integration of knowledge between experts and decision makers a difficult endeavor. These are: the lack of the big picture of the issue (on the dimensions of the message and the process); the relational tensions that arise in view of the knowledge gap and due to the lacking trust between experts and decision makers (on the dimension of the group dynamics); and finally, the lack of common ground and the too distant perspectives between experts and decision makers (on the dimension of the mental models). In the reported case studies, experts and decision makers addressed these challenges by two concatenated meta-practices: Using boundary objects, on the one hand, and engaging in boundary-spanning processes, on the other. Regarding the use of boundary objects, we recurrently found across the single case studies that experts and decision makers use visuals, metaphors, glossaries, artefacts, standardized forms, and shared methods as types of boundary objects to support their knowledge communication. We could show how boundary objects enable experts and decision makers to learn about their differences in understanding, and, by doing so, help to explore how these differences are related, how to benefit from this variety of viewpoints, and to investigate how a common understanding and interest could look like. Thereby, it is important that they hold down an otherwise very flux understanding. By giving an understanding a more fixed reality, experts and decision makers are able to discuss it, identify it as different from their own understanding, dissociate from it, and discuss its implications. However, we found that boundary objects have to be combined with participation in order to help in the knowledge integration efforts between experts and decision makers. Only thanks to boundary spanning practices, such as face-to-face conversations, that structure around these boundary objects, experts and decision makers are able to develop shared understandings and to integrate knowledge. In this way, our investigation provides additional support for Wenger's principle of combining reification (through the use of boundary objects) and participation (through the engagement in boundary spanning practices and in particular in face-to-face conversations) (Wenger, 1998) in order to integrate knowledge across knowledge boundaries.

This result of the concurrent engagement in participation and reification most intrigued us and triggered further, more precise questions. In particular, we wanted to find out how the use of visual boundary objects impacts on the attempts to integrate knowledge in face-to-face conversations. By drawing on the literature, we further elaborated on the

findings from the case studies and developed a model for knowledge integration. Conceiving knowledge integration as a communication process we claimed that knowledge integration is reflected by the successful overcoming of the challenges of unequal participation (an element, which we introduced from the literature (Barge & Oliver, 2003; Beer & Eisenstat, 2004; Dixon, 1997; Eisenhardt et al., 2000; Ellinor & Gerard, 1998; von Krogh et al., 2000)), of the lack of the big picture, of the lack of common ground, and of the unconstructive dealing with conflict. Not only could we generally confirm the model, we could further show that the use of collaborative visual tools can take over the function of visual boundary objects and facilitate knowledge integration. In particular we found that without the visual support, experts and decision makers lack the common ground among them and the big picture of the issue, which is why they are more sensitive to procedural justice as balanced participation and rely in their integration efforts more on conflict. However, we found that they are not able to constructively deal with conflict, which is why their attempts to integrate knowledge are overall less effective. We could show that supporting conversations by a collaborative visual tool helps experts and decision makers to gain the big picture on an issue, establish a common ground, to deal more constructively with conflict and thus to more effectively integrate knowledge in decision making.

Approaching the integration and communication of knowledge between experts and decision makers under these varied perspectives and reaching the presented findings, we hope to have been able to make a few contributions both to the scientific discourse and to practice. In the following, we will outline those contributions, that we consider most important, first for practice and then for research.

2 Contributions to Practice

Many findings of this research have direct *implications for practice*. Particularly the findings from the case studies show a variety of modes to manage the knowledge communication between experts and decision makers and to facilitate the integration of knowledge across knowledge boundaries. Rather than outlining the implications for practice of all findings, we would like to summarize two major implications, which we have discussed repeatedly throughout this thesis.

A first learning for practice can be that in order to manage the knowledge integration between domain experts and decision makers, one has to manage the *process* of their

communication, which is cyclical in nature. This means that decision makers cannot expect to give a one time briefing to the experts and the latter will manage and do an analysis that precisely reflects the needs of the decision makers. The experts, on the other hand, cannot expect that the decision makers precisely define a clear request upfront. Knowing about the ASK-problem and the tight time constraints of decision makers, we found that it is best if experts manage an interactive process characterized by a combination of co-located, face-to-face communication (e.g. meetings, workshops), standardized forms, doing first broad analyzes, engage again in face-to-face talk, refine the request, and sign a form of scope contract.

Second, practitioners can learn from this research that, in order to effectively manage the knowledge integration between experts and decision makers, they have to engage in manifold means to develop the common ground among experts and decision makers. We have seen that the common ground not only has to be developed with regard to professional knowledge, but also has to be established on a personal level. To do so the experts and decision makers can engage in boundary-spanning practices. Experts can organize events, for example, during which they can engage with decision makers not only factually, but also have the possibility to socialize. Actively caring for this relational aspect is very important in order to allow knowledge integration to take place. If problematic relational issues nevertheless start to interfere during a single knowledge communication between experts and decision makers and a constructive handling of conflict is no longer possible, this research has shown that experts and decision makers are well advised to start supporting their interactions with collaborative visualizations (e.g. sketching). When communication partners start visualizing positions and give them visual realities, they are better able to constructively deal with conflict and do not mistake a critique, intended on a content level, as an attack to the person. This leads us to the second way to extend the common ground among experts and decision makers. Through the use of boundary objects, such as visuals, shared repositories, shared methods, metaphors, experts and decision makers have additional, object-like structures to which they can refer and which become part of their meaningful context. Finally, if the specialization of experts is such that there is particularly little common ground between experts and decision makers and the latter have a very hard time understanding their language and mode of reasoning, another advice is to use brokers or mediators who have double qualifications and who can translate meanings both in the direction of the experts and of the decision makers.

Next to these more pragmatic insights for practice, with this thesis, we aimed most of all to make contributions to the scientific discourse on the management of knowledge in organizations.

3 Scientific Contributions, Limitations, and Suggestions for Future Research

In the introduction (Chapter 1), we outlined the grand lines of the scientific contributions of this thesis. In particular, we stated that we intended to contribute to a *communication perspective* on issues of knowledge management. We argued that such a perspective refines the understanding why the co-construction of knowledge in situations of knowledge creation, transfer, integration, or application is a challenging activity. In fact, we outlined a whole set of challenges of the communication between experts and decision makers, which hinders this co-construction of knowledge. In the following, we will elucidate some of the more detailed contributions of this thesis for the scientific community, discuss its limitations, and – along this discussion – outline suggestions for future research. Rather than leading this discussion in different sections, we prefer to show directly for each specific contribution its limitations and implications for future research.

1st Major Contribution, its Limitations and Implications: Refinement and Development of the Process of Knowledge Integration

A central *contribution* of this thesis is that we *have refined and further developed the understanding of the process of knowledge integration*, a process, which, until today, has received only a moderate attention by scholars. Previous research did already discuss knowledge integration between occupational groups (between engineers technicians, and assemblers: Bechky, 2003; between radiologists, nurses, and physicians: Swan & Scarbrough, 2005), yet did not investigate into the expert-decision maker interaction from the standpoint of knowledge integration. We have argued for the importance of this context by showing that specialization becomes ever more important also in decision making. In the expert-decision maker interaction, we could confirm several findings of prior research conducted in other knowledge integration situations, particularly with regard to the challenges present in the knowledge integration process. For example, the lack of a sufficient common ground as a major problem when aiming at integrating knowledge across knowledge boundaries has already been discussed by Bechky (2003) but

also by Grant (1996). We found additional support for this finding both in the case studies and the experiment, and presented for the latter also a scale to quantitatively measure the level of common ground between communication partners. Next to supporting already existing findings, we have presented additional challenges characteristic for the knowledge integration process (in particular, the big picture challenge, the unconstructive handling of conflict, misrepresenting complexity, and the ASK-problem). With the synthetic model for knowledge integration presented in Chapter 4, we have contributed to a richer understanding of knowledge integration and have also paved the way for further research of this process by developing a more elaborate mode for its measurement.

One *limitation* regarding the investigation of the concept of knowledge integration is, however, the way we have analyzed the *second phase of the knowledge integration process*. We have argued that the knowledge integration process consists of two phases. While we have been quite elaborate and precise regarding the first phase and showed what challenges and practices exist when individuals incorporate their specialized knowledge into some form of systemic situation-specific knowledge, we have been less elaborate regarding the second phase of the knowledge integration process (integrate knowledge in the actual decision making and action). This limitation became apparent, above all, in the experiment when we have found that the first phase integration explains only 25% of the second phase integration and that there are other factors which we have not considered and which determine the second phase of the knowledge integration process. From the case studies we gained insights of what these factors could be. We found that the 'knowing-doing' gap, but also the external coercions in which the decision maker finds himself, and the decision makers' fear of losing face, are important factors that impact the second phase of the knowledge integration process. However, we have not discussed communicational reasons why this passage from the first to the second phase of the knowledge integration process is so challenging.

In part, this limitation is related to the communication approach that we have adapted. Our mere focus on the interactional dynamics of a duplet of communication partners has enabled us to shed light on the direct interactional challenges that inhibit the effective integration of knowledge. Yet, it allowed for less precision in analyzing the larger communication context.

While this research could not provide in-depth insights on the second phase of the knowledge integration process because of a poor consideration of the larger communicative context, consequentially, *future research* could engage in qualitative social

network analysis for example by using ethnographic data (Scott, 2000) and analyze how an advice of an expert enters into the discourse about a decision to take, how the content of the advice changes during these interactions, in what form it is applied in the decision to take, or why it is discarded. Being aware of these networks of communications that change the original contribution of the expert, a Brookings' scholar mentioned:

"In the policy making process, there are many changes that can be decided upon. It is a whole area of bargaining and the successful bargainer is not going to give his bottom line. So very often, you as an expert don't send off exactly what you want because you realize that it will be watered down or that it will be strengthened. So you never show your bottom line early. (..) If you start your argument with your best proposal, you have no argument to retreat. Intellectually and morally, this is very hard." (C. Schultze).

Our type of analysis did not allow us to shed light on such interactions between the expert-decision maker communication and the thick network of interactions taking place in the context of their communication. Such an analysis would have certainly contributed to a better understanding why the specialized individual knowledge of experts can indeed be integrated into situational group knowledge between the experts and the decision makers, but nevertheless not be integrated in the actual decision making.

2nd Major Contribution, its Limitations and Implications: Development of a Knowledge Perspective for the Management of Co-located Conversations

Next to investigating the process of knowledge integration, a second major *contribution* of this thesis is that it has contributed to the literature on the *management of conversations* in organizations by applying an explicit *knowledge perspective* to it. While we have shown that much of the literature in this field is limited to outline single prescriptions for conversational behavior that allows for knowledge sharing, creation, or integration, we have presented a framework that allows us to combine these single prescriptions into an integrative whole. In doing so, we were able to show the interrelationships among the single prescriptions and argued that attempts to manage a conversation by introducing a single rule are insufficient.

One *limitation* of the validity of this framework for the management of conversations from a knowledge perspective is that we have not empirically tested the prescriptive framework as a whole, but have only picked three elements of it and have tested them in the experiment (Chapter 5). In particular, we have tested whether the recommendation for a balanced participation (on the process dimension), for a constructive handling of conflict

(on the level of the group dynamics), and for using an expansive message, for example, through the use of visuals (on the level of the message) actually contributes to the effective integration of knowledge in decision making.

Future research should engage in providing additional empirical evidence for the prescriptive framework that we have presented and test how other elements of the framework (e.g. balancing between discovering and focusing) influence one specific knowledge process, such as knowledge integration. In fact, the review on conversations, presented in Chapter 3, lacks precision in that we simply viewed conversations from a knowledge perspective without more specifically distinguishing between the various knowledge processes such as knowledge creation, sharing, integration, or application. In the experiment, we then focused on one specific social knowledge process. Alternatively, or additionally to evaluating one or two further elements of the framework, future research could equally evaluate the framework as a whole, given that every prescription along the six dimensions forms a hypothesis to test. In this way, one could verify, also empirically, that there are connections between the single prescriptions of the various dimensions.

This thesis *contributes* to the study of conversations in organizations also because it is *not limited to the mere analysis of micro-interactional patterns*, but analyzes, in addition, the larger *communicational context* in which conversations take place. In fact, we have outlined the various roles of conversations in the knowledge communication between experts and decision makers (see: Table 11 in Chapter 3) and have also shown when in the macro process of the knowledge communication, co-located, face-to-face conversations are of particular importance (e.g. in the 'articulate need' phase to assure a common understanding of the request) and when other communication formats (like written reports) are preferable. Only by approaching the issue in such a way, we were able to show that while the flexibility (in terms of the possibility to adapt to the characteristics of communication partners and to the issue) and richness (in terms of communicating verbal, para-verbal, and non-verbal signs) (Markus, 1994) of conversations are very important elements for a successful integration of knowledge, they have to be combined with other forms of communication – e.g. visual boundary objects – that allow for reification (Wenger, 1998).

3rd Major Contribution, its Limitations and Implications: Enrichment of the Discourse on Boundary Objects

The last aspect on the necessary combination of participation, flexibility and reification leads us to pinpoint a further important *contribution* of this thesis, which is that we hope to have enhanced the discourse on *boundary objects*. First, we particularly discussed the manifold roles of visual boundary objects in the integration of knowledge and further showed why metaphors are also an important type of boundary objects. Second, we found support for prior findings on the necessary characteristics of objects in order to take over the function of boundary objects (Boland & Tenkasi, 1995; Carlile, 2002, 2004; Star & Griesemer, 1989) and contributed to this argumentation by linking it to our findings of the major communication challenges of the knowledge integration process. Star and Griesemer argued that boundary objects have to provide a loose structure that becomes highly structured in its specific use (Star & Griesemer, 1989). We could show that this characteristic is important, in particular, to represent in-between complexity, to elicit implicit knowledge embedded in practice, and in order to expand the common ground among communication partners by attaching individual, domain-specific knowledge to a common loose structure (e.g. metaphors). Providing an overall structure further helps experts and decision makers to view the big picture. Second, we could show that boundary objects have to enable representations that facilitate the recognition of differences and dependencies across knowledge boundaries not to engage in perspective taking (Boland & Tenkasi, 1995; Carlile, 2002), but also to constructively deal with conflict, and to further develop common ground. While these aspects mainly serve the first phase of the knowledge integration process and the establishment of a shared understanding across knowledge boundaries, we have finally shown that boundary objects are important also for the second phase of the knowledge integration process in so far as they serve as mnemonic devices and help to activate knowledge and to actually apply it in decision making. These findings are – we believe – a necessary step to refine the understanding of the central characteristics of objects in order to become boundary objects.

We suggest that *future research* continues in this direction and more precisely and systematically outlines what should characterize boundary objects in order to facilitate the knowledge integration across boundaries. One way to do so is to show what type of boundary objects – with which characteristics – are particularly useful along the different phases of the knowledge communication process that we have proposed in Chapter 2

(Figure 4). In fact, we did not analyze the boundary objects from the process perspective and were not able to outline the importance of the various objects for the different phases of the knowledge communication process. We believe that future research on boundary objects should close this gap of our research and could gain from a process perspective (see: Figure 31).
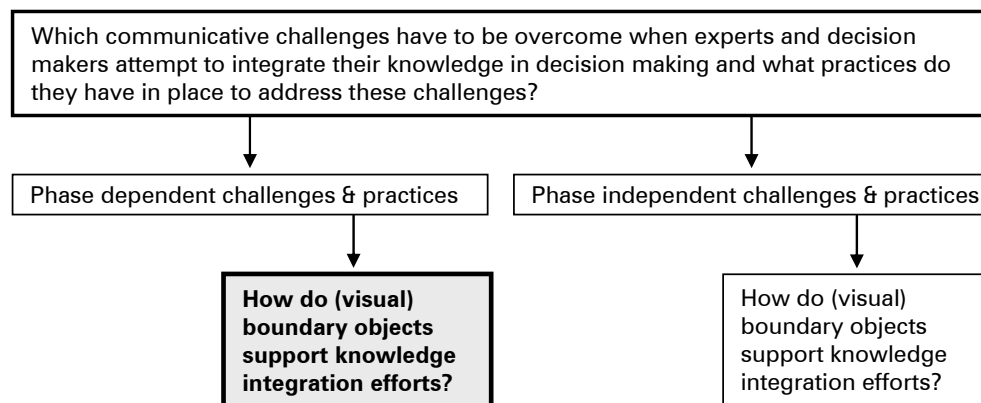
Figure 31: Necessity for a Process View on (Visual) Boundary Objects

Employing a process perspective, one could elaborate a matrix with the process phases of our knowledge communication model on the x-axis and the necessary criteria for boundary objects on the y-axis and show when which criteria is of particular importance. Our research has shown, for example, that in the 'articulate need' phase, it is particularly important to actively collaborate, to elicit implicit knowledge embedded in practice, and to expand common ground by representing differences and dependencies. One could thus argue that the boundary objects' characteristic to provide loose structures, like working with methods or metaphors, is particularly important in the early phases of the model (articulate need; analyze). On the other hand, in the 'convey insights, suggestions, & solutions' phase, the communication is more directional and boundary objects must be more strongly structured. A further benefit of such a process view on boundary objects is that one can outline which characteristics of a specific boundary object are of different importance along the knowledge communication process. In the beginning of the process, the metaphor, to retake the example, is a boundary object because of its loose structure that can become very concrete. Later in the process it is a boundary object because the image it suggests serves as a mnemonic device for the remembrance and activation of knowledge in the actual decision making. Elaborating criteria for boundary objects from a process perspective finally represents an important step in further developing the categorization of boundary objects that Carlile presented (2004).

Our analysis finally contributes to a refined understanding of the necessary interplay of boundary objects and co-located, face-to-face conversations, or in Wenger's terms, of reification and participation (Wenger, 1998). We showed that if the aim of the collaboration across knowledge boundaries aims at developing shared understandings and the integration of knowledge (and not only the management of smooth interfaces between specialized collaborators on different sides of the knowledge boundary without necessarily requiring that the ones understand the work of the others), boundary objects alone cannot guarantee an effective integration of knowledge and there always needs to be rich, flexible forms of communication such as co-located conversations (participation), which structure around boundary objects (reification).

Overall Limitations and Implications for Research: Broadness of Topic and Research Design

In view of the various contributions of this thesis and the limitations that are related to them, we would like to point to two additional more general limitations of the present thesis and indicate, with the benefit of hindsight, what we would have liked to do differently: One limitation refers to the delimitation of the topic of research, the other to the research design and methods we have chosen.

One major problem of this work with which we continuously struggled, is the *broadness of the topic* we have chosen. First, the breadth is due to the fact that we have not focused the analysis on one type of expert and decision maker, but have generally inquired into the knowledge communication between the two. Alternatively, we could have concentrated on one type of expert and decision maker, for example on engineers and managers. With such a choice, one could still have worked with a multiple case approach and analyze the engineer-manager interaction in various organizational settings. A second way to gain focus would have been to concentrate on one challenge in the knowledge communication – for example on the in-between-complexity issue - and discuss it in more depth, rather than striving for completeness and enumerating a whole set of challenges as we did. Methodologically, one could approach such a choice by conducting, first, two or more explorative and broad case studies and with their elaboration and reflection from theory, then come up with a refined research question and conduct two additional, more narrow and in-depth case studies. Qualitative interviews and the qualitative analysis of communication products could be complemented by participative observation where, for example, the researcher would attend meetings between experts and decision makers.

The second overall *limitation* of the presented research regards the method of the general research design. In the outset of this thesis (Chapter1), we have claimed to have triangulated methods. In effect, we have addressed the research questions (with the exception of the 1st sub-question: which communicative challenges and practices are of particular significance at which moment of the macro knowledge communication process?) both in the case studies and in the experiment. Yet, we have done so at different levels. For example, in the case studies, we have investigated in an explorative manner through the 2nd sub-question (see: Figure 1 in Chapter 1) by generally referring to the knowledge communication between experts and decision makers. Yet, in the experiments, we have addressed the question exclusively with regard to face-to-face conversations and analyzed whether we could observe the same knowledge communication challenges also in the face-to-face context. The same is true for the visual boundary objects. While we analyzed them in the case studies for the knowledge communication in general, in the experiment, we exclusively focused on face-to-face conversations. In this way, to some extent, we have addressed different facts with the multiple sources and data, which is why it is not completely correct to talk of triangulation (Yin, 2003: 99). A real triangulation would have been to study face-to-face conversations between experts and decision makers in the case studies through participant observation, as well as analyzing face-to-face conversations in the experiments.

A further minor *limitation* at the level of measurement is related to this general drawback of the methodology which we have employed in this thesis. For the analysis of the face-to-face communication in the case studies, we have exclusively relied on self-reports in the interviews. In the experiment, however, we observed a certain mismatch between the self-reports in the questionnaires and the actual communicational behavior as perceived by the researcher when assisting the experiment or listening to the audio-recordings. In Chapter 5, we have argued that this mismatch, in part, can be explained by the likely gap between the communication partners' espoused theory of their communicational behavior (what they believe they do) versus the one in use (what they actually do) (Argyris & Schön, 1978). In other words, are often poorly aware of their own communicational behavior and do not realize that it might be problematic for an effective integration of knowledge in decision making. Thus, complementing qualitative interviews with observing actual communicational behavior would have certainly led to more precise insights on the communication partners' theories in use.

In view of these limitations, we believe that *future research* should engage in the analysis of the process of knowledge integration between experts and decision makers by observing their face-to-face communications directly. In conjunction with the aim to analyze the role of visual boundary objects for co-located, face-to-face conversations, in particular, in order to better understand how visual tools are enacted (Orlikowski, 2000) and how they influence the micro-interaction and knowledge integration process, we would propose a longitudinal case study approach (Leonard-Barton, 1990). Such an approach would not only analyze macro communication processes, but include participatory observation of face-to-face conversations between experts and decision makers and do qualitative conversation analysis of the in-situ interaction. At best, such qualitative analysis would be further accompanied by the cyclical distribution of questionnaires to both experts and decision makers, which would ask questions both regarding the overall communication and the single face-to-face interactions. A longitudinal study of such a type would more truly live up to the request for triangulation and would permit to analyze how a small selection of the challenges of the knowledge integration process evolve over time and whether also the moderation effect of the use of visual boundary objects is subject to change.

With these final reflections on accomplishments and limitations of the present work and the outlook towards new research undertakings and actions, we remain both confident and doubtful and fortunately remember Weick (2002) who says that it is this ambivalence which is the best condition for learning. We are therefore certain to have learned on how experts and decision makers integrate knowledge in communication and will continue to engage in the journey.

References

Abelson, D. E., & Lindquist, E. A. (2000). Think tanks in North America. In J. G. Mc. Gann & R. K. Weaver (Eds.), *Think tanks and civil societies. Catalysts for ideas and action* (pp. 37-66). New Brunswick: Transaction Publishers.

Ackoff, R. L. (1967). Management misinformation systems. *Management Science, 14*(4), 147-156.

Alavi, M., & Leidner, D. E. (2001). Review: knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly, 25*(1), 107-136.

Alavi, M., & Tiwana, D. E. (2002). Knowledge integration in virtual teams: the potential role of KMS. *Journal of the American Society for Information Science and Technology, 53*(12), 1029-1037.

Allison, G. T. (1969). Conceptual models and the Cuban missile crisis. *American Political Science Review, 63*(5), 686-718.

Amason, A. C. (1996). Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams. *Academy of Management Journal, 39(1)*, 123-148.

Argote, L., & Ingram, P. (2000). Knowledge transfer: A basis for competitive advantage in Firms. *Organizational Behavior and Human Decision Processes, 82*(1), 150-169.

Argyris, C. (1990). *Overcoming organizational defenses: facilitating organizational learning.* Boston: Allyn and Bacon.

Argyris, C. (1994). Good communication that blocks learning. *Harvard Business Review 72(4)*, 77-85.

Argyris, C. (1996). *Knowledge for action. A guide to overcoming barriers to organizational change.* San Francisco: Jossey-Bass Publishers.

Argyris, C., & Schön, D. A. (1978). *Organization learning II: theory, method and practice.* Reading, MA: Addison-Wesley.

Arias, E. G., & Fischer, G. (2000). *Boundary objects: their role in articulating the task at hand and making information relevant to it.* Paper presented at the International ICSC Symposium on Interactive & Collaborative Computing (ICC 2000), Weaskiwin (Canada).

ASCO (2006). *ASCO-Marktstudie 2005/2006.* Zürich: Association of Management Consultants Switzerland (ASCO).

Atkinson, P. (1988). Ethnomethodology: A critical review. *Annual Review of Sociology, 14*, 441-465.

Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2003). *Multivariate Analysemethoden: Eine anwendungsorientierte Einführung* (10th ed.). Berlin: Springer.

Barclay, D., Thompson, R., & Higgins, C. (1995). The Partial Least Squares (PLS) approach to casual modeling: personal computer adoption and use as an illustration. *Technology Studies, 2*(2), 285-309.

Baecker, D. (1999). *Organisation als System.* Frankfurt am Main: Suhrkamp Verlag.

Barge, J. K., & Oliver, C. (2003). Working with appreciation in managerial practice. *Academy of Management Review, 28(1)*, 124-142.

Barrett, P., & Stanley, C. (1999). *Better construction briefing.* Oxford (UK): Blackwell Science.

Barry, B., & Crant, J. M. (2000). Dyadic communication relationships in organizations. An attribution/expectancy approach. *Organization Science, 11*(6), 648-664.

Bateson, G. (1972). *Steps to an Ecology of Mind.* New York: Ballantine.

Bazerman, B. H. (2001). *Judgment in managerial decision making* (6th ed.). Hoboken (NJ): John Wiley & Sons.

Bechky, B. A. (2003). Sharing meaning across occupational communities: the transformation of understanding on a production floor. *Organization Science, 14*(3), 312-330.

Beer, M., & Eisenstat, R. A. (2004). How to have an honest conversation about your business strategy. *Harvard Business Review, 82(2)*, 82-89.

Belkin, N. J., Oddy, R. N., & Brooks, H. M. (1982). Ask for information retrieval: Part I. Background and theory. *Journal of Documentation, 38*(2), 61-71.

Benner, P. E. (1984). *From novice to expert - Excellence and power in clinical nursing practice*. Menlo Park (CA): Addison Wesley.

Berger, P. L., & Luckman, T. (1966). *The social construction of reality. A treatise in the sociology of knowledge*. Garden City (NY): Anchor books.

Bies, R. J., & Moag, J. S. (1986). Interactional justice: communication criteria of fairness. In B. H. Sheppard & B. H. Bazerman (Eds.), *Research on negotiation in organizations* (Vol. 1, pp. 43-55). Greenwich, CT: JAI Press.

Bimber, B. (1998). Three faces of technological determinism. In M. R. Smith & L. Marx (Eds.), *Three faces of technological determinism* (pp. 79-100). Cambridge (MA): MIT Press.

Black, L. J., Carlile, P. R., & Repenning, N. P. (2004). A dynamic theory of expertise and occupational boundaries in new technology implementation: building on Barley's study of CT scanning. *Administrative Science Quarterly, 49(4)*, 572-607.

Bock, G. W., & Young-Gul, K. (2002). Breaking the myths of rewards: an exploratory study of attitudes about knowledge sharing. *Information Resources Management Journal, 15*(2), 14-21.

Bohm, D. (1996). *On dialogue*. New York: Routledge.

Boland, R. J., & Tenkasi, R. V. (1995). Perspective making and perspective taking in communities of knowing. *Organization Science, 6*(4), 350-372.

Bowen, P. A., Pearl, R. G., Nkado, R. N., & Edwards, P. J. (1997). *The effectiveness of the briefing process in the attainment of client objectives for construction projects in South Africa*. Paper presented at the Construction and Building Research Conference (COBRA `97), Portsmouth (UK).

Bourdieu, P. (2001). *Langage et pouvoir symbolique*. Paris: Seuil.

Bregman, A., & Haythornthwaite, C. (2001). *Radicals of presentation in persistent conversation*. Paper presented at the In Proceedings of the 34th Hawaii International Conference on System Sciences, Hawaii.

Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: a cognitive-motivational analysis. *Psychological Bulleting* (86), 307-324.

Brown, J. S., & Duguid, P. (2001). Knowledge and organization: a social-practice perspective. *Organization Science, 12*(2), 198-213.

Brookings Institution. (2004). *Annual Report 2004*. Washington, DC: The Brookings Institution.

Brookings Institution. (2005a). www.brookings.edu, Retrieved: 29th November 2006.

Brookings Institution. (2005b). *Media Guide 2005*. Washington, DC: The Brookings Institution.

Brusoni, S., Prencipe, A., & Pavitt, K. (2001). Knowledge specialization, organizational coupling, and the boundaries of the firm: why do firms know more than they make? *Administrative Science Quarterly, 46(4)*, 597-621.

Callon, M., Lascoumes, P., & Barthe, Y. (2001). *Agir dans un monde incertain. Essai sur la démocratie technique*. Paris: Editions du Seuil.

Carlile, P. R. (2002). A pragmatic view of knowledge and boundaries: boundary objects in new product development. *Organization Science, 13*(4), 442-455.

Carlile, P. R. (2004). Transferring, translating, and transforming: an integrative framework for managing knowledge across boundaries. *Organization Science, 15*(5), 555-568.

Carlile, P. R., & Rebentisch, E. S. (2003). Into the black box: the knowledge transformation cycle. *Management Science, 49*(9), 1180-1195.

Cecez-Kecmanovic, D., & Dalmaris, P. (2000, 8-10th December). *Knowledge mapping as sensemaking in organizations*. Paper presented at the Australian Conference on Information Systems (ACIS), Brisbane.

Chandler, A. D., Jr. (1994). *Scale and scope: the dynamics of industrial capitalism*. Cambridge: Harvard University Press.

Charan, R. (2006) Conquering a culture of indecision, Harvard Business Review, 84(1): 108-117

Chi, M. T. H., Feltovich, P. J., & Glaser, R. (1981). Categorization and representation of physics problems by experts and novices. *Cognitive Science, 5*, 121-152.

Chidambaram, L. (1996). Relational development in computer-supported groups. *MIS Quarterly, 20*(2), 143-165.

Clark, H. H. (1996). *Using language*. Cambridge: Cambridge University Press.

Clark, H. H., & Brennan, S. E. (1991). Grounding in communication. In L. B. Resnick, J. M. Levine & S. D. Teasley (Eds.), *Perspectives on socially shared cognition*. Washington (DC): APA.

Clark, H. H., & Marshall, C. E. (1981). Definite reference and mutual knowledge. In A. K. Joshi, B. L. Webber & I. A. Sag (Eds.), *Elements of discourse understanding* (pp. 10-63). Cambridge: Cambridge University Press.

Closa, C. (2005). Sisyphus revisited: options for the EU's constitutional future. *U.S.-Europe Analysis Series,* http://www.brookings.edu, Retrieved: 29th November 2006.

Cohen, M. D., March, J. G., & Olsen, J. P. (1972). A garbage can model of organizational choice. *Administrative Science Quarterly, 17*(1), 1-25.

Conklin, J. (2006). *Dialogue mapping. Building shared understanding of wicked problems*. Chichester: John Wiley & Sons.

Conklin, J., & Begeman, M. (1988). gIBIS: A tool for exploratory policy discussion. *ACM Transactions on Office Information Systems, 4*(6), 303-331.

Cook, S. D. N., & Brown, J. S. (1999). Bridging epistemologies: the generative dance between organizational knowledge and organizational knowing. *Organization Science, 10*(4), 381-400.

Courthright, J. A., Fairhurst, G. T., & Rogers, L. E. (1989). Interaction patterns in organic and mechanistic systems. *Academy of Management Journal, 32(4)*, 773-802.

Creswell, J. W. (2003). *Research design: qualitative, quantitative, and mixed methods approaches*. Thousand Oaks (CA): Sage.

Critchlow, D. T. (1985). *The Brookings Institution, 1916-1952: expertise and the public interest in a democratic society*. DeKalb (IL): Northern Illinois University Press.

Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. Englewood Cliffs (NJ): Prentice-Hall.

Davis, E. A. (2003). Knowledge integration in science teaching: Analysing teachers' knowledge development. *Research in Science Education, 34*, 21-53.

De Boer, M., Van den Bosch, F., & Volberda, H. (1999). Managing organizational knowledge integration in the emerging multimedia complex. *Journal of Management Sciences, 36*(3), 379-418.

De Dreu, C. K. W. (1997). Productive conflict: The importance of conflict management and conflict issue. In C. K. W. De Dreu & E. Van de Vliert (Eds.), *Using conflict in organizations* (pp. 9-22). London: Sage.

De Dreu, C. K. W., & Van Vianen, A. E. M. (2001). Managing relationship conflict and the effectiveness of organizational teams. *Journal of Organizational Behavior, 22(3)*, 309-328.

De Dreu, C. K. W., & Weingart, L. R. (2003). Task versus relationship conflict, team performance, and team member satisfaction: a meta-analysis. *Journal of Applied Psychology, 88*(4), 741-749.

Deising, P. (1967). Noneconomic decision-making. In M. Alexis & C. Z. Wilson (Eds.), *Organizational decision-making* (pp. 185-200). Englewood Cliffs (NJ): Prentice-Hall.

DeSanctis, G., & Poole, M. S. (1994). Capturing the complexity in advanced technology use: adaptive structuration theory. *Organization Science, 5*(2), 121-147.

DeSanctis, G., & Gallupe, R.B. (1987). A foundation for the study of group decision support systems. *Management Science, 33*(5), 589-609.

Devellis, R. F. (1991). *Scale development: theory and applications*. Newbury Park: Sage Publications.

DiMicco, J. M., & Hollenbach, K. J. (2006, April 22-27). *Visualization of audio: a social tool for face-to-face groups*. Paper presented at the CHI 2006, Montréal, Canada.

DiMicco, J. M., Pandolfo, A., & Bender, W. (2004, November). *Influencing Group Participation with a Shared Display*. Paper presented at the ACM Conference on Computer Supported Cooperative Work (CSCW 2004), Chicago.

Dimond, S. J., & Beaumont, J. G. (1974). Experimental studies of hemisphere function in the human brain. In S. J. Dimond & J. G. Beaumont (Eds.), *Hemisphere function in the human brain*. New York: Wiley.

Dixon, N. M. (1997). The hallways of learning. *Organizational Dynamics, 25(4)*, 23-34.

Donnellon, A. (1996). *Team talk: the power of language in team dynamics*. Boston: Harvard Business School Press.

Dooley, R. S., Fryxell, G. E., & Judge, W. Q. (2000). Belaboring the not-so-obvious: consensus, commitment, and strategy implementation speed and success. *Journal of Management, 26*(6), 1237-1257.

Dougherty, D. (1992). Interpretive barriers to successful product innovation in large firms. *Organization Science, 3*(2), 179-202.

Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: the power of intuition and expertise in the era of the computer*. New York: The Free Press.

Drucker, P. F. (1974). *Management: tasks, responsibilities, practices*. New York: Harper & Row.

Drucker, P. F. (1994). Five questions. *Executive Excellence, 11*(11), 6-7.

Dutton, J. E. (2002). Strategic agenda building in organizations. In Z. Shapira (Ed.), *Organizational decision making* (pp. 81-110). Cambridge (UK): Cambridge University Press.

Dyer, J., & Nobeoka, K. (2000). Creating and managing high performance knowledge-sharing network: the Toyota case. *Strategic Management Journal, 21*(3), 345-367.

Earley, P. C., & Lind, E. A. (1987). Procedural justice and participation in task selection: the role of control in mediating justice judgment. *Journal of Personality and Social Psychology, 52*, 1148-1160.

Edwards, A. L. (1990). Construct validity and social desirability. *American Psychologist, 45*(2), 287-289).

Edwards, J. R. (2001). Multidimensional constructs in organizational behavior research: an integrative analytical framework. *Organizational Research Methods, 4*(2), 144-192.

Edwards, J. R., & Bagozzi, R. P. (2000). On the nature and direction of relationships between constructs and measures. *Psychological Methods, 5*(2), 155-174.

Eisenhardt, K. M. (1989a). Building theories from case study research. *The Academy of Management Review, 14*(4), 532-550.

Eisenhardt, K. M. (1989b). Making fast strategic decisions in high-velocity environments. *Academy of Management Journal, 32*(3), 543-576.

Eisenhardt, K. M., & Bourgeois III, L. J. (1988). Politics of strategic decision making in high-velocity environments: toward a middle-range theory. *Academy of Management Journal, 31*(4), 737-770.

Eisenhardt, K. M., Kahwajy, J. L., & Bourgeois III, L. J. (2000). How management teams can have a good fight. The absence of conflict is not harmony, it's apathy. *Harvard Business Review, 75(4)*, 77-85.

Eisenhardt, K. M., & Santos, F. M. (2000). Knowledge-based view: a new theory of strategy? In A. Pettigrew, H. Thomas & R. Whittington (Eds.), *Handbook of Strategy and Management* (pp. 139-164). London: Sage.

Eisenhardt, K. M., & Zbaracki, M. J. (1992). Strategic decision making. *Strategic Management Journal, 13(8)*, 17-37.

Ellinor, L., & Gerard, G. (1998). *Dialogue: rediscover the transforming power of conversation*. New York: Wiley.

Ellsberg, D. (1961). Risk, ambiguity, and the Savage axioms. *Quarterly Journal of Economics, 75(4)*, 643–699.

Eppler, M. (2002). Knowledge Management Light at Securitech. In O. Sukowski & M. Eppler (Eds.), *Knowledge Management Case Studies*. St. Gallen: NetAcademy Press.

Eppler, M. J. (2003, July 2-4). *The image of insight: the use of visual metaphors in the communication of knowledge*. Paper presented at the I-KNOW, Graz, Austria.

Eppler, M. J. (2004). Knowledge communication problems between experts and managers: an analysis of knowledge transfer in decision processes. *ICA Working Paper 1/2004* http://www.bul.unisi.ch/cerca/bul/pubblicazioni/com/pdf/wpca0401.pdf, Retrieved: 29th November 2006.

Eppler, M. J. (2006). *Managing information quality. Increasing the value of information in knowledge-intensive products and processes*. (2nd ed.). Berlin: Springer.

Eppler, M. J., & Mengis, J. M. (2004). The concept of information overload. A review of literature from organization science, accounting, marketing, MIS, and related disciplines. *The Information Society. An International Journal, 20(5)*, 325-344.

Eppler, M. J., & Mengis, J. (2006). Wissensdialoge. Ein gesprächsbasierter Ansatz des Wissensmanagements. In A. Belliger & D. Krieger (Eds.), *Wissensmanagement für KMU*. Zürich: Hochschulverlag vdf der ETH Zürich.

Ericsson, K. A. (2006). An introduction to the Cambridge handbook of expertise and expert performance: its development, organization, and content. In K. A. Ericcson, N. Charness, R. R. Hoffman & P. J. Feltovich (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 3-20). Cambridge: Cambridge University Press.

Ericsson, K. A., Charness, N., Hoffman, R. R., & Feltovich, P. J. (Eds.). (2006). *The Cambridge handbook of expertise and expert performance*. Cambrdige (UK): Cambridge University Press.

Ericsson, K. A., & Lehmann, A. C. (1996). Expert and exceptional performance: Evidence of maximal adaptation to task. *Annual Review of Psychology, 47*, 273-305.

Evers, H.-D., & Menkhoff, T. (2003). Reflections about the role of expert knowledge and consultants in an emerging knowledge-based economy, *63rd Annual Meeting of the Academy of Management*. Seattle.

Fahey, L., & Prusak, L. (1998). The eleven deadliest sins of knowledge management. *California Management Review, 40(3)*, 265-276.

Fairclough, N. (2005). Discourse analysis in organization studies: the case for critical realism. *Organization Studies, 26(6)*, 915-939.

Fellowes, M., & Berube, A. (2005). Leaving money (and food) on the table: food stamp participation in major metropolitan areas and countries. *Survey Series*: http://www.brookings.edu/metro/pubs/20050517_foodstamps.htm, Retrieved: 29th November 2006.

Fischer, G. (2001). External and sharable artifacts as sources for social creativity in communities of Interest. In J. S. Gero & M. L. Maher (Eds.), *Computational and Cognitive Models of Creative Design V* (pp. 67-89). Sydney: Key Centre of Design Computing and Cognition, University of Sydney.

Fisher, B. A., & Ellis, D. G. (1990). *Small group decision making: communication and the group process* (3rd ed.). New York: McGraw Hill.

Fischer, F., Bruhn, J., Gräsel, C., & Mandl, H. (2002). Fostering collaborative knowledge construction with visualization tools. *Learning and Instruction, 12(2)*, 213-232.

Flores, F., Graves, M., Hartfiled, B., & Winograd, T. (1988). Computer systems and the design of organizational interaction. *ACM Transactions on Office Information Systems, 6(2)*.

Ford, J. D., & Ford, L. W. (1995). The role of conversations in producing intentional change in organizations. *Academy of Management Review, 20(3),* 541-570.

Foucault, M. (1972). *The archeology of knowledge* (M. S. Smith, Trans.). New York: Pantheon Books.

Frey, L. R. (1996). Remembering and "re-membering": a history of theory and research on communication and group decision making. In R. Y. Hirokawa & M. S. Poole (Eds.), *Communication and group decision making* (2nd ed., pp. 19-51). Thousand Oaks (CA): Sage.

Frey, L. R., Gouran, D. S., & Poole, M. S. (Eds.). (1999). *The handbook of group communication theory and research*. Thousand Oaks: Sage.

Galbraith, J. R. (1995). *Designing organizations: an executive briefing on strategy, structure and process*. San Francisco: Jossey-Bass Publishers.

Gale, W. G., & Orszag, P. R. (2002, February 10th). A guns and caviar approach. *The San Diego Union-Tribune*.

Garfinkel, H. (1967). *Studies in ethnomethodology*. Englewood Cliffs, NJ: Prentice Hall.

Gasper, K., & Clore, G. L. (2002). Attending to the big picture: mood and global versus local processing of visual information. *Psychological Science, 13*(1), 34-40.

Gefen. (2000). Structural equation modeling and regression: guidelines for research practice. *Communications of the Association for Information Systems, 4*(7), 1-70.

Gerbner, G. (1956). Toward a general model of communication. *Audio Visual Communication Review, 4*(3), 171-199.

Gerwin, D. (1969). A process model of budgeting in a public school system. *Management Science, 15*(7), 338-361.

Geschäftsprüfungskommission der Schweiz. (2006). *GPK-Bericht: Die Bundesverwaltung vergibt in grossem Ausmass Mandate an externe Experten*. Bern (CH): Geschäftsprüfungskommission des Ständerates.

Giddens, A. (1979). *Central problems in social theory: action, structure, and contradiction in social analysis*. Berkley, CA: University of California Press.

Giddens, A. (1984). *The constitution of society. Outline of the theory of structuration*. Berkeley (CA): University of California Press.

Gigone, D., & Hastie, R. (1993). The common knowledge effect: information sharing and group judgment. *Journal of Personality and Social Psychology, 65*, 959-974.

Glaser, B. G. (1998). *Doing grounded theory. Issues and discussions*. Mill Valley: Sociology Press.

Glaser, B. G., & Strauss, A. (1967). *The discovery of grounded theory. Strategies for qualitative research*. Chicago (IL): Aldine.

Gobert, F., & Simon, H. A. (1996). The roles of recognition processes and look-ahead search in time-consuming expert problem-solving: evidence from grand master-level chess. *Psychological Science, 7*(1), 52-55.

Goffman, E. (1967). *Interaction ritual*. New York: Random House.

Goffman, E. (1981). *Forms of talk*. Philadelphia: University of Pennsylvania Press.

Gordon, M. E., Slade, L. A., & Schmitt, N. (1986). The 'science of the sophomore' revisited: from conjecture to empiricism. *Academy of Management Review, 11(1)*, 191-207.

Graetz, F. (2002). Strategic thinking versus strategic planning: towards understanding the complementarities. *Management Decision, 40*(5), 456-462.

Grant, R. M. (1996). Prospering in dynamically-competitive environments: organizational capability as knowledge integration. *Organization Science, 7*(4), 375-387.

Grant, D., & Hardy, C. (2003). Introduction: struggles with organizational discourse. *Organization Studies, 25*(1), 5-13.

Gratton, L., & Ghoshal, S. (2002). Improving the quality of conversations. *Organizational Dynamics, 33*, 209-223.

Grice, H. P. (1975). Logic and conversation. In P. Cole & J. L. Morgan (Eds.), *Syntax and Semantics, Volume 9: Pragmatics* (pp. 113-128). New York: Academic Press.

Gülich, E. (2003). Conversational techniques used in transferring knowledge between medical experts and non-experts. *Discourse Studies, 5*, 235-263.

Gupta, A. K., & Govindarajan, V. (2000). Knowledge flows within multinational corporations. *Strategic Management Journal, 21*(4), 473-496.

Haas, P. (1992). Introduction: Epistemic communities and international policy coordination. *International Organization, 46*(1), 1-35.

Haber, E. M., Ioannidis, Y. E., & Livny, M. (1994). Foundation of visual metaphors for schema display. *Journal of Intelligent Information Systems, 3* (Special Issue on Advances in Visual Information Management Systems).

Habermas, J. (1984). *Vorstudien und Ergänzungen zur Theorie des kommunikativen Handelns*. Frankfurt am Main: Suhrkamp.

Hair, J. F. J., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis*. Upper Saddle Rive (NJ): Prentice Hall.

Hargadon, A., & Sutton, R. I. (2000). Building an innovation factory. *Harvard Business Review, 78*(3), 157-166.

Harkins, P. J. (1999). *Powerful conversations. How high-impact leaders communicate*. New York: Mc-Graw-Hill.

Harryson, S. J. (2002). *Managing know-who based companies: A multi-networked approach to knowledge and innovation* (2nd ed.). Cheltenham Glos (UK): Edward Elgar Publishing.

Hatwell, Y., Streri, A., & Gentaz, E. (Eds.). (2003). *Touching for knowing. Cognitive psychology of haptic manual perception*. Amsterdam (PA): John Benjamins Pub.

Hayek, F. A. (1967). *Studies in philosophy, politics and economics*. London: Routledge & Kegan Paul.

Heath, R. L., Pearce, W. B., Shotter, J., Taylor, J. R., Kersten, A., & Zorn, T. (2006). The processes of dialogue. *Management Communication Quarterly, 19*(3), 341-375.

Heaton, L., & Taylor, J. R. (2002). Knowledge management and professional works. A communication perspective on the knowledge-based organization. *Management Communication Quarterly, 16*(2), 210-236.

Henry, O. (2002). The acquisition of symbolic capital by consultants: the French case. In M. Kippling & L. Engwall (Eds.), *Management consulting. Emergence and dynamics of a knowledge industry* (pp. 19-35). Oxford: Oxford University Press.

Heracleous, L., & Barrett, M. (2001). Organizational change as discourse: communicate actions and deep structures in the context of information technology implementation. *Academy of Management Journal, 44*(4), 755-778.

HeritageFoundation. (2005). www.heritage.org, Retrieved: 29th November 2006.

Herrmann, T., & Kienle, A. (2004). Kontextberücksichtigung als Kernaufgabe der Wissenskommunikation. In R. Reinhardt & M. J. Eppler (Eds.), *Wissenskommunikation in Organisationen: Methoden, Instrumente, Theorien*. Berlin: Springer.

Hirokawa, R. Y., & Poole, M. S. (1996). *Communication and group decision making* (2nd ed.). Thousand Oaks (CA): Sage.

Hirokawa, R. Y., & Salazar, A. J. (1999). Task-group communication and decision-making performance. In L. R. Frey, D. S. Gouran & M. S. Poole (Eds.), *The handbook of group communication theory and research* (pp. 167-191). Thousand Oaks: Sage.

Hitzler, R. (1994). Wissen und Wesen des Experten. Ein Annäherungsversuch. Zur Einleitung. In R. Hitzler, A. Honer & C. Maeder (Eds.), *Expertenwissen. Die institutionalisierte Kompetenz zur Konstruktion von Wirklichkeit* (pp. 13 – 30). Opladen: Westdeutscher Verlag.

Hoffman, R. R. (1998). How can expertise be defined? Implications of research from cognitive psychology. In R. Williams, W. Faulkner & J. Fleck (Eds.), *Exploring expertise* (pp. 81-100). New York: Macmillan.

Hoffman, R. R., Shadbolt, N. R., Burton, A. M., & Klein, G. (1995). Eliciting knowledge from experts: A methodological analysis. *Organizational Behavior and Human Decision Processes, 62*(2), 129-158.

Hollingshead, A. B. (2001). Cognitive interdependence and convergent expectations in transactive memory. *Journal of Personality and Social Psychology, 81*(6), 1080-1089.

Huang, J. C., & Newell, S. (2003). Knowledge integration processes and dynamics within the context of cross-functional projects. *International Journal of Project Management, 21(3)*, 167-176.

Huisman, M. (2001). Decision-making in meetings as talk-in-interaction. *International Studies of Management & Organization, 31*, 69-90.

Huff, A., & Jenkins, M. (Eds.). (2002). *Mapping strategic knowledge*. London: Sage Publications.

Hurd, M. D. (1999). Anchoring and acquiescence bias in measuring assets in household surveys. *Journal of Risk and Uncertainty, 19*(1-3), 111-136.

Husted, K., & Snejina, M. (2002). Diagnosing and fighting knowledge-sharing hostility. *Organizational Dynamics, 31*(1), 60-73.

Inns, D. (2002). Metaphor in the literature of organizational analysis: A preliminary taxonomy and a glimpse at a humanities-based perspective. *Organization, 9*(2), 305-330.

Isaacs, W. (1999). *Dialogue and the art of thinking together. A pioneering approach to communicating in business and in life*. New York: Doubleday.

Iselin, E. R. (1993). The effects of the information and data properties of financial ratios and statements on managerial decision quality. *Journal of Business Finance & Accounting, 20*, 249–267.

Jackson, D. J. (2003). Revisiting sample size and number of parameter estimates: some support for the N:q hypothesis. *Structural Equation Modeling, 10*(1), 128-141.

Jago, A. G. (1982). Leadership: perspectives in theory and research. *Management Science, 28*(3), 315-336.

Jakobson, R. O. (1960). Closing statement: linguistics and poetics. In T. A. Sebeok (Ed.), *Style in language* (pp. 350-377). Cambridge (MA): MIT Press.

Janis, I. L., & Mann, L. (1977a). *Decision making: a psychological analysis of conflict, choice and commitment*. New York: Free Press.

Jarboe, S. (1996). Procedures for enhancing group decision making. In R. Y. Hirokawa & M. S. Poole (Eds.), *Communication and group decision making* (2nd ed.). Thousand Oaks, CA: Sage.

Jehn, K. (1995). A multimethod examination of the benefits and detriments of intragroup conflict. *Administrative Science Quarterly, 40(2)*, 256-282.

Jehn, K. A., & Mannix, E. (2001). The dynamic nature of conflict: a longitudinal study of intragroup conflict and group performance. *Academy of Management Journal, 44(2)*, 238-251.

Jespersen, O. (1922). *Language: its nature, development, and origin*. London: George Allen and Unwin.

Jick, T. D. (1979). Mixing qualitative and quantitative methods: triangulation in action. *Administrative Science Quarterly, 24(4)*, 602-611.

Jones, M. C., & Price, R. L. (2001). *Organizational Knowledge Sharing in ERP Implementation: a multiple case study analysis*. Paper presented at the Twenty-second International Conference on Information Systems, New Orleans.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*(2), 263-291.

Katz, R., & Allen, T. J. (1982). Investigating the Not Invented Here (NIH) syndrome: a look at the performance, tenure and communication patterns of 50 R&D project groups. *R&D Management, 12*, 7-19.

Keil, F. C. (Ed.). (2001). *The MIT encyclopedia of cognitive science*. Cambridge (MA): MIT Press.

Keppel, G., & Wickens, T. D. (2004). *Design and analysis. A researcher's handbook* (4th ed.). Englewood Cliffs (NJ): Prentice Hall.

Keyton, J. (1999). Relational communication in groups. In L. Frey, R., D. Gouran, S. & M. S. Poole (Eds.), *The handbook of group communication theory and research*. Thousand Oaks (CA): Sage.

Kingdon, J. (1995). *Agendas, alternatives, and public policies* (2nd ed.). New York: HarperCollins.

Kim, D. H. (1993). A framework for integrating individual learning and organizational learning. *Sloan Management Review, 35*, 37-50.

Kirkpatrick, S. A., & Locke, E. A. (1991). Leadership: do traits matter? *Academy of Management Executive, 5*(2), 48-60.

Klein, G. A. (1993). A Recognition-Primed Decision (RPD) model of rapid decision making. In G. A. O. Klein, J., R. Calderwood & C. E. Zsambok (Eds.), *Decision making in action: Models and methods* (pp. 138-147). Norwood (NJ): Ablex.

Kline, R. B. (1998). *Principles and practice of structural equation modeling*. New York: Guilford.

Koskinen, K. U. (2005). Metaphoric boundary objects as co-ordinating mechanisms in the knowledge sharing of innovation processes. *European Journal of Innovation Management, 8*(3), 323-335.

Kosslyn, S. M. (1978). Imagery and internal representation. In E. Rosch & B. Lloyd (Eds.), *Cognition and categorization*. Hillsdale (NJ): Lawrence Erlbaum Associates.

Krauss, R. M., & Fussell, S. R. (1991). Perspective-taking in communication: representations of others' knowledge in reference. *Social Cognition, 9*, 2-24.

Krauss, R. M., & Fussell, S. R. (1998). Social psychological models of interpersonal communication. In S. R. Fussell & R. J. Kreuz (Eds.), *Social and cognitive approaches to interpersonal communication* (pp. 655-701). Mahwah (NJ): Lawrence Erlbaum Associates.

Krauss, R. E., Fussell, S. R., & Siegel, J. (2003). Visual information as a conversational resource in collaborative physical talks. *Human-Computer Interaction, 18*(1), 13-49.

Krugman, P. (2005, February 4th). Gambling with your retirement. *The New York Times*.

Kurtz, C. F., & Snowden, D. J. (2003). The new dynamics of strategy: Sense-making in a complex and complicated world. *IBM Systems Journal, 42*(3), 462-483.

Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: The University of Chicago Press.

Langlois, R. N. (Ed.). (1986). *Coherence and flexibility: social institutions in a world of radical uncertainty*. New York: New York University Press.

Lawrence, P. R., & Lorsch, J. W. (1967). Differentiation and integration in complex organizations. *Administrative Science Quarterly, 12*(1), 1-47.

Lazega, E. (1992). *The micropolitics of knowledge. Communication and indirect control in workgroups*. Hawthorne (NY): Aldine de Gruyter.

Levin, G., & Lieberman, Z. (2004, June 7-9, 2004). *In-situ speech visualization in real-time interactive installation and performance*. Paper presented at the Third International Symposium on Non Photorealistic Animation and Rendering (NPAR 2004), Annecy (France).

Leonard-Barton, D. (1990). A dual methodology for case studies: synergistic use of a longitudinal single site with replicated multiple sites. *Organization Science, 1*(3), 248-266.

Leonard-Barton, D. (1992). Core capabilities and core rigidities: a paradox in managing new product development. *Strategic Management Journal, 13*, 111-125.

Leonard, D., & Sensiper, S. (1998). The role of tacit knowledge in group innovation. *California Management Review, 40*(3), 112-132.

let's-focus (2006). let's focus - drawing attention. http://www.lets-focus.com, Retrieved: 29th November 2006.

Levitt, B., & March, J. G. (1988). Organizational learning. In W. R. Scott & J. Blake (Eds.), *Annual Review of Sociology* (pp. 319-340). Pablo Alto (CA): Annual Reviews.

Lindblom, K. (2001). Cooperating with Grice: A cross-disciplinary metaperspective on uses of Grice's cooperative principle. *Journal of Pragmatics, 33*(10), 1601-1623.

Linn, M. C., Clark, D., & Slotta, J. D. (2003). WISE design for knowledge integration. *Science Education, 87*(4), 517-538.

Linn, M. C., Davis, E. A., & Bell, P. (2004). Specific design principles: elaborating the scaffolded knowledge integration framework. In M. C. Linn, E. A. Davis & B. P. (Eds.), *Internet Environments for Science Education*. Mahwah (NJ): Lawrence Erlbaum Associates.

Linstead, S. (2006). Ethnomethodology and sociology: an introduction. *Sociological Review, 54*(3), 399-404.

Luhmann, N. (2000). *Vertrauen. Ein Mechanismus der Reduktion sozialer Komplexität* (4th ed.). Stuttgart: Lucius & Lucius.

Lyons, K., Skeels, C., & Starner, T. (2004). *Augmenting conversations using dual-purpose speech*. Paper presented at the 17th annual ACM symposium on user interface software and technology, Santa Fe, NM.

Lyotard, J.-F. (1984). *The postmodern condition: a report on knowledge*. Minneapolis: University of Minnesota Press.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1(2)*, 130–149.

MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods, 4*(1), 84-99.

Manning, T. (2002). Strategic conversation as a tool for change. *Strategy & Leadership, 30*, 35-37.

March, J. G. (1994). *A primer on decision making. How decisions happen*. New York: The Free Press.

March, J. G., & Olsen, J. P. (1997). The Technology of Foolishness. In D. S. Pugh (Ed.), *Organization Theory* (4th ed., pp. 339–352). London: Penguin.

Margerison, C. J. (1989). Improving communication at work. *Marketing Intelligence & Planning, 7*, 33-37.

Markus, M. L. (1994). Electronic mail as the medium of managerial choice. *Organization Science, 5*(4), 502-527.

Maruyama, M. (1986). Toward picture-coded information systems. *Futures*, 18(3), 450-452.

McCambridge, J. (2003). 12 angry men: a study in dialogue. *Journal of Management Education, 27*(3), 384-401.

McGann, J. G., & Weaver, R. K. (2000). *Think tanks and civil societies. Catalysts for ideas and action*. New Brunswick (U.S.A) and London (U.K.): Transaction Publishers.

Mengis, J., & Eppler, M. J. (2005, July 2005). *Persistence through visualization in knowledge-intensive conversations*. Paper presented at the 9th International Conference on Information Visualization, London.

Mennecke, B. E. (1997). Using group support systems to discover hidden profiles: an examination of the influence of group size and meeting structures on information sharing and decision quality. *International Journal of Human-Computer Studies, 47*(3), 387-405.

Merten, K. (1999). *Einführung in die Kommunikationswissenschaft. Grundlagen der Kommunikationswissenschaft.* (Vol. 1/1). Münster: Lit Verlag.

Meyer, A. D. (1991). Visual data in organizational research. *Organization Science, 2*(2), 218-236.

Mieg, T. H. A. (2001). *The social psychology of expertise: case studies in research, professional domains, and expert roles.* Mahwah (NJ): Lawrence Erlbaum.

Milbank, D. (2005, April 27th). Where does the bean soup fit in? *The Washington Post.*Miles, M., & Huberman, A. M. (1984). *Qualitative data analysis.* Beverly Hills (CA): Sage Publications.

Minsky, M. (1986). *The society of mind.* New York: Simon and Schuster.

Mintzberg, H. (1973). *The nature of managerial work.* New York: Harper & Row.

Mintzberg, H., Raisinghani, D., & Théorêt, A. (1976). The structure of 'unstructured' decision processes. *Administrative Science Quarterly, 21*(2), 246-275.

MQ Management und Qualität. (2005). Herausforderung "Reach for Excellence". *MQ Management und Qualität, 1-2.*

Murthy, U. S., & Kerr, D. S. (2003). Decision making performance of interacting groups: an experimental investigation of the effects of task type and communication mode. *Information & Management, 40*(5), 351-360.

Nelson, R. R., & Winter, S. G. (1982). *An evolutionary theory of economic change.* Cambridge: Harvard University Press.

Nesher, D. (2001). Peircean epistemology of learning and the function of abduction as the logic of discovery. *Transactions of the Charles S. Peirce Society, 37*(1), 23-57.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science, 5*(1), 14-37.

Nonaka, I., & Konno, N. (1998). The concept of "ba": building a foundation for knowledge creation. *California Management Review, 40*(3), 40-54.

Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company. How Japanese companies create the dynamics of innovation.* New York: Oxford University Press.

Nonaka, I., & Toyama, R. (2003). The knowledge-creating theory revisited: knowledge creation as a synthesizing process. *Knowledge Management Research & Practice, 1(1)*, 2-10.

Nonaka, I., Toyama, R., & Konno, N. (2000). SECI, ba and leadership: a unified model of dynamic knowledge creation. *Long Range Planning, 33(1)*, 5-34.

Nutt, C. P. (1984). Types of organizational decision processes. *Administrative Science Quarterly, 29*(3), 414-450.

OED2. (1989). *The Oxford English dictionary* (Vol. 4). Oxford: Clarendon Press.

Okhuysen, G. A., & Eisenhardt, K. M. (2002). Integrating knowledge in groups: how formal interventions enable flexibility. *Organization Science, 13*(4), 370-387.

Olaniran, B. A. (1996). A model of group satisfction in computer-mediated communication and face-to-face meetings. *Behavior & Information Technology, 15*(1), 24-36.

Olson, G. M., & Olson, J. S. (2000). Distance matters. *Human-Computer Interaction, 15*, 139-178.

Opdahl, K. (2002). *Emotions as meaning: the literary case on how we imagine.* Lewisburg: Bucknell University Press.

Orlikowski, W. J. (2000). Using technology and constituting structures: a practice lens for studying technology in organizations. *Organization Science, 11*(4), 404-428.

Orlikowski, W. J., & Barley, S. (2001). Technology and institutions: what can research on information technology and research on organizations learn from each other? *MIS Quarterly, 25*(2), 145-165.

Oskamp, S. (1982). Overconfidence in case-study judgments. In D. Kahneman, P. Slovic & T. A. (Eds.), *Judgement under uncertainty: heuristics and biases.* Cambridge: Cambridge University Press.

Osterloh, M., & Frey, B. S. (2000). Motivation, knowledge transfer, and organizational forms. *Organization Science, 11*(5), 538-550.

Overman, S. (2003). Human contact critical to knowledge management. *HR Magazine, 48*, 30-31.

Paulhaus, D. L. (1991). Measurement and control of response bias. In J. P. Robinson, P. R. Shaver & L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes: Volume 1 of measures of social psychological attitudes*. San Diego (CA): Academic Press.

Pavio, A. (1971). *Imagery and verbal processes*. New York: Holt, Rinehart and Winston.

Pavio, A. (1986). *Mental representations: a dual coding approach*. Oxford: Oxford University Press.

Pearson, A. W. E., M.D.; Amason, A.C. (2002). An assessment and refinement of Jehn's intragroup conflict scale. *International Journal of Conflict Management, 13*(2), 110-126.

Peterson, R. S. (1999). Can you have too much of a good thing? The limits of voice for improving satisfaction with leaders. *Personality and Social Psychology Bulletin, 25*, 313-324.

Pettigrew, A. M. (1973). *The politics of organizational decision-making*. London: Tavistock.

Pettigrew, A., Thomas, H., & Whittington, R. (Eds.). (2006). *Handbook of strategy and management* (2nd ed.). London: Sage.

Pfeffer, J., & Salancik, G. R. (1974). Organizational decision making as a political process: The case of a university budget. *Administrative Science Quarterly, 19*(2), 135-151.

Pfeffer, J., & Sutton, R. I. (1999). Knowing "what " to do is not enough: turning knowledge into action. *California Management Review, 42*(1), 83-108.

Pfeffer, J., & Sutton, R. I. (2000). *The knowing-doing gap. How smart companies turn knowledge into action*. Boston (MA): Harvard Business School Press.

Pinch, T., & Bijker, W. E. (1992). The social construction of facts and artifacts: or how the sociology of sience and the sociology of technology might benefit each other. In W. E. Bijker & J. Law (Eds.), *Shaping technology building society. Studies in sociotechnical change* (pp. 17-50). Cambridge (MA): MIT Press.

Piontkowski, U., Böing-Messing, E., Hartmann, J., Keil, W., & Laus, F. (2003). Transaktives Gedächtnis, Informationsintegration und Entscheidungsfindung im Medienvergleich. *Zeitschrift für Medienpsychologie, 15*(2), 60-68.

Piontkowski, U., & Keil, W. (2004). *Process gains and process losses for knowledge integration in computer-mediated groups*. Tübingen: Knowledge Media Research Center (KMRC)

Piontkowski, U., Keil, W., Hartmann, J., & Münzer, S. (2004). *Voraussetzungen und Möglichkeiten der Wissensintegration in computer-mediierten Gruppen*. Paper presented at the Tagungsband "Unbegrenztes Lernen - Lernen über Grenzen", Münster.

Polanyi, M. (1966). *The tacit dimension*. London: Routledge and Kegan Paul.

pom+. (2005a). *pom+ knows how (company leaflet)*. Zürich: pom+.

pom+. (2005b). *pom+ service fact sheet (company leaflet)*. Zürich: pom+.

Poole, M. S. (1999). Group communication theory. In L. R. Frey, D. S. Gouran & M. S. Poole (Eds.), *The handbook of group communication theory and research* (pp. 37-70). Thousand Oaks (CA): Sage.

Poole, M. S., & Hirokawa, R. Y. (1996). Introduction: communication and group decision making. In *Communication and group decision making*. Thousand Oaks (CA): Sage.

Priem, R. L., Harrison, D. A., & Muir, N. K. (1995). Structured conflict and consensus outcomes in group decision making. *Journal of Management, 21(4)*, 691-710.

Putnam, R. (1994). Conversational recipes. In P. M. Senge, R. B. Ross, B. J. Smith, C. Roberts & A. Kleiner (Eds.), *The fifth discipline fieldbook. Strategies and tools for building a learning organization.* (pp. 260-262). New York: Doubleday.

Quarterly, C.-S. C. (2005). http://www.capitolhearings.org, Retrieved: 29th November 2006.

Quinn, J. J. (1996). The role of 'good conversation' in strategic control. *Journal of Management Studies, 33(3)*, 381-394.

Ravasi, D., & Verona, G. (2001). Organising the process of knowledge integration: the benefits of structural ambiguity. *Scandinavian Journal of Management, 17(1)*, 41-66.

Reflact, & Eppler, M. J. (2005). Let's Focus. Visual Knowledge Management.

Reinhardt, R., & Eppler, M. J. (Eds.). (2004). *Wissenskommunikation in Organisationen. Methoden, Instrumente, Theorien.* Berlin: Springer.

Reinmann, G., & Mandl, H. (Eds.). (2004). *Psychologie des Wissensmanagements.* Göttingen: Hogrefe.

Rhodes, J. (1991). *Conceptual toolmaking. Expert systems of the mind.* Cambridge, MA: Basil Blackwell.

Rich, A., & Weaver, R. K. (2000). Think tanks in the U.S. media. *Harvard International Journal of Press/Politics, 5*(4), 81-103.

Ringach, D. L. (2003). Look at the big picture (details will follow). *Nature Neuroscience, 6*(1).

Rittel, H., & Webber, M. M. (1984). Planning problems are wicked problems. In N. Cross (Ed.), *Developments in Design Methodology* (pp. 135-144). Chichester: Wiley.

Roozenburg, N. F. M. (1992). On the logic of innovative design. In N. Cross, K. Dorst & N. Roozenburg (Eds.), *Research in Design Thinking* (pp. 127-138). Delft: Delft University Press.

Rosenthal, U., & Hart, P. t. (1991). Experts and decision makers in crisis situations. *Knowledge: Creation, Diffusion, Utilization, 12*(4), 350-372.

Ross, R. B. (1994). Skillful discussions. Protocols for reaching a decision - mindfully. In P. M. Senge, A. Kleiner, C. Roberts, R. B. Ross & B. J. Smith (Eds.), *The fifth discipline fieldbook. Strategies and tools for building a learning organization* (pp. 385-398). New York: Doubleday.

Sack, W. (2000, January 2000). *Discourse diagrams: interface design for very large-scale conversations.* Paper presented at the 33rd Hawaii International Conference on System Sciences, Los Alamitos CA.

Scarbrough, H., Swan, J., Laurent, S., Brsnen, M., Edelman, L., & Newell, S. (2004). Project-based learning and the role of learning boundaries. *Organization Studies, 25*(9), 1579-1600.

Schegloff, E. A. (1987). Analyzing single episodes of interaction: an exercise in conversation analysis. *Social Psychology Quarterly, 50*(2), 101-114.

Schein, E. H. (1993). On dialogue, culture, and organizational learning. *Organizational Dynamics, 22(2)*, 40-51.

Schein, E. H. (1995). Dialogue and learning. *Executive Excellence, 12*, 3-4.

Schneider, S. C. (1987). Information overload: causes and consequences. *Human Systems Management, 7*, 143-153.

Schober, M. F., & Clark, H. H. (1989). Understanding by addressees and overhearers. *Cognitive Psychology, 21(2)*, 211-232.

Schön, D. A., & Rein, M. (1994). *Frame reflection: Toward the resolution of intractable policy controversies.* New York: Basic Books.

Schwartzman, H. B. (1989). *The meeting. Gatherings in organizations and communities.* New York: Plenum Press.

Scott, J. (2000). *Social network analysis* (2nd ed.). Thousand Oaks: Sage Publications.

Senge, P. M. (1990). *The fifth discipline. The art and practice of the learning organization.* New York: Currency Doubleday.

Senge, P. M. (1992). Mental models. *Strategy & Leadership, 20(2)*, 4-10.

Senge, P. M., Kleiner, A., Roberts, C., Ross, R. B., & Smith, B. J. (Eds.). (1994). *The fifth discipline fieldbook: strategies and tools for building a learning organization.* New York: Currency Doubleday.

Shannon, C. L., & Weaver, W. (1949). *The mathematical theory of communication*. Urbana: University of Illinois Press.

Shotter, J. (1993). *Conversational realities: constructing life through language*. London: Sage.

Simon, H. A. (1955). A behavioral model of rational choice. *The Quarterly Journal of Economics, 69*(1), 99-118.

Simon, H. A. (1960). *The new science of management decision*. New York: Harper & Row.

Simon, H. A. (1973). The structure of ill structured problems. *Artificial Intelligence, 4*(3-4), 181-201.

Simon, H. A. (1979). Rational decision making in business organizations. *The American Economic Review, 69*(4), 493-513.

Simons, T., & Peterson, R. (2000). Task conflict and relationship conflict in top management teams: the pivotal role of intragroup trust. *Journal of Applied Psychology, 85(1)*, 102-111.

Sommerville, I. (2001). *Software engineering* (6th ed.). Harlow (UK): Addison-Wesley.

Sonesson, G. (1997). The multimediation of the lifeworld. In W. Nöth (Ed.), *Semiotics of the media. Proceedings of an international congress, Kassel, March 1995* (pp. 61-78). Berlin & New York: Mouton de Gruyter.

Sparrow, P. R. (1999). Strategy and cognition: understanding the role of management knowledge structures, organizational memory and information overload. *Creativity and Innovation Management, 8(2)*, 140-149.

Stafford, B. M. (1994). *Artful science, enlightenment, entertainment, and the eclipse of visual education*. Cambridge (MA): MIT Press.

Star, S. L. (1989). The structure of ill-structured solutions: boundary objects and heterogeneous distributed problem solving. In M. Huhns & L. Gasser (Eds.), *Readings in distributed artificial intelligence*. Menlo Park (CA): Morgan Kaufman.

Star, S. L., & Griesemer, J. R. (1989). Institutional ecology, 'translations' and boundary objects: amateurs and professionals in Berkley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science, 19(3)*, 389-420.

Stasser, G. (1992). Information salience and the discovery of hidden profiles by decision-making groups: a 'thought experiment'. *Organizational Behavior and Human Decision Processes, 52(1)*, 156-161.

Stasser, G., & Stewart, D. (1992). Discovery of hidden profiles by decision-making groups: solving a problem versus making a judgment. *Journal of Personality and Social Psychology, 63(3)*, 426-434.

Stasser, G., Vaughan, S. I., & Stewart, D. D. (2000). Pooling unshared information: the benefits of knowing how access to information is distributed among group members. *Organizational Behavior and Human Decision Processes, 82(1)*, 102-116.

Sternberg. (1997). *Thinking styles*. New York: Cambridge University Press.

Steyaert, C., & Bouwen, R. (1996). Conversational construction of new meaning configurations in organizational innovation: A generative approach. *European Journal of Work and Organizational Psychology, 5*(1), 67-89.

Stone, D. (2000). Non-governmental policy transfer: the strategies of independent policy institutes. *Governance, 13*(1), 45-69.

Stone, D. (2005). *Capturing the political imagination: think tanks and the policy process*. Oxford (UK): Routledge.

Sull, D. N., Ghoshal, S., & Monteiro, F. (2005). The hub of the world. *Business Strategy Review, 16* (1).

Sutcliffe, K. M. (1994). What executives notice: accurate perceptions in top management teams. *The Academy of Management Journal, 37*(5), 1360-1378.

Sutcliffe, K. M. (2005). Information handling challenges in complex systems. *International Public Management Journal, 8*(3), 417-424.

Swain, M. R., & Haka, S. F. (2000). Effects of information load on capital budgeting decisions. *Behavioral Research in Accounting, 12*, 171-199.

Swan, J., & Scarbrough, H. (2005). The politics of networked innovation. *Human Relations, 58*(7), 913-943.

Szulanski, G. (1996). Exploring internal stickiness: impediments to the transfer of best practice within the firm. *Strategic Management Journal, 17, Winter 96 Special Issue*, 27-44.

Szulanski, G. (2000). The process of knowledge transfer: a diachronic analysis of stickiness. *Organizational Behavior and Human Decision Processes, 82*(1), 9-27.

Tannen, D. (1999). *The argument culture: stopping America's war of words.* New York: Ballantine.

Topp, W. (2000). Generative conversations: applying Lyotard's discourse model to knowledge creation within contemporary organizations. *Systems Research and Behavioral Science, 17(4)*, 333-340.

Tushman, M. L., & Nadler, D. A. (1978). Information processing as an integrating concept in organizational design. *Academy of Management Review, 3(3)*, 613-625.

Tversky, A., & Kahneman, D. (1973). Availability: a heuristic for judging frequency and probability. *Cognitive Psychology, 5(2)*, 207-232.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*(4481), 453 - 458.

Vincent, A., & Rosse, D. (2001). Personalize training: determine learning styles, personality types and multiple intelligences online. *The Learning Organization, 8*(1), 36-43.

von Ghyczy, T. (2003). The fruitful flaws of strategy metaphors. *Harvard Business Review, 81(9)*, 86-94.

von Krogh, G. (1998). Care in knowledge creation. *California Management Review, 40*(3), 133-153.

von Krogh, G., Ichijo, K., & Nonaka, I. (2000). *Enabling knowledge creation. How to unlock the mystery of tacit knowledge and release the power of innovation.* New York: Oxford University Press.

von Krogh, G., & Roos, J. (1995). Conversation management. *European Management Journal, 13(4)*, 390-394.

Waibel, A., Bett, M., Finke, M., & Stiefelhagen, R. (1998). *Meeting browser: tracking and summarizing meetings.* Paper presented at the DARPA Broadcast News Workshop, Lansdowne, VI.

Wallas, G. (1926). *The art of thought.* New York: Harcourt Brace.

Walsh, J. P., & Ungson, G. R. (1991). Organizational memory. *Academy of Management Review, 16*(1), 57-91.

Walton, D. (2000). The place of dialogue theory in logic, computer science and communication studies. *Synthese, 123*, 327-346.

Watzlawick, P., Beavin, J. H., & Jackson, D. D. (1967). *Pragmatic of human communication.* New York: Norton.

Weaver, R. K., & Stares, P. B. (2001). Guidance for governance: an overview. In R. K. Weaver & P. B. Stares (Eds.), *Guidance for governance: alternative sources of policy advice* (pp. 1-30). Tokyo and New York: Japan Center for International Exchange.

Webster, M. (2006). *Merriam-Webster's collegiate dictionary. Eleventh edition.* Massachusetts: Merriam-Webster.

Weeks, H. (2001). Taking the stress out of stressful conversations. *Harvard Business Review, 79(7), 112-119*

West, C. T., & Schwenk, C. R. (1996). Top management team strategic consensus, demographic homogeneity and firm performance: A report of resounding nonfindings. *Strategic Management Journal, 17(7), 571-576.*

Weick, K. E. (1977). Laboratory experimentation with organizations: a reappraisal. *Academy of Management Review, 2(1)*, 123-127.

Weick, K. E. (1979). *The social psychology of organizing* (2nd ed.). Reading, MA: McGraw Hill.

Weick, K. E. (1993). The collapse of sensemaking in organizations: the Mann Gulch disaster. *Administrative Science Quarterly, 38*(4), 628-652.

Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks (CA): Sage.

Weick, K. E. (2005). Organizing and failures of imagination. *International Public Management Journal, 8*(3), 425-438.

Weick, K. E., & Quinn, R. E. (1999). Organizational change and development. *Annual Review of Psychology, 50*, 361-386.

Weick, K. E. (2002). Puzzles in organizational learning: an exercise in disciplined imagination. *British Journal of Management, 13*, S7-S15.

Weick, K. E., & Sutcliffe, K. M. (2005). Organizing and the process of sensemaking. *Organization Science, 16*(4), 409-421.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science, 16*(4), 409-421.

Weinberger, A., & Mandl, H. (2003). Computer-mediated knowledge communication. *Studies in Communication Sciences*, *Special issue on New Media in Education*, 4, 81-105.

Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity*. New York: Cambridge University Press.

Westley, F. R. (1990). Middle managers and strategy: Microdynamics of inclusion. *Strategic Management Journal, 11*, 337-351.

Wildavski, A. (1969). Rescuing policy analysis for PPBS. *Public Administration Review, 29(2)*, 189-202.

Witte, E. (1972). Field research on complex decision-making processes - the phase theorem. *International Studies of Management and Organization*, *2(2)*, 156-182.

Wittenbaum, G. M., Hollingshead, A. B., & Botero, I. C. (2004). From cooperative to motivated information sharing in groups: moving beyond the hidden profile paradigm. *Communication Monographs, 7*(3), 59-84.

Wright, C. (2002). Promoting demand, gaining legitimacy, and broadening expertise: the evolution of consultancy-client relationships in Australia. In M. Kipping & L. Engwall (Eds.), *Management consulting: emergence and dynamics of a knowledge industry*. Oxford: Oxford University Press.

Yin, R. (1993). *Applications of case study research*. Beverly Hills, CA: Sage Publishing.

Yin, R. (2003). *Case study research* (3rd ed.). Thousand Oaks (CA): Sage Publishing.

Yin, R. (2004). *The case study anthology*. Thousand Oaks (CA): Sage Publications.

Yourstone, S. A., & Zimmer, W. J. (1992). Non-normality and the design of control charts for averages. *Decision Sciences, 23*(5), 1099-1113.

Yukl, G. (2005). *Leadership in organizations* (6 ed.). Upper Saddle River (NJ): Prentice Hall.

Zan, L., Zambon, S., & Pettigrew, A. M. (Eds.). (1993). *Perspectives on strategic change*. Boston: Kluwer Academic Publishers.

Zimring, C., & Craig, D. L. (2001). Defining design between domains: an argument for design

Appendix

Outline

Appendix 1

Case #1: The Knowledge Communication between the Scholars of the Brookings Institution and U.S. Policy Makers

Overview on Brookings

Organizational Structure & Areas of Activity

- 4 research programs:
  - Foreign Policy
  - Governance Studies
  - Economic Studies
  - Metropolitan Policy
- 9 policy centers
- 40 projects
- 62 areas of expertise
- Brookings Institution Press
- Executive Education

Brookings is one of the oldest think tanks of the United States and as such conducts policy relevant research and provides advisory services to government. It was founded in 1927, has 281 employees and its experts are academics (mainly with a PhD) who also have longstanding experience in business, non-profit, and government. It is financed to more than 50% by grants and the support of philanthropic foundations, corporations, and individuals. The other important pilaster of Brookings' income is given by the revenues of its endowment (30%).

Brookings has a national and international focus and engages in four main research programs:

Foreign Policy

Under this research program, Brookings conducts analyses and advisory services of world events and proposes policy ideas and recommendations, on topics such as, for example, the complex interactions of the U.S. with the Islamic world, global climate change, or rules in the use of international force (Brookings Institution, 2005b).

Governance Studies

The aim of this research program is to "explain how and why policymaking institutions in the United States and abroad perform as they do" (Brookings Institution, 2004: 18) and outline measures to improve this performance. Focal areas are - among others - national electoral systems, legislative politics, forms of federalism, local administration of educational institutions, the news media, and budgetary procedures.

Economic Studies

In the realm of the Economic Studies research program, the central aim is to re-examine national priorities, the functions that the federal government should

(not) assume, and the means how to finance such undertakings. Typical undertakings in this realm concern issues like fiscal sanity, social security with respect to age, lifestyle and medicine, tax policy, or globalization in relation to U.S. employment (Brookings Institution, 2005b).

Metropolitan Policy

This research program has been launched in 1996 as the fourth of Brookings' major research programs and as such indicated a major shift in Brookings' priorities. It deals with aspects close to the everyday lives of the U.S. population like traffic, sprawl, high housing prices, or low-paying jobs. All series targeted issues facing specific state, metropolitan, and local governments and were looking for an active engagement with the communities (Brookings Institution, 2005b).

Within these four main research programs, Brookings has nine policy centers, many of which are joint-ventures with other institutions (e.g. Urban-Brookings Tax Policy Center) and is active in more than 40 research and policy projects (e.g. the Environment and Development Initiative). Finally, under the Brookings Institution, there is also the Brookings Institution Press (publishing books and journals) and the Brookings Center for Executive Education (providing executives practical public policy and leadership education). In the media guide, the expertise of its scholars is grouped around 62 issues of geographical (e.g. Afghanistan, China) or thematic (e.g. Aging, Finance Banking, Congress) nature.

Historical Background of Brookings

The beginnings of the Brookings Institution trace back to 1916, when the Institute for Government Research (IGR) was formed. The founders of the institution shared the belief that political processes needed to be based more strongly on professionalism and expertise. They thought that a critical analysis of government administration and political processes was needed and that it should have been accompanied by specific suggestions for improvement. During World War I, IGR advised the U.S. government in modern accounting systems, filing systems and personnel manuals. After the war, the IGR advised the government in ways to reduce the huge Federal debt, which led to the Budget and Accounting Act of 1921.

In 1922 and 1924, Robert Somers Brookings established two supporting

sister organizations: the Institute of Economics and the Brookings Graduate School of Economics and Government. In 1927, the three organizations were combined to form the Brookings Institution with Harold Glenn Moulton as Brookings' first president (Critchlow, 1985).

Facing the Great Depression, President Roosevelt called on the Brookings Institution for assistance. Even if Brookings was directly involved in the elaboration of the National Industrial Recovery Act (as a part of the New Deal), Moulton and his team of researchers strongly opposed the political interventionism of the New Deal. Despite this dispute, Brookings performed services for New Deal Agencies and, among others, helped to set up a vast accounting system for the Social Security System. In the aftermath of World War II, Brookings was engaged in developing the European Recovery Program, which assured that the Marshall Plan was run carefully (Brookings Institution, 2005a).

In 1952, Robert Calkins became president of the Brookings Institution and the strong anti-interventionalist view of the state within the scholars of Brookings made way to ideas closer to Keynesian fiscal policy (Critchlow, 1985). Calkins reorganized the Institution around the Economic Studies, Government Studies, and Foreign Policy Programs, brought in first rate academics with government experience and secured grants from the Rockefeller and Ford Foundations. In the 1960s, Brookings strengthened its link to the policy makers in Capitol Hill and conducted research projects for government agencies as the Council of Economic Advisors, or the State Department. During that time, Brookings particularly prepared the ground for ideas of deregulation (Brookings Institution, 2005a).

Kermit Gordon took over the presidency of Brookings in 1967. He supported the establishment of the Brookings Papers on Economic Activity and expanded the Foreign Policy Studies Program by including research on national security and defence. But after the election of Richard Nixon in 1968, the relationship between the Brookings Institution and the White House deteriorated. Brookings was perceived by many in the White House as the mouthpiece of the Democrats. The sharp stock market decline and the rapid inflation of the early 1970's made foundation funding and endowment revenues dip (Brookings Institution, 2005a).

In 1977, Bruce MacLaury became the new president of Brookings. He built

up stronger links with the business community and increased the amount of government contracts. In these years, competition began to grow: the federal government had strengthened its own capacity for research and analysis and other private think tanks emerged. Many of them followed clear ideological and political goals and strived for a more short term impact on current policy issues. As a reaction, Brookings engaged in shorter and timelier communications as well as in outreach activities in order to better reach the press and the broader public with its research activities. In these years, Brookings was strongly involved in financial advisory services for the federal budget. In the '80s, Brookings was involved in health care and tax policy and in the '90s, it recommended new approaches to welfare, public service, and campaign finance. In 1995, Michael Armacost became the fifth president of Brookings (Brookings Institution, 2005a).

Positioning and Main Functions of Brookings:

With these activities, Brookings aims to position itself within the market of expertise and the (U.S.) policy making context with the following mission:

> "Brookings is an independent, non partisan research organization (that) seeks to improve the quality of U.S. public policies. It addresses current and emerging policy challenges and offers practical recommendations for dealing with them, expressed in language that is accessible to policymakers and the general public alike"(Brookings Institution, 2005a).

To Brookings, equally important than research is also the effective communication of research results and policy recommendations to policy makers. The mission statement entails both traditional values of Brookings – as non-partisanship and thorough scholarship – and also newer commitments – as timeliness, practicality and comprehensibility. As a direct consequence of these more recently included values, Brookings has reinforced alternative communicative means like conferences, policy briefs, and the Internet.

Under the umbrella of this overall scope, Brookings' scholars attribute four major roles to its institution.

1. Building scientific, policy relevant body of knowledge by conducting research:
   – developing ideas

First, Brookings aims at conducting *academic research* that has policy implications: "The (..) role which is important is doing scholarly research. Congressional staff is so busy, they don't have the time to step back and really analyze something from a certain distance" (R. Nessen). Research is important to provide insights to the policy world and to reduce the work load of policy makers. Research is also important for Brookings to distinguish itself from other, more ad-

– proposing
policy alter-
natives

vocacy oriented organizations and to underpin the academic and non-partisan foundations of its expertise. "There are all sorts of think tanks in Washington. (..) There is a strong desire (at Brookings) to keep up the academic credentials, and not become an advocacy organization (..) that is just promoting opinions and not real research" (R. Nessen). Brookings' research aims both at the conceptual block-building of a policy issue and elaborating concrete policy recommendations for very specific topics. The more conceptual work is necessary in order to build a sort of repository of knowledge and to affirm a scholar's expertise in a certain field. In case a policy issue gains suddenly in importance, Brookings is already prepared with the necessary expertise. In this work, Brookings sees its function not so much in proposing revolutionary new theories and ideas, rather in *working these ideas out in specific policy contexts[1]*:

> "We come up with a lot of ideas. But they are not some kind of brilliant development. (..) It is not like a Nobel prize winning chemist, who came up with a new way of isolating stem cells. In the 1960s and early 70s, for example, Brookings continuously got money on the question of regulation. The argument for more deregulation turned out in study after study, in airlines, trucking, and other areas. None of these were new ideas, but we worked them out in the various sectors" (C. Schultze).

Related to this role of working out ideas in the concrete policy contexts, another important function of Brookings is to *present to government non-partisan alternatives,* as outlined by Charles Schultze:

> "I started (..) an annual volume which is called 'Studying National Priorities'. It was an attempt to take an outside evaluation of the governments' budget of each year (..) and to provide (..) alternatives. (..) The budget really encompasses and lies out what the President thinks the government ought to be doing. (..) The President presents the budget to Congress and, understandably, he has absolutely no interest in saying: 'look there is another way to do this.' (..) So we proposed alternatives and tried to be relatively neutral and not biased, but in fact, (smiling) I am sure there are some things I liked better than others" (C. Schultze).

2. Disseminating
research in-
sights and pol-
icy ideas

Second, next to conducting research, an equally important function of Brookings is to convey its insights to policy makers, the media and the general public. It has to *communicate its research results in a way that is understandable and meaningful* to its audiences.

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1 Diane Stone (2005: 136), by referring to Hayek (1967), therefore calls think tanks "second-hand dealers in ideas" as their role is to propagate and purvey ideas rather than thinking more radically about theoretically concepts.

"If you look at the mission statement of Brookings, you know research, analysis, non-partisan, but then, it says to disseminate these ideas. So it's equal, do the research and get it out there so that people can think about it. That's where the communication comes in" (R. Nessen).

3. Convening political parties and bringing academic experts closer to the policy world

Third, Brookings has an important *convening function*: "Washington works a lot better when people actually talk with each other. They don't have to agree, but understanding what the other person is saying" (W. Gale). Brookings brings together people across partisan borders and makes them discuss policy issues, be that in a symposium of 250 people or in a smaller, private get together. Brookings is a convener not only *between divided (political) parties*, but also *between academia and the world of politics* and organizes events where academic experts meet and interact with policy makers.

4. Translating from scientific to policy world

Finally, Brookings has an important role as a *translator and knowledge broker*.

"The other thing that we can do is to translate works from the academic world to the policy world. If in the scientific domain, something is already known, but policy makers are not aware of it, it won't affect their policy making. (..) So one of the things we do is to help breach the gap between the policy world and the research world" (W. Gale).

Oftentimes, the policy maker expects from Brookings not to conduct new research, but asks for a synthetic overview on the already existing body of literature in a language that is accessible to the policy world. "The objective (of this project) was to hopefully bring the policy makers to speed on what the state of social science knowledge was. So the term is knowledge broker rather than knowledge creator" (K. Weaver).

Up to this point, we have provided an overview on the organizational context of the Brookings Institution and presented its mission and main roles. The following sections will focus on the knowledge intensive communication between Brookings' experts and the policy making world. We will start with a closer description of the expert, decision maker situation.

The Expert – Policy Maker Situation:

Brookings' *experts* are academically trained scholars and most of them possess a PhD, many in Economics or Political Science. Characteristic for Brookings' scholars is also that they have a considerable experience in government, but also business, or non-profit organizations. Some scholars of Brookings have been

Experts:

– academically trained (PhD), have government experience, and are experts not only in one, but several policy areas

quite important figures in the administration of the United States. Alice Rivlin, for example, spent about a third of her career at Brookings, a small part in academia and about half of it in government (for example as Vice Chair of the Federal Reserve Board (1996-99) or as the founding director of the Congressional Budget Office (1975-1983)).

The gap between Brookings' scholars and the policy makers is not insurmountable only because Brookings' scholars have extensive experience as policy makers, it is also the case because their knowledge is not extremely specialized for that they would know "more and more about less and less" (W. Gale). Rather: "we are so much into real world issues, you find yourself pulled in all directions all the time" (W. Gale). As such, Brookings' work sometimes is similar to the one of Congressional staffers. Charles Schultze's "Studying National Priorities" initiative, for example, which provided outside evaluations of the governments' yearly budget and presented alternatives, was downsized when the President, in the mid 1970s, established the Congressional Budget Office, who took over a very similar work.

Policy Makers:

– form a large, heterogeneous group
– in part specialized in particular policy areas

The *policy makers* are quite a fragmented group in the Congress of the United States (McGann & Weaver, 2000: 15) and are formed by the 435 representatives of the house and the 100 senators, and also by the thousands staffers of congress. The Representatives of the House and the Senators form the legislative body of the United States (lower and upper house). They have the power, among others, to initiate revenue bills, impeach officials, and elect the President in electoral college deadlocks. The Houses use committees that consider, amend, and report bills in a specific field such as Finance or Armed Forces. Next to the members of the House of Representatives and the Senators, an important role in the policy formulation process also has the congressional staff. They assist members of Congress and evaluate the outcome of legislative proposals, make recommendations regarding particular issues and are therefore often specialized in specific policy areas (e.g. health issues, environmental matters, taxes) (Capitol Advantage, 2005).

The responsibilities and functions of the four organs (representatives, senators, committees, staffers) lead to a situation, in which many possible sources of policy formulation exist (Mc Gann & Weaver, 2000, p.15). An idea for a new policy is therefore certain to evolve until it becomes legislation. "Policy ideas are always changed in the political process. It is usually the interaction of different

ideas that produces a novel policy. A policy is almost always a compromise”, says Alice Rivlin.

Another important target of Brookings’ communication are the media, academia, and the general public. All these audiences can be the source of a new policy or can influence, at least indirectly, policy makers and the policy making process. “Policy makers get their information through the media” and “the media, the policy makers, the Washington policy community, and the academics, (…) they all feed on each other. Policy makers read the newspaper, academics read the newspaper, and the people of the newspapers call other academics” (P. Orszag). Thus, the group of policy makers is large and heterogeneous and the mode of communication of Brookings’ experts slightly varies according to their characteristics. The congressional staffers for example are often trained economists, which is why the communication with these policy makers slightly varies from the one with Congressmen. William Gale: “When you talk to congressional staff, you want to give them the empirical evidence, the formal arguments. (..) That’s a more formed, technical discussion. When you talk to congressmen, they are busy decision makers”. But, the inherent challenge in the knowledge communication seems to remain the same as Gale formulates:

> “There are inherently differences between the way I communicate with media rather than with policy makers, but what remains the same is that, as an expert in policy issues, and in economics and in econometrics, my job is to distil the interest in economics and econometrics and convey them in non-technical ways in those circumstances.”

In sum, we can say that there is a clear functional difference between the experts of Brookings and the policy makers in Congress (Brookings’ scholars advise, members of Congress decide). However, in terms of expertise, training and experience, the knowledge asymmetry is not insurmountably large. In fact, the description of the expert-decision maker situation has revealed a first fundamental strategy of Brookings in its knowledge-intensive communication with policy makers. To make the translation work less impossible and to guarantee a shared context between its experts and the policy makers at Congress, all its scholars need to have a certain experience in government for that there is an almost continuous in-and-out-flow between the administration and the think tank.

**The Knowl-
edge Com-
munication
Process be-
tween
Brookings
and the U.S.
policy mak-
ers at Con-
gress:**

**Identify Ex-
perts and Ex-
pertise**

In the following paragraphs, we will describe how the knowledge communica-
tion process between Brookings' experts and the policy makers unfolds and will
structure this description along the knowledge communication process presented
in Chapter 2.
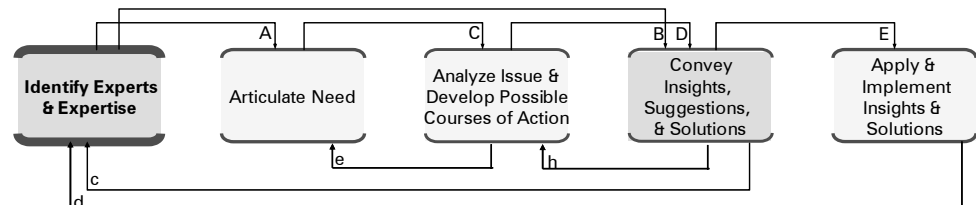
Figure 1: The 'Identify Experts & Expertise'-phase

The first important phase in the interaction between Brookings's experts and
the policy makers in Congress is the identification of the relevant experts and the
ways to contact them (see: Figure 1). Brookings conducts research projects out of
the scholars' own initiatives and usually not out of a demand from Government.
For this reason, in many instances, the knowledge exists somewhere, but the
policy makers have to identify the one or two Brookings' scholars or the particu-
lar product of Brookings as the pertinent source from which to gain insight for a
current policy challenge.

Brookings builds on the following practices to ease the identification of
Brookings's experts on behalf of the policy makers.

Practices:

– Manage a well
functioning
(in-) formal so-
cial network:
geographical
proximity &
strong bounds
with other or-
ganizations

Prior studies have shown that geographical proximity plays an important
role in the influence of think tanks on the policy making process. Washington
based think tanks usually have a higher media visibility, as also more testimonies
in front of Congress (Rich & Weaver, 1998). Kent Weaver mentions:

"You know there is an advantage of being in Washington, they run into you, they have seen
you at meetings, they sort of know who you are, whether you are good at communicating,
whether you are good at answering questions, and sort of generally what your views are."

Geographical proximity is therefore an important aspect for establishing an
informal network between experts and policy makers as Alice Rivlin outlines:
"Washington is an amazingly small town (..), people know each other. There is
quite a lot of informal interaction, people are meeting over lunch or breakfast in
a small group" (A. Rivlin).

A first idea of how the Brookings Institution deliberately strives to be well connected gives its choice of board members and how they are interconnected with other organizations (companies, universities, or governmental organizations) (see: Figure 2). The representation of Figure 2 is limited to the level of Brookings' board of directors and to the more formal ties of Brookings. On the level of the scholars, Brookings tries to guarantee a well-functioning informal social network by hiring mainly scholars who have served in government. In this way, there exist direct bonds between the experts and the policy makers.

Members of the Board of the Brookings Institution who sit..

..in the board of other companies and ..

.. in the board of other, in part governmental, organizations.
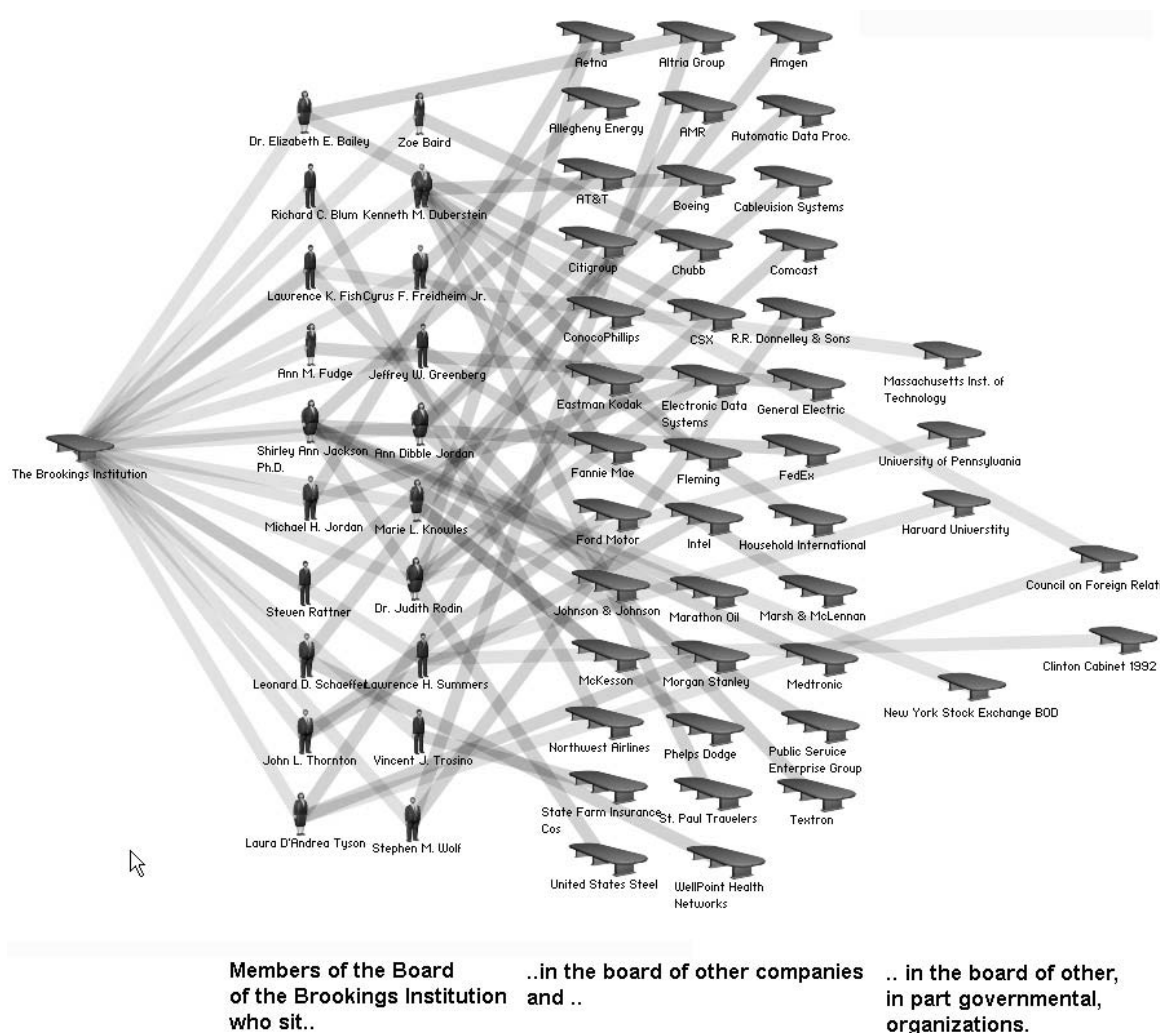
Figure 2: The Direct Links between the Brookings Institution and Companies, Universities, and Governmental Organizations at the Level of the Board of Directors (Source: www.theyrule.net)

– Build on reputation of experts: presence

Many of the scholars of Brookings are famous for their expertise in particular policy issues as Ron Nessen outlines: "A lot of our experts are on TV a lot,

in media

Michael O'Hanlon, who is our military expert, Isabel Sawhill, obviously, Kenneth Pollack on Iraq. They are known and get called directly" (R. Nessen). These scholars are affirmed experts in certain areas not only for their presence in the media, but also for the previously mentioned service in a presidential administration. Alice Rivlin explains: "It is very useful to have been a policy maker because that gives you additional credibility, not as an expert, but as someone who is listened to" (A. Rivlin).

– Propose multiple means to identify relevant experts: media guide & Internet

Apart from relying on existing social networks and the already acquired recognition from the public, Brookings ascertains an easy identification of its relevant policy experts in a variety of ways. Foremost, the institution developed a *media guide*, which allows the identification of the relevant experts through several search paths. Experts are multiply listed according to the alphabetical order of their names, their geographical specializations, their thematic focuses (e.g. Immigration, Housing, Health Care, Globalization), the languages they speak, the administrations they have served, and the research programs with which they are associated.

Another way is through Brookings' website. Like for the media guide, also on the website, one can find the pertinent scholars in a variety of ways. For example, one can pass through the current top stories in the U.S. policy environment and then click at related articles or experts on the topic, or one can search a scholar directly either by name, issue, or research program.

– Include cross-referencing to widen variety of access paths

Brookings extensively practices *cross-referencing* both in the media guide as also in the website, that is, it indicates related material (such as events, papers, policy briefs, etc.) and experts. By looking at other projects to which a certain scholar has contributed, the cross-referencing allows the user a better understanding of whether the scholar is really the ideal expert for a certain policy issue.

"And the nice thing too is that you can get related material. I told you that Sarah Binder is an expert on filibuster, so I go on the website and want to get familiarized with her work. You see a list of her work with just one explanation line. So you work your way down in the areas that more interest you" (R.Nessen).

As shown in Figure 3, cross-referencing gives the user also another modality how to find interesting and pertinent information. Rather than engaging in quite

a narrow, linear search by keyword, the policy maker is guided by associations which allow for discovery, opening up a discourse, and providing context. These are all important aspects if we move from an idea of transferring information to one of communicating and constructing knowledge.

Figure 3: Example of Cross-referencing - a Project Presented at Brookings' Website and the References to its Related Resources

— Set up a communications office as a broker and mediator

Finally, Brookings' communications office plays an important *role as a broker and mediator* between the scholars and the policy makers. It indicates experts, arranges meetings or interviews and organizes the necessary facilities.

"They also call here, look we want to make a story on the CBNS evening news on filibuster, you have any expert on this topic? And we would say, well Sarah Binder is the one who can help you. We can call her and make the arrangement: do you want to interview her in our studio?" (R. Nesson)

– Augment convenience of ac-

Given the ever tighter time pressure, Brookings is engaging in practices that offer *more convenient and less time consuming* ways for media and policy mak-

cess by reducing time investment (by organizing events at Capitol Hill, and by providing own TV studio)

ers to access Brookings' experts and information products. A first example of this is that Brookings installed an i*n-house TV and radio studio* that is linked in such a way to permit radio and television stations to directly transmit the signals through the fiber optic line to their TV and cable networks or stations (Brookings Institution, 2005b). Thanks to this facility, the media partners do not have to bring along all their equipment and they have a greater chance to get Brookings' scholars on air. The scholar, on the other hand, does not need to invest hours of his/her time to give a 5 to 10 minute interview.

A second way how Brookings offers policy makers more timesaving means to access its experts and information is by organizing events directly on Capitol Hill. Policy makers "not only do not have the time to read anything, they don't have the time to take the cab and come here (to Brookings)" in order to attend conferences, seminars, or talks (R. Nessen). Brookings therefore started to organize events that take place just next door to where the policy makers do their daily work. "We had about five events on Capitol Hill. (..) We did one event with a group of other organizations and (..) that was quite a successful event. We had another event, with the chairs of the budget committee and the Congress on Capitol Hill. We had another one this year mostly with staff from Capitol Hill, and there was an article about in the Washington Post recently" (I. Sawhill). Such events have various functions as, for example, convening parties or gaining the attention for a topic. But the fact of organizing them on Capitol Hill itself is an important strategy to ease the access for policy makers to Brookings' insights and to more strongly mark Brookings' presence within the U.S. policy makers.

Articulate Need: Definition of a Project's Parameters Characteristics:

In Chapter 2, we have argued that once a decision maker has identified an expert to be pertinent for the decision at issue, he would try to articulate what kind of insight he needs (see Figure 4).
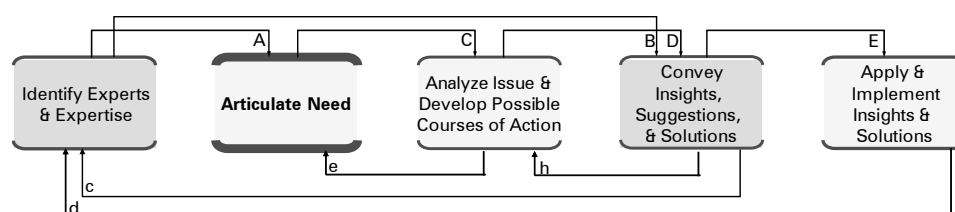
Figure 4: The 'Articulate Need'-phase (Definition of the Parameters of an Analysis)

In the case of Brookings, such a procedure is true only for a small part of the expertise that Brookings communicates to the policy makers. It is the case for

congressional testimonies at hearings in front of Congress. The Congressional majority on a particular committee decides on which topics the Congress will have hearings and invites a scholar of Brookings to give a five-minute testimony. Around 80% of the witnesses will be called by the majority staff and 20 percent by the minority staff in order to have some ideological balance. Each testifier is asked to send his/her testimony in a written format to the Committee and there is some space for readjustments (K. Weaver). Here, there is a clear and very specific demand on behalf of the policy maker, which is communicated in a short and standardized form. Apart from testimonies, Brookings' scholars usually work without a clear request from policy makers.

Most of Brookings' work is based on projects, for which Brookings does not have a clear request from the policy makers. While there are many ways how a project can be initiated, it usually is defined quite bottom-up by one or several senior fellows. In rare cases, the director of a research program, the president of Brookings himself, or external groups can have an influence on the definition of projects. The following aspects play an important role in the definition of projects.

– (Re-)action to political agenda

Many projects are defined in more or less direct relation to the *political agenda*.

"Look at Isabel Sawhill's project on Welfare Reform and Beyond. She started it at the beginning of 2004, because sometime during 2004, the welfare reform bill was going to expire. It was the year when Congressmen had to face this issue: what is it in the bill that has worked well and should be extended, and what (..) should be changed and added in the reauthorization (..)? The objective of this project was really determined by the legislative calendar" (R. Nessen).

Yet, frequently, the relation of a project to the political agenda is not as direct.

"Almost anything important is on the agenda of the policy maker even sometimes ignoring it. Better explanations of how the macro economy works, what determines the country's exchange rate, what causes the current trade deficit; that is not something policy makers would have to know all about it, that is not on their agenda in such terms. Even though the issue is on the agenda" (Ch. Schultze).

Brookings can reframe an issue, put it in a larger context and provide a bigger picture of a policy challenge. It can put attention to an issue, which is only

dormant in a policy makers' mind and has been ignored for all too long. The latter is currently the case for example with regard to the fiscal sanity issue, as explains Isabel Sawhill: "The political system is not taking action on this front right now. They are bitterly divided, and so, outside of government, research organizations and think tanks are eager to make the people and the opinion leaders aware of the problem.

– Agenda setting and conceptual block building

    Similar to projects that aim to create awareness for a current policy challenge are those that address issues, which probably will be of a growing importance in the future. On the one hand, it is a question of doing "the research and the conceptual block-building now in order to be ready when the policy maker is interested in them" (W. Gale). Such projects for example focus on future developments in India and South Asia, for example, by studying the consequences of the growing economic and military power of India, its implications for India's relation with China and the consequences of these changes for the worldwide distribution of power. For Brookings, it is necessary to stay at the curve of political and economical developments in order to assure its expertise in the long term. "We don't want to be focusing on last year's issues. We want to talk about issues that are going to be important in the future, but which may not even be discussed in the present" (I. Sawhill). In this way, a particular challenge for Brookings is to sense upcoming developments and create awareness of problems of the future that need to be addressed today. "That's what I would call the agenda setting challenge" (I. Sawhill). An example of such an agenda setting project was "Priorities 2000" that Brookings launched in the election year 2000. In the realm of this project, eight National Issues Forums were organized, in which experts of different viewpoints were brought together and discussed upcoming paramount issues of the U.S. policy arena. These events were complemented by the publication of the book "Setting National Priorities", in which 15 experts presented informative articles on these issues.

– Personal interest of scholars

    In other projects, the topic of a project is even less dependent on the political agenda and is more strongly determined by the personal interest of a (group of) scholar(s) at Brookings. "We have a small group of people who have taken up the subject of what is the relationship of economic wealth or income and happiness. That is something which is not immediately policy oriented, although it has policy implications" (R. Nessen). Yet, in most cases, the orientation on the po-

litical agenda or on political developments is quite interwoven with the personal interests of the researcher.

"There is definitely a personal interest behind my projects (..), and there are components related to what is going on in the policy world. Hopefully, and one of the things that makes a project interesting to me, is that it has real world impact and implications, that it has some salience. That does not mean that these are issues which are decided right now" (W. Gale).

– Disposition of foundation /philanthropic corporation or individual

Normally, once the idea of a project is elaborated, a project proposal is worked out and the scholars look for funding in private organizations. In other rare cases, a foundation or philanthropic corporation comes to Brookings and has a more or less specific idea of a project they would like to support. Thanks to the fact that Brookings is financed by almost a third by its own endowment, it enjoys a pretty large independence in the definition of its projects. Nevertheless, the situation has partially changed in the last years.

"For many years, (..) the agenda was very bottom up, set by individual scholars choosing projects they wanted to work on. And the institution (..) would then go out and look for funding. But if you couldn't find the funding you did the project anyway. In the recent years, the ability to raise funds has become more important for whether you can do projects or not. There's much more focus on fundability and on immediate policy impact" (K. Weaver).

Usually, the foundations that sponsor a project do not intervene in the definition of the project. Yet, sometimes there is room for negotiations as explains Kent Weaver:

"We did a big project on welfare reform with several of my colleagues and we raised about 3 million dollars from foundations. But their interest was less on the original research that I wanted to do (..). They were interested more in synthesis and in what's the best social science knowledge rather than producing new knowledge."

– Government requests

Only a very small minority of the projects is commissioned by policy makers as only 1% of Brookings' income stems from government.

To summarize, with the exception of testimonies, for which short and standardized requests from the policy makers exist, Brooking defines its projects rather independently from policy makers and from donor organizations. They

are very much driven by the interests of the individual scholars, but are also highly interwoven with the political landscape. They aim to present alternatives to current policy solutions, reframe a discourse or to put issues of the present and future on the agenda. The phase involving the articulation of the policy makers' need is therefore only of limited importance in this particular case.

Conduct Analysis of Issue and Develop Possible Courses of Action (Policy Recommendations)

Main characteristic:

− Rather independent from policy makers (except Program for Metropolitan Policy)

In the knowledge communication process, as presented in Chapter 2, it is said that once the decision makers have specified their needs, the next phase in the knowledge-intensive interaction is the analysis phase (see Figure 5). Yet, in the case of Brookings, as there seldom is a clear request on behalf of the policy makers, there is only little interaction between policy makers and the experts in this phase and Brookings' scholars work rather independently form policy makers.

Figure 5:   The 'Analyze Issue/Conduct Research & Develop Possible Courses of Action'-phase (Develop Policy Recommendations)

One research program – the Program for Metropolitan Policy - constitutes to some extent an exception to this general observation as explains Ron Nessen:

"The program for Metropolitan Policy is somewhat different from the rest of Brookings. It is the most recent major research area of Brookings. The guy who runs it, Bruce Katz, (..) had the idea to have a think tank that dealt with urban issues and rather than producing books it worked directly with local officials. Its findings are very practical and very action oriented, you know the road system of Pittsburgh or whatever (..). This has much more direct policy impact in the sense that they are working together with policy officials on specific issues. (..) They do the whole process together, from the definition of the project, up to its implementation."

While the experts of the Program for Metropolitan Policy closely collaborate in all phases with the policy makers, and do so also during the analysis of the issue and the development of solutions and suggestions, this is not generally the case for Brookings' other Research Programs.

**Convey In-
sights, Sugges-
tions, & Solu-
tions**

Characteristics:

Three 'Outreach'
strategies:

1. Written Mate-
   rial
2. Face-to-Face
   Events & Oral
   Communica-
   tions
3. Website

Once the scholars have completed a project, the next phase in the knowledge communication between experts and policy makers is to convey the gained insights, the proposed suggestions and solutions to the policy makers (see Figure 6).
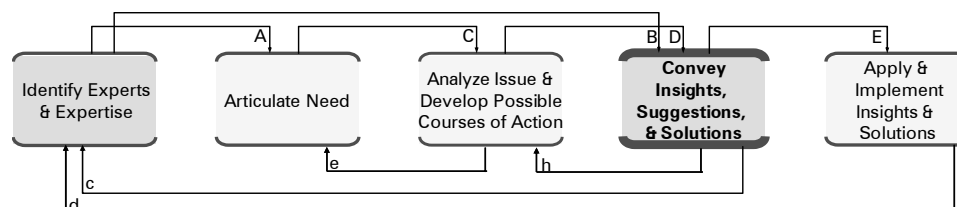
Figure 6: The 'Convey Insights, Suggestions, & Solutions'-phase

Brookings conveys the insights and policy suggestions it gains from its research activities through a variety of communication products and channels. Three major "outreach" activities can be identified: A) *written materials and publications* like articles, policy papers, opinion-pieces, etc. B) *face-to-face events and oral communications* like testimonies at congressional hearings, informal meetings, policy briefings, etc., and C) the *website*. The idea behind the intensive endeavors in communicating the insights through an interesting mix of communicative means is that "the world will not flock to the scholar's idea once he has done his paper" (W. Gale). Rather, only by communicating through different channels and media formats and addressing a variety of audiences, the scholars' ideas might get in circulation among policy makers. Peter Orszag outlines an example of a communication strategy of one of his projects:

"We came out with this new study (..) on the effects of match rates on saving. We held a conference here to get it out to different offices (..) and the policy community of the different think tanks. We held a conference call with reporters and had 20 or 25 reporters on the phone. I had conversations with specific reporters and there was a story in the Washington Post and the Wall Street Journal, as well as a big editorial in the New York Times. This, I believe, influences policy makers. Then, I brought it up again at a hearing before the Ways and Means Committee yesterday, which is yet another audience. At the same time, we are getting the paper out to the academic audience" (P. Orszag).

By targeting different audiences – policy makers directly through testimonies, journalists and the public opinion through major national newspapers, academia through scientific papers, etc. – Brookings strives to get its ideas into "circulation". The idea is not to directly get through with a specific idea, but to frame a policy discourse from a particular perspective.

Brookings uses a variety of communication formats to bring their ideas into

the public policy discourse and inform the policy making processes. With regard to the written material, each year Brookings publishes around 50 books and 7 periodic journals, writes 20 policy briefs (8-page long writings on current policy issues providing background information and policy recommendations, distributed online), around 180 op-eds (brief opinion pieces place opposite to the editorial page of major national newspapers), writes 50 papers and articles, and elaborates equally many reports. With regard to oral forms of communication, most important are the testimonies at congressional hearings, the events Brookings organizes on Capitol Hill, the informal meetings, the over 50 public briefings a year, the interviews its scholars give for radio and television broadcasts, and finally the discussion series, in which journalists, government officials, and experts meet to discuss pressing and conflict-rich problems.

Rather than outlining all these various communication formats in detail, we directly discuss the practices and challenges with which Brookings is faced in this phase of the knowledge communication and illustrate them with examples of single communication formats.

Practices:

– Use various communication formats along their functions

– Draw on a mix of written communication formats to provide both in-depth conceptualizations of an issue (books) and timely policy recommendations (policy briefs, op-eds, etc.)

Whereas Brookings previously used to place emphasis mainly on books and comprehensive, long term publications, today, it uses the various communication forms in relation to their specific characteristics and way of use (e.g. types of information to present, audience to reach, involvement with communication partner).

Written communication, in Peter Orszags view, has the role to inform the political discourse and gradually (re-)frame the perspective on an issue:

> "There are all these sorts of *Washington wisdoms* that become engrained and once they are engrained, it is very hard to remove them and then they feed into policy views. That's where I see the policy briefs and books and papers, it's informing that."

Books remain an important written communication format in spite of an environment where policy makers have less and less time and there is a large pressure to publish in brief cycles and in ever shorter formats. They help to *maintain the academic credentials* of the organization and distinguish the organization from more advocacy oriented think tanks and serve an audience that likes to be *informed in a serious manner*. Books allow for a *conceptualization of a whole problem* by outlining the casual links and indicating guidelines for possible (al-

ternative) solutions. Finally, they are more long term oriented and manage to *keep ideas alive* within the policy stream.

Next to books, there are a set of shorter and more quickly released formats, with which Brookings tries to exert a more direct influence on the *policy process*. Policy briefs, for example, are a standard structured outlet limited to 3000 words (8 pages). They provide more timely information on more detailed questions. In less time, policy makers gain the main insights on a topic. Not only the *conciseness* of the format, but also its *standard structure* (shown in Figure 7) is important in this regard as it allows for a faster orientation and for a quicker retrieval of the relevant information.

For all these shorter, more quickly released written communication formats, Brookings maintained procedures that help to guarantee the *high quality and the academic standards*, for which Brookings is known: "These go to the same academic reviews, the same academic style, and are sent out to outside experts for comments" (R. Nesson).

Figure 7: Example of a Policy Brief, Added with Labels Indicating Some of the Standard Features of a Policy Brief of Brookings

– Draw on the Brookings' website to:

The vast majority of the written material is accessible free of charge over the Brookings' *website* (www.brookings.edu). It is organized similar to a big portal or news website that gives access to more than 45000 documents. The website

– reach a broader audience

– release information quickly and make its access independent from time

– allow the public a direct and interactive contact with scholars (chat, comments)

gives products like the policy briefs a much larger audience and a single document may be downloaded up to 35'000 times (hardcopy version 3000-5000 times).

For the policy maker, one of the big advantages of the Internet is that he/she can access the piece of information the moment he/she really needs it. In this way, it remains alive much longer than it used to do:

"We can send policy briefs to policy makers, but they probably will go right in the trash because policy makers in the United States are simply overwhelmed with information. So it's better to make them accessible when they want it and the easiest way to do that is through Internet in electronic pdf format. In this way you can pull it up whenever it suits you, rather than digging you through massive files that are not pertinent for you" (K. Weaver).

The media also allows for the distribution of other types of information like, for example, video and audio streams (e.g. of speeches, events, policy briefs), power point presentation, transcripts (e.g. of congressional testimonies).

Next to being a distribution channel of Brookings' products, the website also serves as a *news channel*, where current policy issues are pushed on the first page and events (like briefings, policy luncheons, conference calls) are announced. In the future, Brookings will strengthen this functionality of the website.

"I think we are going to – primarily through the website – anticipate events. What is the top story right now? The battle over the filibuster. We have got an expert, she has given a lot of interviews, she has done the research, and so forth. Let's put that on the front page of the website. And what's the second issue? Well, foreign policy, Iraq and North Korea" (R. Nessen).

The Internet further allows for a direct contact with scholars and a more personalized and interactive form of communication. Brookings organizes life Internet chats where users can interact with one of the experts of Brookings on a specific issue. Users can also post an opinion, suggestion, or critique next to an article. In this way, they can relate a piece of information to their context and ask questions, activities which are very central to sense-making and turning information to knowledge.

Next to all the written products and the Internet, a major way how Brook-ings addresses policy makers is through oral communication and face-to-face conversations. Next to classical oral communications like testimonies during congressional hearings, public briefings (at the occasion of book releases, celebra-tion of a compact, or return from a journey in a politically interesting area) or interviews, Brookings organizes informal meeting like, for example, lunch or breakfast meetings, where congressional democrats or members of congressional staff work on a particular issue.

We will first discuss why Brookings gives ever more weight to these orally based communications and then present three forms of oral communication more in depth: testimonies at congressional hearings and events on Capitol Hill.

One reason is that Brookings has an important *convening function* and the best way to make different parties listen to each other and to *bridge partisan debates*, is to make them sit at the same table and start a dialogue:

> "Because the debate was very partisan, we wanted to bring in knowledge to bear that was useful. (..) I guess our objective was to find areas where there were agreements across parti-san boundaries, so they could start to think of agreements for policies and not be bogged down by partisan debates. You know there are just some things people will continue to dis-agree [on]; You can't do anything about that. But on others, you can. If there are 25 issues, you probably can find agreements on 10 of them. That's a start" (K. Weaver).

Face-to-face encounters help to overcome polar views and develop a sense of belonging so that, eventually, new communities of practice or knowing emerge (K. Weaver). Next to these functions, events and face-to-face conversations are also important to gain the attention of the policy makers who are ever more overloaded with information.

> "There is an enormous amount of written information (..) and policy makers cannot possi-bly assimilate it all. One way to do that is to hear it first, and then get some more informa-tion with more depth that is in a written format. So one function of oral communication is shortcuts, to gain attention" (K. Weaver).

Oftentimes, policy makers do not have the time to search for a solution, but once they stumble across an interesting idea that suits their objectives, they might pick it up. Events and other sorts of oral communications constitute such start-up moments as Kent Weaver's example illustrates:

> " We came up with this idea in the form of a policy brief. But I guess the key thing was that

we had a lunch on the hill and fifteen key staffers of the Congress came, of those also some moderate Republicans who were looking for something that would make the bill less aggressive. They essentially took our proposal, integrated it [into the bill] and it became law. That is really unusual."

In addition to that, conversations give room to the *elaboration of a common understanding* and an expert can give examples and make an idea really meaningful to the context of the policy maker. "Explaining it face-to-face to a policy maker and hearing them: 'Oh yeah, I get it and it makes sense', that helps a whole lot" (W. Gale).

Finally, an important reason why oral communication is an important way how to convey expertise to decision makers is because "Washington is an *oral based culture* and scholars have to adapt their communication style to the dominant form of communication" (K. Weaver).

Communication formats and their use by policy makers, the media and the general public are changing continuously. Therefore, Brookings has the credo to continuously rethink and change its communication strategy, as explained by Nessen:

"One of the reasons why we did this focus group was to find out, whether we were disseminating ideas properly, in the right format, in the right time. (..) You always have to keep changing and adapt yourself to the times. One of the slogans I have is doing things the same way as we did last year, is just an excuse for not thinking" (R. Nessen).

Example 1 of a Face-to-Face Communication:
– Testimonies at congressional hearings
– Main characteristic: indicator for the impact of a think tank

Testimonies are oral presentations of experts during a congressional hearing. A congressional hearing is a meeting or session of a Senate, House, Joint, or Special Committee of Congress, usually open to the public, to obtain information and opinions on a current policy issue, or, more specifically, on proposed legislation, conduct an investigation, or evaluate/oversee the activities of a government department or the implementation of a Federal law. A scholar usually is invited by a specific committee of the Senate (e.g. the U.S. Senate Committee on Foreign Relations, U.S. Senate Committee on Small Business and Entrepreneurship) to outline the main causes and implications of a certain issue and outline possible solutions for the problem in a five-minute presentation. Members of Congress then have the possibility to ask questions. A scholar usually testifies next to other experts on the issue (Quarterly, 2005).

Between the beginning of July 2003 and the End of June 2004, Brookings'

scholars have testified 27 times. The impact of a think tank on a policy is often measured in terms of the number of congressional testimonies its scholars are able to hold because it is a possibility to directly meet members of Congress and have some sort of impact on their views. Some scholars of Brookings see testimonies as really important: "In general, they (Congressmen) don't have time to read a book. But they may listen to a presentation and, quite likely, may Congress read and listen to testimony. In my experience, testimonies are quite important" (A. Rivlin). Yet, other scholars believe that they are mainly show, as outlines Peter Orszag:

"Testimonies I view as type of a show. I don't view anything real happening. (..) The problem is that testimonials are canalized and the interaction is so short. You have five minutes. It's mostly sort of a debate. It's not where people's views are significantly persuaded. Most people go into the hearing and go out of the hearing thinking the same thing"

To be invited to testify signals the recognition of a scholar's expertise on a certain issue: "I don't think it is just the book that leads to the testimony. (..) I think that the fact is that a number of our scholars at Brookings are well known for their expertise" (I. Sawhill) But this reputation is also bound to who is in power at the White House. Brookings ranked for many years as the think tank with most testimonies until Republicans took over power in Congress in 1995. From then on, Congress relied more on conservative think tanks and the Heritage Foundation managed to have more testimonies than Brookings (Rich, 2004).

Challenges & Practices of Testimonies:
– Condensation & prioritization
– Imagine addressee as intelligent layperson not expert
– Talk (not read) in plain English

For experts, a major challenges in hearings is to break down the whole complexity of an issue in a five minutes talk, of which they would like congressmen to remember one or two points:

"If you have five minutes, you have to make key points. You have to figure out, what is your main message you want to get across? (..) You just try to convey three core things and hope they would remember one of them. And then the written testimony gives more of the background." (K. Weaver)

A major challenge in testimonies is therefore to engage in a good prioritization and condensation of the message. A guideline for this work of prioritization seems to be to cross out background information and come straight to the facts, problems, and solutions. Whether such an approach is favourable for the transformation of the piece of information to knowledge (contextual information is key in this process, see: practices on message dimension) is questionable. Another

guideline for testimonials is to perceive and imagine the addressee not as an expert, but as an intelligent layperson: "I imagine saying that to a person who is intelligent but who is not trained in economics. What is the hindsight that I have to offer in plain English?" Another simple suggestion one of Brookings' scholars mentions is also related to language: "I find it most helpful to talk rather than to read testimonies. Reading out loud testimonies is boring as hell" (W. Gale).

Example 2 of a Face-to-Face Communication: Events (on Capitol Hill)

Functions:
– Directly access policy makers to gain impact
– Allow policy makers more convenient access
– Convene opposing parties and engage them in dialogue

Practices:
– Team up with other policy organizations
– Involve policy makers in events to gain visibility and make them engage in Brookings' ideas

To strengthen direct access to policy makers at Congress, Brookings started to organize events on Capital Hill. For the Restoring Fiscal Sanity project, for example, Brookings' scholars organized five events on Capitol Hill. One reason for organizing events as close to the Congressmen as possible is that, in view of Congressmen's ever tighter time-constraints, they must be able to access Brookings' expertise very conveniently and without a lot of time requirements:

"What we will be doing more of is organizing events up at Congress, because the other thing that came out of the focus group is that they don't have any time to come off the hill. They don't only not have the time to read anything, they don't have the time to take the cab and come here" (R. Nesson).

For such events, Brookings teams up with other organizations like for example the Committee for Economic Development or the Heritage Foundation. On the one hand, the inclusion of other organizations with different ideological standpoints is important to give the event more credibility and also allows for attracting a broader audience:

"These collaborative efforts help to get more attention, to get more chance of influencing the debate, to reach a broader audience. (..) The way to get the word out is to combine forces because there is not a lot of disagreement outside the government that this (the federal budget deficit) is a major issue that needs to be addressed." (I. Sawhill)

For one of the events on Capitol Hill (regarding fiscal policy), Brookings invited Senators John McCain and Joseph Lieberman to speak and comment on a paper. To *include senators and policy makers* themselves is important to have a larger media attention, but also to make them directly engage in the concepts. Alice Rivlin explains:

"A standard format for Brookings is what we call a National Issues Forum. That means that there is a Brookings paper or book, then we invite several political people, from the administration or out of the Congress to comment on the book. And that gives them some exposure to the book, because they have to read it and comment on it. And it also gives

wider exposure to the concept itself. If you have an important member of Congress giving a speech, then C-Span or others will be willing to cover it."

This gives Brookings not only the possibility to be closer to the policy makers' way of reasoning, but also to gain insights and feedback on their own work.

– Time communication in relation to the calendar of the public policy process

Another more recent practice of Brookings' communication strategy is to time the release of a book or report (and all the communicative events that go along with it) more closely with the policy calendar. An example of this is the communication of the Restoring Fiscal Sanity project which resulted in two books, and various events that accompanied the release of these books. The responsible for the project decided to publish the first book and organize the accompanying, publicizing events just ahead President Bushes State of the Union speech and the publication of the budget of the fiscal year 2005. With a "publicity blitz" including luncheons on Capitol Hill, testimonies in front of Congress, reports, interviews, etc., just ahead an important political event, Brookings aimed to more actively have an influence on the political discourse (Brookings Institution, 2004). In many instances, a close coordination of Brookings' communication with the political agenda and in this sense also the timeliness of its communication are crucial in order to augment the possibility to influence the policy making processes.

– Scale information within one and across various media
- Within one media: provide information in different levels of detail and offer several summaries varying in size
- Across media: use oral media to give overview, books to inform in-

Throughout the variety of its products, Brookings adheres to the idea to present information in a scalable manner. 'Information scaling' designates the idea that a piece of information, e.g. a conducted research and its results, is presented in a variety of lengths and media formats. The content is scaled in its length so that according to the specific needs of the audience, a different version can be chosen.

" The logic is, policy makers don't read 500 page books, I like to write 500 pages books. So we can still write the 500 pages books but we write the conclusions of those in a format that is more accessible to them. So there is the 8 page version, the 30 page version and the 500 page version. So you hope that the policy maker, or more likely the congressional staff members, read the 8 page version of a policy brief and go from there to more depth." (K. Weaver)

"We did fairly recently a survey asking congressional staff and serious reporters (..) on the form they would like to have our findings. (..) What is the ideal length of a Brookings' publication that they could really use? Some said one page, some said two paragraphs, and

depth

some said bullet points. (..) So we (..) will probably (..) keep the policy briefs (..), but we will have a one page summary of that, a two paragraph summary, and a bullet point summary" (R. Nesson).

Depending on the interests of the user, he/she can choose the degree of detail, in which he/she wants to be informed. In this way, the busy congressmen takes the brief version that only outlines the conclusions and propositions, while the member of the congressional staff can look – in the longer version – at the numbers and facts that lead to the conclusions.

In this way, Brookings scales its information both within one media and across medias. On the one hand, a lengthy report will have a variety of summaries and the addressee can choose how detailed he/she would like to be informed. On the other hand, a one hour Public Briefing can give a general outlook of a problem and serve as a "summary" of a lengthy book. In addition, the same information can be consumed also by reading a policy brief that will present the information with moderate details.

Apply & Implement Insights & Solutions Characteristics:

With all the various formats that Brookings employs to communicate its expertise, research insights and recommendations, it "seeks to improve the quality of U.S. public policies" (Brookings Institution, 2005a) and to have some sort of impact on the policy world. In the following, we consider the communication of when Brookings' expertise is applied in the policy making process (see Figure 8).
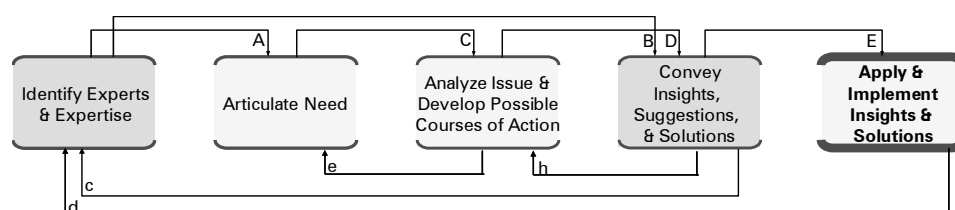
Figure 8: The 'Apply & Implement Insights, & Solutions'-phase

– Think tanks' impact is difficult to measure

It is difficult to measure the impact of think tanks (Stone, 2000; Weaver & Stares, 2001) and assess, which of the promoted ideas have had what type of impact. Policy choices are made in rather fluid processes and issues gain and loose the attention of policy makers. Also, the experts' ideas, insights and recommendations can influence the policymaking process on various levels and moments. One advice is never sufficient to make a specific policy choice and a

policy proposal is certain to change within the policy making process. Finally, the influence takes place through multiple means (direct communication to politicians, indirect access through media) (Weaver & Stares, 2001: 25) and one communication can elicit others and develop an interwoven network of communications, which is why it is difficult to determine clear causalities. For all these reasons it is particularly hard to clearly measure the impact of think tanks.

– Classical impact indicators: media visibility, testimonies at congressional hearings

Given these difficulties, the two classical ways to measure the impact of think tanks are to look at their *media visibility* (number of media citations in major U.S. newspapers) and at the *number of testimonies at congressional hearings*, as also Isabel Sawhill's statement illustrates:

"It is very difficult to measure (..) how much impact this particular study had in the policy making process. Last year, when we put out our first book it got quite a good attention. There were, I think, 12 major newspapers that mentioned the book by name. Many more editorials and articles talked about the substance of the book without citing it out right. We did many interviews with the press and with the media more generally. We had opportunities to testify before Congress and to meet with policy makers" (I. Sawhill)

As far as media visibility is concerned, among all the think tanks in the U.S., the Brookings Institution is traditionally the most cited one by all U.S. newspapers, except for the clearly conservative Washington Times, where it is the fifth most cited (Rich & Weaver, 2000). As already mentioned, with regard to testimonies in front of Congress, Brookings is leading off the ranking as well together with the Heritage Foundation (Brookings Institution, 2005a; Heritage Foundation, 2005). Both media visibility and number of testimonies are indicators for the access of the organization to policy makers and to the general public, but are not fully reliable indicators on how much impact the knowledge communication of the think tank had on the policy process. (Abelson & Lindquist, 2000)

– Diffuse impact: shape the intellectual environment and context of discussions

It is very seldom that that an idea or insight promoted by scholars of a think tank has a direct and tangible impact on the writing of a new legislation, on a funding decision, or a similar policy decision. Usually, an idea, insight, or proposal shapes the policy making process in a much more diffuse way. On the long run it can, for example, influence the perception and mental model of the policy maker, shift the attention to another aspect of an issue, redefine implicit priorities, reframe the discussion, activate informal networks and friendships across partisan borders, and many other fuzzy impacts more. In this rather diffuse way,

the published written materials and oral communications influence the intellectual environment, in which the media, the policy community and policy makers are operating, as exemplifies Peter Orszag:

"About two or three years ago, the administration started to heavily make the argument that the budget deficit would have no influence on the interest rates (..). That started to pervade the policy community and the press and they said things like the literature suggests that there is no evidence that ..; which is not really true. So we did this paper, which actually documented what the literature showed. (..) And gradually it did flip the conventional wisdom in town back to where it had been. (..) I think the paper changed the context in which discussions were held" (P. Orszag).

– Advancement of broad ideas: example of de-regulation

Another type of impact a think tank can have is to *promote a broad idea* by working it out in various sectors. One of Brookings most influential ideas is the one of deregulation promoted in the 1970s. Brookings' scholars showed in various studies that deregulation would be the preferable choice for a variety of industries. Brookings became the intellectual reference for the idea of deregulation as states Charles Schultze: "When Carter came in, airline was first, because this was what Kennedy worked on. The next step was trucking. (..) The idea became so popular that Congress went beyond what we had ever intended. So it was a concatenation of various events". Schultze adds that it is a very rare case that a think tank can so prominently propagate an idea: "Opposed to the deregulation where it all of a sudden clicked through, very often you won't quite see the impact"

– Direct impact on legislation: a rare occasion

In very rare cases though, the *impact of Brookings' activity is directly visible* and the recommendations and provided expertise have a direct impact on the writing of a new legislation.

"Isabel Sawhill came up with this idea of a partially refundable child tax credit. We publicized the idea in the form of a policy brief. But I guess the key thing was that we had a lunch on Capitol Hill with the senators' staffers. About 15 staffers came, including some key staffers of some moderate Republicans came who were looking for something that would make the bill less aggressive. They essentially took this proposal, put it in the bill and it became law in about a month and a half. That is really unusual" (K. Weaver).

Discussion of the Process Model

Describing the process and means through which Brookings communicates its expertise to decision makers, we have seen that the process model of knowledge communication can provide a useful structure to the presentation of the process. However, several reservations have to be made. First, we have seen that

in the case of Brookings - an independent think tank that aims to *push* its insights and policy recommendations into the policy process - the phase of need articulation (on behalf of the decision maker) and the communication during the analysis phase do not really correspond to the way Brookings interacts with the policy makers at the Capitol Hill. Also the 'apply & implement insights & solutions'-phase is of minor importance in the case of Brookings.
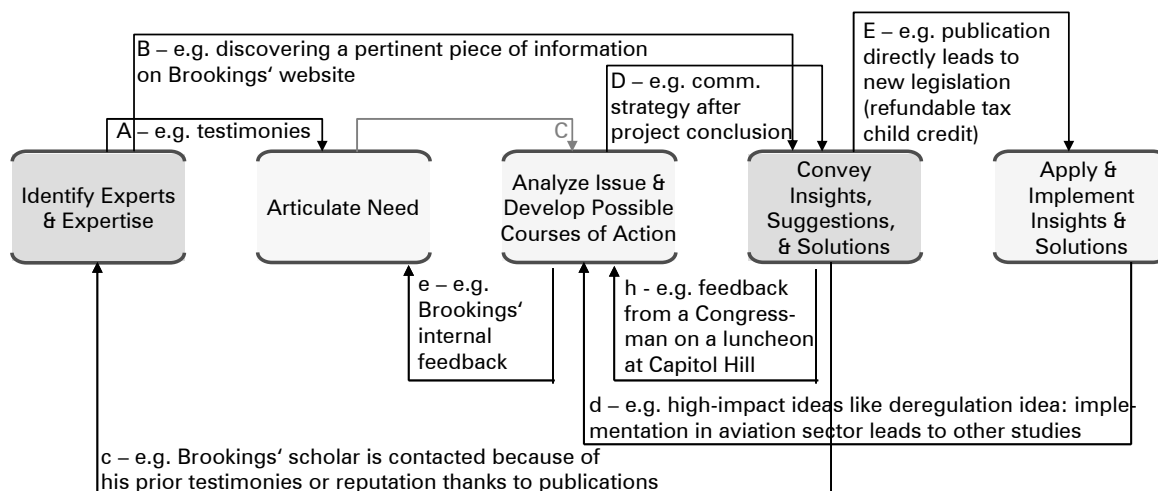
Figure 9: Single Instances of Feed-Forward and Feedback Loops within the Interaction between Brookings and the Policy Makers

With regard to the feed-forward and feedback loops we have presented in the knowledge communication model (Chapter 2), the case of Brookings does not allow us to identify very "thick" or institutionalized arrows. Yet, we have discussed instances where feed-forward and feedback arrows are of importance. Figure 9 gives an overview on these. We have mentioned, for example, that it is seldom that policy makers do a clear formulation of what expertise they need from policy makers and that there is a clear feed-forward (arrow "A") between the Identification and the Articulation phase. We have also discussed the rather intensive communication process that comes into place when the scholars have finished a project (arrow 'D'). Another feedback loop we mentioned is the one between the Implementation and the Analysis phases (arrow 'd'): For certain high impact ideas, like the deregulation idea, Brookings became very famous for its insights. Once this endeavor was started in the aviation sector, Brookings did studies on deregulation for other sectors, such as the truck industry or electricity.

Rather than observing clear arrows leading from one phase to another, we

have seen that the connections are not so clear and that the arrows remain vague. This is the case because Brookings' expertise has to "compete" within a whole market of expertise. Weaver and Stares (Weaver & Stares, 2001: 24), by referring to Kingdon, describe this process to be much closer to March's "garbage-can" idea of decision making: Problems, policies, and politics form more or less independent streams and policy expertise in the shape of information can linger along for quite a while until it is attached to a focal problem and used as a motivation or solution for a particular problem (Kingdon, 1995: 165).

Figure 10 gives an overview on the major practices along the knowledge communication process between Brookings' experts and the policy makers.

General Practices for Identifying Experts & Expertise
- Manage a well functioning social network: geographical proximity & prior expertise in government
- Use reputation of experts
- Propose multiple means to identify relevant experts: Media Guide & Internet
- Include cross-referencing to widen variety of access paths to information
- Set up a communications office as a broker and mediator
- Augment convenience of access by reducing required time investment (by organizing events at Capitol Hill, and by providing own TV studio)

General Practices for Conveying Insights, Suggestions, & Solutions:
- Use various communication formats strategically along their functions:
  - written communication: books to conceptualize issues, to nurture academic credentials, and keep ideas alive; short & quickly released formats (policy briefs, etc.) to provide concrete and timely policy recommendations
  - face-to-face communication: events to gain attention for issue, provide overview, nurture dialogue in-between partisan borders
  - Internet: reach broader audience, provide more convenient access to more up-to-date information, enable direct contact & interactivity
- Time communication in relation to the calendar of the public policy process
- Scale information within one and across various media:
  - within one media: provide information in different levels of detail, do several summaries varying in size
  - across media: use oral media to give overview, books to inform in-depth

Specific Practices for Written Material:
- Distribute products online to reach a broader audience, to allow policy makers pull the information in the moment of interest, and to provide more interactivity
- Install formal and informal processes for quality assurance
- Loosely adhere to standard structure and format of single products

Specific Practices for Events & Face-to-Face Communications:
- Team up with other think thanks and organizations to expand reach and attention and to manifest non-partisanship
- Involve policy makers in events to gain visibility and make them engage in Brookings' ideas

Figure 10: **Summary of the Practices along the Knowledge Communication Process between Brookings and the Policy Makers**

Phase Un-specific Challenges (& Practices) in the Knowledge Communication

Challenges & Practices Bound to the Communicated Message

Challenges:

– Difficulty to adapt language and to avoid technical, domain specific language

There are a set of the communicative challenges and some practices, which are not specific to one phase of the knowledge-intensive interaction between experts and decision makers, but which span several of these and deal with more micro issues of the communication. In the following, we will present these challenges through the framework for managing knowledge conversations, presented in Chapter 2. The framework shows five dimensions: 1. the message, 2. the process, 3. the group dynamics, 4. the mental models, and the 5. outer context.

A set of general problems in the knowledge-intensive communication between Brookings' experts and the policy makers at Congress are bound to the presentation of the message. Brookings' scholars have also reported some practices in order to better tackle with these challenges.

First, a major challenge for the expert is to *adapt his/her language* to the one of the policy maker. On the surface, this problem is about vocabulary, genre and ways of talking. For example, certain concepts that are very common to Brookings' experts like "cross-elasticity of demand", "multiplier effect", or "present value" are difficult to understand for policy makers. If Brookings' experts use such terms, the policy makers will concentrate on these and will divert their attention from the central issue.

The language difference cannot be grasped fully by the different use of semantics. Language functions as a proxy for a whole set of differences that exist between Brookings' experts and the policy makers at Congress and which are related to the differences in their knowledge, experiences, and perspectives. In other words, differences in perspectives on the mental model dimension are expressed by different language use, which shows an interrelationship between the message and the mental model dimension of the framework. Peter Orszag exemplifies this connection:

"The language difference is often a proxy for a different set of experiences and backgrounds. You have members of Congress who have been running for Congress for 15 or 20 years and are used to a variety of activities that are not fundamentally based on economic research. (..) Economists talk in one type of way and, policy makers talk in a different way. Economists are almost naturally inclined to thinking: 'all else being equal, the partial equation of changing this is changing that'. Members of Congress often are not thinking in that way. They see two things happening at the same time so they must be casually related. It's much less theoretical. (..) There are often different languages involved. (..) The language difference is a proxy of a whole lot of other differences. Background and training really;

and that manifests itself in language" (P. Orszag)

Since the policy maker does not have the time nor interest to learn the language of the expert and appropriate the knowledge that goes with it, it is a main task of Brookings' experts to know the ways of thinking of the policy makers and to be able to adapt their language and ways of expression.

– Difficulty to present complex issues in very concise and simple formats

Another challenge related to the communicated message is it for Brookings' scholars to synthesize their vast knowledge into very short communications. In view of the ever growing time pressure and the changed values and preferences of the media (linkage with outer context: Ever tighter time constraints lead to a request for extreme conciseness), this capability is central both for written and also for oral communications (earlier, we have discussed the necessity of shorter communication formats such as policy briefs, testimonies in congressional hearings, or Brookings' scaling strategy). Another situation, in which it is essential that Brookings' scholars know how to synthesize and simplify a message is during interviews and the participation at TV shows. Charles Schultze notes:

> "Every month, I do a business, stock market TV show (..) it's the nightly business report on the public TV channel, it goes on for years and has a pretty wide audience. I only have one minute and a half to get something across. If it is a subject I know, I can write what I have to write in half an hour. But it always comes out 2 to 3 times too long and then I spend hours to get it shorter" (C. Schultze).

It seems that even if the expert is very familiar with the topic, it is a particular challenge to outline a complex train of thought in a very concise manner.

Practices:
– Deemphasize academic terms and technical details

Brookings' experts must translate findings written in a scientific language to a language that is accessible to policy makers. "When I am talking to an academic I am wearing a different hat than when I am taking to a policy maker. It happens subconsciously, you kind of switch mode" (P. Gale). One practice in doing so is to de-emphasize scientific terms.

> "If you start: 'The present value of the social security deficit is 4 trillion dollars', they ask what you intend with present value, and you go and say that it is the amount today that with interest will equal.. and it just puts them off. I will say 'present value', (..) to make sure it is accurate, but I kind of put it at the end so that (..) so it does not block the listeners mind. I would say: 'Over the next 75 years the social security deficit is 4 trillion dollars in present value'" (W. Gale).

In this way, Brookings' scholars aim to get rid of a too technical language and of technical details as explains William Gale: "It's about conveying the important insights from economics in non-technical terms. (..) You don't need to understand the formal calculations to understand" (W. Gale).

– Reduce a text to its pure logical flow of argumentation

One practice in order to turn a written or oral text concise, yet complete, is to *outline its pure argumentative structure*. For the sender, it forces him/her to verify whether his/her argumentation is logical and meaningful, whether it misses something, includes superfluous elements, or combines inconsistent categories. On the other hand, to communicate the logical skeleton upfront the actual article or speech gives the receiver a very synthetic overview on the argument, helps to orient him-/herself, to know how a single piece of information relates to the others, and permits not to loose the big picture of a whole argument. Charles Schultze exemplifies:

"I remember President Linden Johnson, apparently, when he was in the Senate had got news to have getting information presented to him in an outlined form, not paragraph after paragraph (..): Roman I, Roman I.I.a. And President Kennedy's Chairman of the Economic Advisors (..) later became Johnson's advisor and he soon discovered this. (..) It's really useful because you can see the logical structure with the outline. To a busy politician, just looking at a dense paragraph of text, it puts him off, but if he can see the structure, that helps very much" (C. Schultze)

– Contextualize information through the use of analogies and metaphors

There is a final practice on the message level, into which Brookings engages: *contextualization through the use of metaphors[2]*: By looking at Brookings' products, what is quite striking is the extensive use of metaphors and analogies. This is already noticeable in the titles such as "Sisyphus Revisited" (Closa, 2005), "Leaving Money (and Food) on the Table" (Fellowes & Berube, 2005), or "A Guns and Caviar Approach" (Gale & Orszag, 2002). In this latter example, in order to make a point on President Bushes politics of war spending and simultaneous tax cuts for high income-households, the authors call it "guns and caviar" approach and compares it to President Johnson's "guns and butter" politics of the 1960s (when Johnson expanded war and domestic spending at the same time). In this way, Brookings' scholars often use analogies or metaphors to con-

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2 Stone (2005) also points to the role of metaphors in the communication of think tanks. She claims that the metaphors are instrumental in turning abstract ideas usable for political usage as they help to simplify debates. She refers to the often used war, faith, and market metaphors, which often represent means to create allies and enemies and to win acceptance for a cause by either praising it or vilifying alternatives.

vey the main idea of their reasoning and to anchor the idea with a commonly known situation or fact. William Gale outlines how he would communicate his idea of a pension system, in which people can opt out of pre-fabricated packages rather than needing to make the packages themselves:

> "The tag line would be, you don't have to be a mechanic in order to drive your car, you don't need to be a PhD in economics in order to get most out of your formal case system. (..) "It is important to use analogies, anchoring techniques, examples, sometimes even a story to illustrate a good point" (W. Gale).

Gale gives another illustration of how he uses analogies. To illustrate the idea of alternative budget projections that subtract various retirement funds from the current CBO (Congressional Budget Office) baseline, he often uses the analogy of the firm:

> "I would tell Congressmen: 'A firm that was running a current deficit, but that has a surplus in the pension fund, you would not take the pension fund and use it for the operating business.' Congressmen, they get that and that adjustment makes sense to them" (W. Gale).

The practice to use known analogies and examples in order to favor the sense-making process of the policy maker, brings advantages also in terms of media awareness. If we look at the media clipping in the major U.S. newspapers. In the New York Times, Brookings' scholar Peter Orszag is quoted with: "It's not a nest egg. It's a loan" (Krugman, 2005). In the Washington Times, a debate between the same scholar Peter Orszag and Robert Pozen is quoted as follows: "The accounts are not sugar; they're like trying to get your kid to eat the spinach by offering a turnip for dessert" (a response of Peter Orszag during a congressional hearing to Robert Pozen's testimony, in which the latter claimed that "the personal accounts Bush advocates are the 'desserts' and that Social Security's solvency is 'the spinach'", see: Milbank, 2005).

Challenge Bound to the Group Dynamics and the Socio-Emotional Aspects between Experts & Decision

On the level of the process, we have not identified any phase independent challenge or practices, which is why we directly discuss a challenges related to the group dynamics that become installed between experts and decision makers.

For Brookings' experts, it is sometimes difficult if a decision maker *him-/herself feels knowledgeable about a certain issue*. Even if Brookings is one of the most renowned think tanks in the United States, expert status can never be taken for granted, especially in fields like economics or political science as outlines

Makers

– Policy maker feels knowledgeable him-/herself and expert has to convince him of his expertise

Charles Schultze:

"Virtually every major politician figures that I am as good as this guy in what is going to happen in the economy. (..) Whereas when they deal with a physicist, even if he is not able to effectively communicate and sell his insights to a policy arena, everybody agrees he is a real expert and knows something I don't."

This challenge of conveying not only the expertise, but at the same time also the expert status is less pressing if Brookings' experts deal with issues that are more technical and less ideological like the example for cost estimates for medical care: "Here, you can get by on prior expertise. So even then, your estimates may not be expected, but the policy makers do not think that they know how to do it themselves and so they can't really judge on that" (C. Schultze). For this reason, in order to convince politicians how much expertise sticks within a certain recommendation, the expert has to show the effort in terms of research it contains and show also certain technical aspects:

"For example, all the consequences of President Bushes policies on national saving and investment in the social security area, this is something you can't pass by with being an expert on that, you got to convince people. It is not: he is an expert, he knows it. Whereas if I can say I have a team of 3 statisticians at disposition, and after two months of efforts and use of a large computer model, we come out with these numbers, we don't say whether it's good or bad, you will be treated as an expert, even though, at the end, they will still ignore your advice. But you carry some cache" (C. Schultze).

Challenges and Practice Bound to the Mental Models of Experts and Decision Makers:

– Policy maker's perspective differs from the one of the expert:

- Experts' insights appear counterintuitive

On the level of the mental models, another set of hurdles for the knowledge communication between experts and decision makers can be identified.

First, policy makers often look at an issue from a *very different perspective* than the experts, which is why the experts' findings can be quite counterintuitive to the policy makers. William Gale exemplifies such a case:

"There is an issue whether taxes that are not border adjustable affect the competitiveness of domestic firms. A value added tax is refundable at the border. The U.S. does not have a value added tax and there is a debate whether the U.S. should have one that is refundable at the border. The view that business people use is that this would make them more competitive. From an economist's point of view, we would say, no, it would not, because of the exchange rate. It would actually lead to 0 more competitiveness. (..) This finding is counterintuitive, it involves a thinking that is not related to their [the policy makers] daily business and their daily horizon."

In this way, it is often harder for Brookings' experts to convey their insights

if the policy makers already have some knowledge and opinions on the issue. In this case, not only do they have to expose a complex argument, but they also have to convince policy makers why their current belief is not forcibly valid. In part, this challenge is related to the prior knowledge of the policy makers, but it is also related to the way, how both policy makers and experts frame an issue.

"I always get people shaking their heads because they are refusing to believe it. It is a hard thing. It involves exchange rate adjustments and I think that business people are used to think of their world in their way and they tend to miss out the macro-economic consequences" (W. Gale).

- systemic thinking and multiple inter-relationships vs. bi-polar go/no-go thinking without allowing uncertainty

Another challenge is bound to the fact that, in the political environment, clear positions and *yes-or-no answers* are often needed since decisions have to be taken, laws have to be passed and policies need to go into a clear direction. The policy makers are trained to think in this frame of *go versus no-go*. In addition, in a bi-partisan political system, debates on political issues are often led by two polar opinions as if a problem has only two possible solutions. An academic, instead, is trained thinking: "*it depends*" for that an issue is interwoven with multiple other variables, that there are important feedback loops in such a system, and so forth. He/she often has difficulties to break down the complexity of an issue and to convey it in simple terms. Charles Schultze gives an illustrative example to underline this point:

"It's particularly (difficult) if three or more things interact. You write in terms of, now what I am going to tell you is difficult to know, but for God's sake, it is not enough. Therefore, I am going to tell you this. But, by the way, this is only true if.. (..) I just recently remember trying to do some consulting for an investment bank. It had to do with the U.S. trade deficit and what to do about it. For an economist, what really drives the deficit is the national saving and investment. If you invest more than you save, you got to borrow abroad. If you save more than you invest, it's vice versa. However, it is also true, and that is driving the trade deficit in the long run, there are things happening in international trade itself which feed back to saving and investment. So the influences go both ways."

Given the complexity of issues and the experts' difficulty in meaningfully reducing this complexity, on the side of the policy makers, "there is a demand for clear-cutting answers where there really aren't any. That's hard" (P. Orszag).

The different orientations of policy makers and experts are beneficial both for the decision makers - their discourse gets nurtured by richer thinking and additional evidence, which leads to an opening-up of perspectives – as for ex-

perts – they risk less to fall into the "paralysis by analysis"-syndrome. Yet, one problem of the go versus no-go thinking of policy makers is that there is not really a space for uncertainties and it is difficult for experts to communicate the degree of confidence they have in a certain recommendation or conclusion (yet, these would often be important indications as they show the decision makers the risk related to a certain decision). "You are doing a profession, your academic credentials are that if it is Y don't tell them X. If you realize in the paper that you are not a 100% sure, there are some possibilities that you be wrong, you don't tell them that, they will cease on it" (C. Schultze).

Practice:

– Put yourself in the perspective of the audience and imagine them to be intelligent lay-people

One practice of Brookings' experts is that they try to imagine the perspective of the policy makers, to envision their needs, constraints, ways of reasoning, etc. Charles Schultze explains: "It's an art, but if you can put yourself into somebody's mind who is listening… (..) Figure out why this is difficult for people to get and write to that. (..) Time and again, I think I can explain something better I had struggled with than something that is obvious. (..) In these cases, I can figure out with what somebody else will be struggling with as well" (C. Schultze). To do so, the scholars imagine their audience to be intelligent people, but that are usually not used to thinking the way the expert does. It is easier for the expert to put him-/herself in the perspective of someone else, if he/she has lived a reality similar to the one of the policy maker. This practice shows another instance of how the mental model dimension is connected to the message dimension, in so far as only by being able to imagine the mindset of the policy makers, the expert can effectively reduce the complexity of the message and de-emphasize scientific terms. It also shows an interconnection with the outer context dimension. If the expert, in the past, has taken over the role of the policy maker, he can more easily imagine their way of thinking. "I don't know if it's necessary to spend so much time in government, but it certainly increases your understanding of how to communicate" (A. Rivlin).

Challenges and Practice Bound to the (Political) Outer Context:

Finally, some of the challenges of the knowledge communication between Brookings and the policy makers are bound to larger *context*ual factors, in which the communication takes place.

A general, but very important challenge for Brookings is how to deal with the ever *tighter time constraints* with which the policy makers are faced. Earlier

– Ever tighter
time con-
straints

on, we have discussed various implications of this development. On the level of
the message, for example, we have discussed the growing need to present com-
plex issues in a very concise and simplified manner, be that in written communi-
cations (e.g. scaling strategy, move from extensive formats like books to short
articles like policy briefs) or during oral presentations (such in the realm of tes-
timonies or the participation at TV shows). "Often, it's the problem that under-
lying research is more complicated than policy makers have time for. The cave-
ats get lost" (P. Orszag).

– Issue touches
power struc-
tures

Another limitation in the possibility to successfully integrate Brookings' ex-
pertise in the policy making process is given when existing *power structures are
touched* or questioned by the topic at issue. Such issues often regard formula
fights as Kent Weaver explains:

"One of my policy briefs was on the distribution formula for grants that states use for low-
income families. It's based on how much the states would have spent historically: if they
have spent less, they would get less. It is just grotesquely unfair. It is a formula that was
inherited from the previous Aid to Families with Dependent Children program, and the
formula made sense under the old program. But with my proposed changes, it would have
meant that money would have taken away from some states. And Congress hates these
types of issues. They are called formula fights. They are divisive because some people win,
some people loose, zero sum battles in which Congress does not like to be involved in. I
thought, this was so grotesquely unfair that it would be relatively easy to get Congress to
fix it, but it turned out to go nowhere. They did not want to face it. It divides Republicans
internally. It's not something the majority party can agree on. The status quo wins in such
type of situations. Issues that divide parties are difficult, where power is at stake" (K.
Weaver).

In a situation, where the issue touches power structures and where no con-
sensus within the party exists so that policy makers pursue their own interests, it
is particularly difficult for an expert to introduce his or her expertise in the po-
litical debate.

– Discourse on
an issue is very
value-laden

There are political issues that are discussed mainly on a *moral level* and that
traditionally *divide parties*. Examples of such value-laden debates are the legisla-
tion on stem cell research, on abortion, or U.S. military interventions abroad.
The more important moral values and ideology become in a political decision
and the more partisan the discussion, the more difficult it is for Brookings' ex-

perts to nurture the political discourse with their expertise and knowledge.

> "If the conclusions happen to be very ideological or if they have a big impact on people's ideology, your expertise may not carry very far. (..) Sometimes, these conclusions go against the deeply anchored beliefs of policy makers, which have nothing to do with science, like in the business of creationism. There are people with very firmly held ideas that you can't shake. (..) The influence of the religious right makes that these people feel absolutely self confident. When I talk in front of Congress, I always have this 10% of worry inside me that this is something I am not a 100% sure of it. Partly because economics as a profession (..) you can be less certain. It's a lot easier to have an informative debate and discussion with people who are ideologically not strongly belief driven" (C. Schultze).

The growing tendency to lead political discussions on a moral level and "the fact that politics has become much more polarized in the last years, made it more difficult to be the neutral expert speaking truth to power" (K. Weaver). In such a situation, it is difficult to introduce expertise and factual arguments in the political discourse.

– Policy makers have already made commitments

Another contextual aspect, which impacts on the policy makers' possibility to integrate the expertise provided by Brookings' experts is the fact whether policy makers *have already made commitments* and/or have clearly exposed their opinion on an issue. In such situations, face-saving behavior and integrity is often deemed more important by the decision maker than accuracy of the decision. Kent Weaver gives an illustrative example:

> " One of the things I said when I testified (..) was that you cannot strengthen social security without an increase in the payroll tax (..). But the President had given a very clear direction to the Commission that it was not to consider a payroll tax increase. They completely agreed with me, you cannot do this. But they were given the mandate that the payroll tax was not to increase, period. So the commitment was so strong that no information saying how stupid it was to do what they were going to do, would convince them not to do it" (K. Weaver)

Similarly, if the policy makers have already exposed their views on an issue and fear to loose their face if they accept an opposite recommendation of an expert, it is very difficult to bring in expertise into a policy making process: "If, as a consequence of your estimates, it makes a policy look stupid, which someone is pushing, they might agree, but they (..) won't start arguing. (..) They would try to find another expert who gives them another answer" (C. Schultze).

– Policy proposals are washed out within the policy making process

Another contextual aspect to consider when communicating expertise to policy makers is that, in the policy making process, original proposals are changed and often *washed out*. The expert knowing that his/her original recommendation will be changed during the process, might decide to adapt his/her communication strategy:

"If you start your argument with your best proposal, you have no argument to retreat. Intellectually and morally, this is very hard for an academic. You are supposed to show all the consequences. You don't deliberately change the figures, but the assumptions you may have chosen are not your best. (..) Often, a big part of it is not revealing your uncertainties" (C.Schultze).

So rather than outlining the best estimate or the best solution up front, the expert who is aware of the bargaining mechanisms that are involved in the policy making process, might decide not to present all the potential weaknesses and uncertainties related to the solution he proposes or to unveil his/her best recommendation only later on in the process. Although this problem is more pressing if the expert is working within the administration and not for an independent think tank, it nevertheless represents a difficulty for experts in the political arena.

– Competitive environment with many partisan and non academic think tanks competing

Another challenge given by the context in which Brookings is operating is the ever *stronger competition* from partisan, non-academic think tanks. In such an environment, the challenge is to gain the attention from the media and the policy makers and to be regarded as a neutral expert. Kent Weaver explains: "The world of think tanks has become much more competitive. 40 years ago, there were two think tanks, Brookings and the American Enterprise Institute. Now there are a hundred of think tanks in Washington and thousands of interest groups" (K. Weaver). These think tanks do not form a homogenous category, but differ considerably: some are specialized in a few specific policy domains and some are more advocacy than research oriented and aim to promote a particular agenda (Weaver, 1989). Politicians, on the other hand, are not always aware of these distinctions and therefore do not automatically relate the term "think tank" to organizations which give trustful advise. For this reason, it is harder for Brookings to be perceived as a non-partisan group of experts, even more so as the institution is often considered to be democratic. Therefore, the challenge is how to adapt to the successful communication strategy set by more advocacy oriented think tanks while maintaining its academic credentials. "The Heritage

Foundation really emphasized the means with which we communicate. Things are much more short term and are much more accessible" (K. Weaver). The media with its values have a preference for the shorter, quicker, and event-based communications, which are characteristic of the communication of the Heritage Foundation. The challenge for Brookings therefore is to continuously adapt its communication to these changes, but maintain its high standards of quality within its publications and other forms of communications (R. Lawrence).

– Rapidly changing communication standards

A final challenge in the outer context of the knowledge communication between Brookings' experts and policy makers is given by professional values and *communication standards* of journalism: the consequences of such guidelines can restrain the successful communication of Brookings' expertise. An example of this is the media's value to always report in a balanced way. It can lead to a situation, in which an too much weight is given to marginal positions:

"Partly it is because reporters don't fully grasp the difference between, hard-core research and sort of repackaging. We see this in lots of different debates, be that climate change or whatever, you see that. You always have to say on the one hand and on the other in the media. So you get expert A and expert B. Often it is completely unbalanced. 99% of scientists agree with person A and then the other is sort of a freak or a joke and then that person is given almost equal billing because journalists are almost so worried about being balanced" (P. Orszag).

Practice:
– Employ scholars with prior experience in Government

An already mentioned and very important practice of Brookings, which contributes to a favorable context of the knowledge communication, is that most scholars who are employed at Brookings have prior experience in Government. Ron Nesson explains that this practice not only guarantees a better access to policy makers because the scholars know the policy makers personally from their prior work (see: Identify Experts and Expertise), but it is also important for that Brookings' scholars know the problems of the policy makers, can imagine their modes of reasoning, and therefore better address them in their writings and presentations (see: Challenges and Practice Bound to the Mental Models of Experts and Decision Makers). Finally, the adherences to various departments and administrations are important to mark the non-partisanship of Brookings.

"We got people from the current administration, we got people from the Clinton Administration, we've got people from papa Bush, Reagan, Jimmy Carter, John Ford, Richard Nixon, and, believe it or not, we have got a guy who was in the Truman administration" (R. Nesson).

After having described the communication process by which Brookings' experts aim to propose their policy recommendations and expertise to policy makers, we have outlined a variety of (phase-unspecific challenges and some practices, which generally characterize the knowledge-intensive communication between the two. To provide more structure in this last discussion, we have categorized the challenges and practices according to the five dimensions of the framework for leading knowledge-intensive conversations (presented in Chapter 2). Figure 11 gives an overview on these phase-independent challenges and practices. Repeatedly, we gave examples of how the different dimensions are interrelated with each other. For instance, we have shown that the challenge to adapt to the policy makers' language (message dimension) is related to the differences in perspectives and background knowledge of experts and policy makers, an aspect we have attributed to the mental model-dimension. In this context, we have also shown the positive connection between the practice of employing scholars with prior Government experience (outer context) and the differences in mental models. Another example is the repercussions of the growing time pressure (on the level of the outer context) on the urge for conciseness on the message dimension.

Challenges

Practices

Message

- Difficulty to adapt language and to avoid technical, domain specific language
- Difficulty to present complex issues in very concise and simple formats

- Deemphasize academic terms and technical details
- Reduce a text to its pure logical flow of argumentation
- Contextualize information through the use of analogies and metaphors

Process

Group Dynamics

- Policy maker feels knowledgeable him-/herself and expert has to convince him of his expertise

Mental Models

- Policy maker's perspective differs from the one of the expert
  - experts' insights appear counter-intuitive
  - systemic thinking and multiple inter-relationships vs. bi-polar go/no-go thinking without allowing uncertainty

- Put yourself in the perspective of the audience and imagine them to be intelligent laypeople

Outer Context

- Ever tighter time constraints
- Issue touches power structures
- Discourse on an issue is very value-laden
- Policy makers have already made commitments
- Policy proposals are washed out within the policy making process
- Competitive environment with many partisan and non academic think tanks competing
- Rapidly changing communication standards

- Employ scholars with prior experience in Government

Figure 11: Phase Independent Challenges (and Practices) of the Knowledge Communication between Brookings' Experts and the Policy Makers

Conclusion   We have presented a large set of communicative challenges and practices that define the knowledge-intensive interaction between Brookings' scholars and the policy makers at Congress. Within the variety or richness of these characterizations, the reader might have lost the sense for which practices are most central for Brookings' endeavors in conveying their knowledge to policy makers. To conclude, we would like to synthesize the outlined variety by presenting five generic practices that best reflect the Brookings' way of communicating its knowledge to policy makers. These are: 'Active Cooperating', 'Information Scaling and Tuning', 'Validation: Affirming Quality and Credibility', 'Establishing Common Ground', and 'Balancing Out Dilemmas'.

Overall Practices:
1. Active Cooperating

Brookings does not perceive its communication with the policy makers and with the media as a unilateral process where the think tank simply intends to push ideas. On the contrary, Brookings strives for active cooperation and knowledge networking with the policy makers, with the media, with other think tanks, and with policy organizations.

First, active involvement of policy makers: When Brookings organizes events such as luncheons on Capitol Hill or briefings at the occasion of a book release, oftentimes, senators or other known politicians get actively involved in the event. Earlier on, we gave the example of an event regarding the Restoring Fiscal Sanity project where Brookings invited Senators John McCain and Joseph Lieberman to speak and comment on a paper. Such collaborations bring about various advantages at the same time. Senators enjoy a high visibility and by involving them in Brookings' events, the event itself will profit from a higher media visibility and reach a larger audience. Secondly, the fact that the senators comment on the book makes them engage with the subject quite intensively, which increases the probability that they will put forward some of the ideas in the Senate. By commenting, the senators also translate what was in the language of Brookings' experts into the language of the policy makers and therewith make the content more accessible to the policy world. Finally, Brookings receives valuable feedback from the policy makers and can probably improve the quality of its contribution and idea.

The second form of active cooperating is the involvement of other think tanks and policy organizations. Still in the aforementioned events at Capitol Hill, Brookings often teams up with other policy organizations. Brookings traces

various advantages from such collaborations. On the one hand, the event is pub-licized among the communities of all the involved institutions and this permits a higher visibility, also across partisan boarders. In addition, media will be more attentive to such a joint and therefore bigger event, as Isabel Sawhill outlines: "The reason for these collaborative efforts is to get more attention, to get more chance of influencing the debate. To reach a broader audience" (I. Sawhill). Secondly, such collaboration also increases the perceived quality and the credi-bility of the event. If Brookings would organize it on its own, many people and organizations would have a certain suspicion that Brookings simply aims to promote democratic values. Thanks to the collaboration with other organiza-tions, Brookings strongly affirms the non-partisanship of the event and many politicians will listen more carefully and get themselves into the thought without a priori shutting themselves off partisan borders. A final minor point is that by doing collaborations with other policy organizations, Brookings can also share its economic expenses for the event. Yet, the main motives for such collabora-tions are to gain a broader attention and a higher credibility. Such collabora-tions work primarily when the topic is considered by all organizations to be highly important and the commitment and action of the policy makers is deemed to be necessary.

> "The political system is not taking action on this front right now (on fiscal sanity). They are bitterly divided, and so outside of government, research organizations and think tanks are eager to make the people and the opinion leaders aware of the problem. The way to get the word out is to combine forces because there is not a lot of disagreement outside the government that this is a major issue that needs to be addressed. (..) So it's to bring com-bined influence on the public and the elected officials. It is persuasion by education" (I. Sawhill).

Brookings does not only collaborate with other organizations for the or-ganization of events, there are also initiatives of joint projects like, for example, the "AEI-Brookings Project on the Independent Counsel Statute Yet", a collabo-ration with the American Enterprise Institute, or the maintenance of the Urban-Brookings Tax Policy Center, A joint venture of the Urban Institute and the Brookings Institution (Tax Policy Center, 2005).

Finally, Brookings pairs up also with Media Partners. Earlier on, we gave the example of a collaboration with the Washington Post, that hosts and ar-chives all the Internet chats that take place between a Brookings' scholar and the general public regarding a specific topic. The advantage for Brookings is again

to enlarge its typical audience and to gain the readers of the online version of the Washington Post. In addition, Brookings may also profit from the Washington Post's promotion activities of their chat service. In this case, they might also benefit from the technological skills that are necessary for such a service.

In sum, we can say that Brookings actively collaborates with policy makers, other policy organizations, and media partners. By doing so, the Institution profits from a variety of advantages such as gaining a larger audience and more credibility, improving the products' quality, translating findings into the language of the policy maker, and profiting from (technical) skills and financial resources. On a long run, such collaborations can even lead to real knowledge networks where more direct and personal knowledge exchange takes place in more informal communications, as we have seen, a very important aspect when aiming to integrate expertise into the policy making process.

2. Information Scaling & Tuning

A major practice in the way how Brookings communicates its insights and expertise to policy makers is what we call *'information scaling'* and *'information tuning'*. We have shown that Brookings scales the information both within one media and across several media. Within one media, Brookings does diversely long summaries of a product. Across media, Brookings scales the information by systematically using oral communications and events like public briefings, or radio-/TV shows as occasions where someone can quickly get a general look-out and become aware of a certain idea or approach that is discussed more in detail in a book or report.

We have mentioned earlier on that the policy makers represent quite a fragmented target group. Congressmen usually don't have an economical background, but have a lot of experience in the political world. Members of congressional staff are oftentimes similar experts in economics or public policy than Brookings' scholars themselves. In a context, where the audience's knowledge and experience can be very diverse, it is particularly important to tune the information to the particularities of the different policy makers. Varying the length of a piece of information is only one way how to adapt and tune it to the various target groups. Choosing different media, communication modalities and styles is another way. The insights gained from a project might be communicated in a book, in various articles, in a report, in policy briefs, op-eds, events, in testimonies at congressional hearings, in interviews for newspapers, and

when attending a radio or TV show. Distributing a piece of information in such a variety of forms, allows many different audiences to access it. Brookings' scholars also have the chance to adapt the examples, analogies, and stories, they use to better illustrate their ideas to the context of the specific audience.

3. Validation: Affirming Quality and Credibility

One of the major challenges of an organization like Brookings is to *renew and maintain the credibility and quality* of its experts and of its knowledge-intensive products and services. Brookings has several practices in place to validate and affirm its quality and credibility in the short and long run.

One of the most important aspects is that Brookings *sticks to its non-partisan and academic positioning.* "No one tells Brookings' scholars what they should think about a specific issue. It's institutional policy that the institution does not take position, only scholars do" (W. Gale). In this way, there is no institutionalized "Brookings' view" or "Brookings' approach". From an outside perspective, nevertheless, Brookings as an institution has been identified with certain (ideological or theoretical) viewpoints. In its early years and up until the end of Moulton's presidency in 1952, Brookings was said to share quite a liberal view and believed in the market's capacity to correct economic and social mal-adjustments (anti-interventionalist view on state). After Moulton, Brookings was said to be sympathetic to an economic view that leans against the Keynesian perspective (Critchlow, 1985). Today, there is certainly a suspicion about Brookings to be democratic and liberal. Finally, the centrist positioning - "Brookings is the closest to centrist as you can get these days in Washington" (R. Nessen) - of Brookings is after all an institutional positioning. Yet, Brookings seriously attempts to live and promote a diversity of ideas within the institution, even within the same research and book project or within the same event.

> "The different scholars working for this project (Restoring fiscal sanity) did not all share the same vision of how to resolve the problem of fiscal sanity. I do think it is a strength that Brookings does not have an institutionalized view. For this project, I deliberately chose authors that were well informed, that's the most important criteria, and secondarily that would have somewhat diverse perspectives on whatever is the issue. (..) I think that if you have to work with someone who has a different view than you, but who is equally well informed, you get a better product. I think that's a motivating factor and then, in my view, I think it leads to a more interesting book because it is not all people singing from the same hymnals" (I. Sawhill).

One way to assure the non-partisanship and ideological balance is by care-

fully choosing the composition of the scholars working on a project. Next to this aspect, it is also important how projects are funded: "One of the other rules is that no more than 50% of the funding of a project can come from one sponsor" (R. Nessen).

Non-partisanship assures a higher quality of Brookings products. In addition, the non-partisanship is important in order to be considered a credible source for policy expertise and not simply an organ of a party.

> "Brookings is not partisan, is not viewed as being partisan. It's not left or right, it is a serious academic organization. People say: 'Oh Brookings, we pay attention to Brookings because they are non-partisan, they are not identified with any particular philosophy'. It is important that Brookings' ideas are not painted by partisanship" (R. Nessen).

Because of the commitment to being non-partisan, the ideas that come out of the Brookings Institution remain surprising and can even be contradictory. For this reason, it is harder for a politician to say: 'Ah, I won't listen to them anyway, they come from the other party'. Each scholar might have his/her own, surprising point of view as Isabel Sawhill explains: "Individual scholars of Brookings might put forward interesting ideas. We are more like a university with different scholars and many of these scholars have strong points of view, but the institution does not" (I. Sawhill).

The non-partisanship goes together with the adherence to academic standards in approaching work and both are also important aspects for Brookings in differentiating itself from other, more advocacy oriented think tanks. As opposed to such organizations, Brookings aims "to get the analysis right, rather than to push a particular agenda" (W. Gale). The following quote of Ron Nessen coins this distinction quite clearly: "The president of Brookings, who was at the time Michael Armacost, he had told me: '(..) at Brookings, we do the research and the conclusions in that order'" (R. Nessen). For Brookings' scholars have in common to strive keeping up the academic credentials and not to become an advocacy or shallow organization. "I keep insisting that these (the policy briefs) really have to present research that you have been conducting and not simply something you have been writing on over the weekend" (C. Schultze). By adhering to the standards of social science Brookings can manifest the credibility of its information products, the single scholars, and the institution as a whole.

Brookings assures the quality of its products in a variety of ways. First of

all, Brookings *hires* only scholars with high credentials. Most of them have a PhD from a prestigious university and have served for the administration. "A lot of the quality assurance happens at the hiring level" (W. Gale). A second process to assure the quality of Brookings' products is the *internal approval procedure for research projects*. "All the research projects have to be approved by the board of trustees. If someone has the idea that he wants to make a project on why George Bush was the stupidest president we have ever had, you know, you can't do that" (R. Nessen). Third, continuous reviewing processes: Once a project is approved and the first publications are being elaborated, there are several forms of internal, external, official and unofficial feedback and editing procedures. For books this process is rather formal. All books are externally reviewed by three reviewers, a process similar to the one of the university press. For other products like the policy briefs, the reviewing process is much more informal.

> "For policy briefs it is a more haphazard review process. Everything gets reviewed internally, it goes to the director of the program, so economic studies or government studies, and then to the president of the institution, and then there is informal consultation as well" (K. Weaver). In general, the culture of continuous internal reviews is very important for the quality of the results. "We read each other's work all the time" (W. Gale).

In sum, Brookings has various practices in place to assure the quality of the research and to affirm the credibility of its scholars and their expertise. Central is the adherence to the non-partisan and academic positioning and the therewith implicated recruitment, funding, project approval and reviewing practices.

4. Establishing Common Ground

A major challenge in the knowledge communication between domain experts and decision makers is that they need a sufficient *common ground*, a shared context and common knowledge base, in order to be able to embed the newly received information in a meaningful context. If there is not enough common ground between the two partners, the decision maker will not be able to make sense of the technical jargon of the expert and will not understand how a specific piece of information should possibly help him/her in his/her practical, daily problems. At the same time, the expert is not able to align his communication to the needs of the decision maker because he simply does not know his/her priorities and daily concerns. On the other hand, if there is a large overlap between the knowledge of the two parties, specialization is smaller and it might be questionable why the decision maker has to rely on the expert all together and their knowledge should be integrated (Eisenhardt & Santos, 2000). However, in

most cases the bigger threat is the one not to share enough common ground rather than too much of it.

To ascertain the necessary common ground between the politicians and its scholars, we have mentioned that Brookings has the practice to work with scholars who have working experience in the administration. This allows them to know the policy makers' constraints, their ways of thinking, their priorities, and also their limitations and constraints within the political processes. Another way how Brookings gives its scholars the chance to better understand the context of the policy makers and to adjust their language and way of reasoning is to organize events, in which scholars meet policy makers face-to-face. There, Brookings' scholars have the possibility to personalize and finely tailor their communication. They get to know policy makers on a personal level and so establish further the common ground among them. The creation of a sufficient common ground is important for creating a successful communication and a shared understanding.

5. Balancing Out Dilemmas (between academic comprehensiveness and concision and between proactive agenda setting and swift reaction to political changes)

Finally, a last practice summarizing what we have discussed so far is that Brookings is to *find balances within at least two important dilemmas*. A first dilemma exists between the *professional responsibility as researchers to do and present comprehensive research according to social science methods* (which usually is time consuming) and conceptualize issues thoroughly, and, on the other hand, to *have solutions ready the moment a problem pops up in the policy world and to present research results very swiftly and in a very concise manner*. Part of this balancing dilemma is also to know how to simplify an idea and insight, reduce unimportant complexity and represent it in a very brief format (challenge we have discussed on the message level), and, on the other, represent the issue or idea in a good quality and in a comprehensive and meaningful way, without leaving apart central aspects of it. A look back in history shows that this dilemma was emerging already in the 70s and that it became more apparent with the growing competition from more advocacy oriented think tanks, with the changing media environment, and with the ever tighter time constraints of policy makers, all of which pushed for ever shorter formats. According to Robert Lawrence, an example that well illustrates how Brookings copes with this stretch between academic comprehensiveness and concision is the foundation of Brookings "Papers on Economic Activity" in 1970. The founders of this new format had the feeling that a lot of the research comes too late for policy

because of the extensive review processes. In order to be able to publish an article within 3 months, they decided not to peer review the article, but in order to assure the quality, they published not only the paper, but invited also two discussants who wrote on the paper. Further, they brought very renowned people in the board of the senior advisors, which was important to signal expertise but also to really assure quality (R. Lawrence).

Today, Brookings manages this first balancing dilemma in part also by presenting the same piece of information in a variety of products and lengths (practice we have called information scaling for which a same information item is presented, more comprehensively, in the book format, and shorter and more accessibly, in policy briefs).

A second balancing dilemma is the one between *being proactive versus being reactive to the policy world*. We have argued earlier that while advocacy organizations or organizations that are funded by government contracts mainly react to the political agenda, Brookings defines its activity very much bottom-up by the individual scholars and engages in agenda setting. Even if this is the case, there exists a dilemma for Brookings that if they define their projects too independently from the policy world, they will not have the policy impact they are striving for. Yet, if they are just reacting to what already happens in the policy world, they will not have the time to do serious research on the issue and provide trustworthy insights. Only by developing a practice of balancing out both of these dilemmas, Brookings can successfully communicate its expertise to policy makers.

Brookings, as one of many think tanks in the U.S. market of policy expertise, disposes of rich practices to nurture the political discourse with reliable and useful information. We have identified five such major practices that best define Brookings' knowledge communication with the policy makers at Congress. These are the practices of active co-operating, information scaling and tuning, affirming quality and credibility, installing a necessary common ground between Brookings' experts and the policy makers, and finally skilfully balancing out the dilemmas of academic comprehensiveness and concision and of pro-action and reaction. These practices are important for policy makers to make sense of the provided information and to be able to contextualize it in a setting that is meaningful to them. In this way, Brookings manages to not only provide information

on a policy challenge, but to invite policy makers to create new meanings and interpretations of their policy world and from there, to newly shape possible solutions. By doing so, Brookings maximizes the potential to integrate its knowledge and expertise in the policy making process.

Appendix 2

List of Interviewees for Brookings Case

1) Interview with William G. Gale, The Arjay and Frances Fearing Miller Chair, Deputy Director and Senior Fellow of the research program Economic Studies, and Co-director of the Urban-Brookings Tax Policy Center at the Brookings Institution, Washington DC, May 17, 2005

2) Interview with Robert Lawrence, Albert L. Williams Professor of International Trade and Investment at the Kennedy School of Government, Harvard University, Cambridge, MA, March 1, 2005

3) Interview with Ron Nessen, Journalist in Residence at the Brookings Institution, Washington DC, May 17, 2005

4) Interview with Peter R. Orszag, Joseph A.Pechman Senior Fellow, Economic Studies, at the Brookings Institution, Washington DC, May 20, 2005

5) Interview with Alice M. Rivlin, Senior Fellow and Director, Greater Washington Research Program, Metropolitan Policy at the Brookings Institution, June 17, 2005

6) Interview with Isabel V. Sawhill, Vice President and Director of the research program Economic Studies at the Brookings Institution, The Cabot Family Chair, Co-Director of the project Welfare Reform & Beyond, June 16, 2005

7) Interview with Charles L. Schultze, Senior Fellow Emeritus, Economic Studies, at the Brookings Institution, Washington DC, May 20, 2005

8) Interview with R. Kent Weaver, Senior Fellow at the research program Government Studies at Brookings Institution, Washington DC, May 18, 2005

Appendix 3

Case #2: The Knowledge Communication between Facility Management Consultants and their Clients (pom+)

**Overview on
pom+**

pom+ is a consultancy company active in the sectors of construction -, facility-, and portfolio management. In 2004, the company achieved a turnover of 6.5 million Swiss Francs (4.2 million Euros). It employs 38 employees, and has offices in Zurich and Bern, Switzerland. The clients of pom+ are medium and large companies of industries such as the construction and real estate industry, the financial industry, the logistic industry, and the telecommunication industry. In addition, the Swiss Confederation and the cantons are also key customers of pom+.

pom+ was founded in 1996 as a spin-off of the Swiss Federal Institute of Technology Zürich. Under the mission "we make companies, real properties, and projects fit!"[3] (pom+, 2005a), pom+ offers a diversified set of consulting services. Next to project management it does consulting for organizational development, for information and communication management, and supports companies in the design of processes and structures. The pom+Group comprises the pom+Consulting, the pom+Products, and the pom+i. Under pom+Consulting, the core business of the group, consulting services in the fields of portfolio management, facility management, and construction management are offered. The activities of pom+Products are limited to a few, highly specialized software applications, and pom+I designates the subsidiary of pom+ in Italy (MQ Management und Qualität, 2005). In the following, we will concentrate entirely on the services, products, and knowledge communication processes of pom+Consulting.

**Organizational
Structure and
Areas of Activity:**
4 service types:
– organizational

pom+Consulting structures its consulting offer in four main services: 1. *organizational development,* in which realm it does consulting for strategic processes, business models, and benchmarking; 2. *process and structure design*, where it supports clients in their process management, but also in their management of risk, knowledge, customer relationship, and supply chain manage-

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3 Wir machen Unternehmen, Immobilien und Projekte fit!

development
- process and
  structure design
- information and
  communication
  management
- project man-
  agement

3 areas of applica-
tions:
- construction
  management
- facility man-
  agement
- portfolio man-
  agement

ment; 3. *information and communication management*, within its scope pom+ guides the conceptualization and implementation of solutions for mobile and pervasive computing, for process portals, for software solutions, and for data and document management systems. Finally, pom+ offers consulting services for *project management*, in particular for the organization and guidance of projects and for their quality management. The company offers these services in three main areas: *construction management*, *facility management*, and *portfolio management*. In the area of construction management, among other services, pom+ does feasibility studies for construction projects, risk analyses and risk strategies, identifies potentials of collaborations between constructors and investors, and evaluates and customizes software solutions for construction processes. In the realm of facility management (FM), pom+ elaborates, for example, performance figures of the use and control of buildings, does concepts for the internal billing of room costs and FM solutions, revisions the supply chain management of FM, and supports the implementation of SAP solutions for FM. Finally, with regard to portfolio management, pom+ develops and implements strategies for real estate portfolios and real estate funds, evaluates and customizes the introduction of software solutions for real estate portfolio management, identifies potentials for collaborations between portfolio managers and investors, and plans and conducts the data collection and analyses for single real estate objects and entire real estate portfolios (pom+, 2005b).

pom+ provides consulting services mainly in the realm of real estate, construction and facility management. Yet, in rare cases, it advises organizations in aspects of quality -, process -, or project management, which are not related to real estate. In these cases, the consulting is purely methodological: "We don't know the processes, but we can help on a methodological level, to filter out the clients existing knowledge, to structure it systematically and provide a clear methodological approach"[4] (G. Bilotta).

**The Expert –
Decision
Maker Situa-
tion**

Below, we will briefly describe the partners – the experts and decision makers - of the knowledge-intensive communication of this case. The experts are the consultants of pom+ while the decision makers are pom+'s clients, mainly pro-

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4 „Inhaltlich kenne wir deren Prozesse nicht, wir können aber methodisch helfen, und ihr Wissen herausbekommen und in eine Systematik und in eine Methodik hineinzupacken."

ject mangers, heads of sections or members of the board.

Experts: Consultants

– have mostly a technical background, a university degree, few prior practical experience, and are considered to be "theoreticians from the university"

– have a rather broad, transversal, and interdisciplinary knowledge

The consultants and senior consultants of pom+ - the *experts* of this case – mostly have a university degree in engineering, informatics, or architecture. Some of them have an education in facility management from an advanced technical college. While almost all experts of pom+ have a rather technical background, some have completed secondary studies in management and business administration. A few consultants have a doctor degree. The rather academic background of pom+'s consultants can be both an advantage, but also a challenge in the knowledge-intensive communication with the client. While academic titles help to mark expertise, they can sometimes be an additional hurdle in the knowledge communication with the clients: "Often, we have the reputation of being theoreticians from the university. 'Now these theoreticians come and want to tell us practitioners how we should do things'. In the beginning, this often leads to some skepticism" (C. Kaufmann).[5] As it is typical for a consulting company, most consultants of pom+ directly come from the university and have only a limited prior professional experience.

The consultants of pom+ distinguish themselves more through the breath rather than the depth of their knowledge.

"My focus is transversal and includes knowledge in the fields of business administration, information technology, and facility management. In all these areas, I know something, but do not have an in-depth knowledge. This interdisciplinary knowledge gives me a very distinguished view." (R. Becht).[6]

In many instances, the expertise knowledge of pom+ is made of this particular view and specific methodological approach and thinking.

Decision Makers – Clients:

– are themselves knowledgeable on facility-, portfolio, and con-

The *decision makers* of this case are the clients of pom+. Typically, clients are state organizations like universities or state departments, but also many private companies from industries such as the insurance, the telecommunication, or the retail industry. These organizations ask for the support, assistance, and consulting of pom+ with regard to their projects on facility, construction, or portfo-

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5 „Vielfach haftet an uns der Ruf, Theoretiker aus der Uni zu sein. ‚Jetzt kommen diese Theoretiker und wollen uns Praktiker sagen, wie wir das machen sollen.' Dies führt am Anfang oft zu Skepsis."

6 „Mein Fokus ist der Querschnitt und schliesst betriebswirtschaftliches, IT Wissen und den Fachbereich FM mit ein. Von allen diesen Bereichen weiss ich etwas, besitze aber kein vertieftes Wissen. Mit meiner interdisziplinären Ausbildung habe ich eine sehr spezifische Sichtweise"

struction man-
agement

lio management. Typical decisions are: what type of facility management soft-
ware to implement, what strategy to pursue in the development of a real estate
portfolio, or what business model to adopt for a specific construction project.
"At the end, it is the client who has the responsibility on his/her project. We can
only offer knowledge input and support them in his/her decisions"[7] (B. Buser).

The contact people on the client side are mainly project managers of, for
example, quality management or facility management projects, heads of the real
estate or of the internal services department. They include representatives across
all levels of the hierarchy, from the simple caretaker, to referees, building man-
agers and up to members of the executive boards. At the beginning of pom+'s
activity, the client had only a very limited know-how on facility -, construction -
, and portfolio management. Today, both the industry as also the single clients
have become more professional and the knowledge asymmetry is no longer bla-
tant. Most contact people are themselves very familiar with the issues of facility,
construction, portfolio, process, and quality management. "In eighty percent of
the cases, we deal with people who already are familiar with the issues" (G.
Bilotta).[8]

**Types of
Knowledge
Object of
Communica-
tion:**

– Market knowl-
edge
– Technical
knowledge
– Methodological
and procedural
knowledge
– Abstract and
theoretical
knowledge

One could argue that not all types of knowledge are equally difficult or easy
to convey and communicate and not all types require the same means and
modes of communication. We will not enter this discussion in particular, but we
would like to indicate at least briefly what types of knowledge the consultants of
pom+ are communicating to their clients. In most cases, clients ask for market
knowledge, technical knowledge, and methodological knowledge.

"The people believe that we know the market – and in fact, we do – and they want from
pom+ that we do a state of the art project for process, portfolio, and facility management.
Others ask our service because we have procedural knowledge, certainly, also technical
knowledge is of importance, but they are really interested in our procedural knowledge, in
the method."[9] (G. Bilotta)

Since pom+ mainly has clients who themselves are specialized in facility and
construction management, the methodological and procedural knowledge is

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7 „Der Kunde hat letztes Endes die Verantwortung für sein Projekt, wir können nur Wissensinput liefern und den
Kunden unterstützen."
8 „Zu 80% haben wir mit Leuten zu tun, die fachlich schon eine Ahnung haben."
9 "Die Leute glauben, dass wir den Markt kennen - und das ist auch so - und wollen von pom+, dass wir ein State
of the Art Projekt Prozessablauf machen, ein Portfoliomanagement, ein FM umsetzen. Andere fragen uns an,
weil wir Prozesswissen haben, natürlich auch Fachwissen, aber diese interessieren sich in erster Linie für das
Prozesswissen, die Methodik."

about strategies

more important than the technical one.

"Often, we guide the client on a methodological level and not so much on technical aspects. We have a moderation task and mainly provide the client with methodological knowledge. Also (..) during the as-is analysis, in which we need the information from the client, we give away methodological knowledge"[10] (R. Baumann).

A second characteristic of the object of communication between pom+ and its clients is its abstractness. "Especially if one talks of strategies, one can try to make it simple, but in one way or the other, the discourse remains on a rather high, abstract level"[11] (G. Bilotta).

The Knowledge Communication Process between Experts and Decision Makers:

In the following, we will describe the process of interaction between pom+ consultants and their clients and will give emphasis to the challenges and practices with which the consultants are confronted by attempting to convey their knowledge to their clients. For the description, we will use the process model for knowledge communication discussed in Chapter 2. We will see which of the conceptually proposed phases (and feedback-loops) are of particular importance in this context, and which are almost non-existent. In a further step, we will discuss the particular challenges and practices that arise and are implemented along the process of the interaction.

Identification of Experts and Expertise

The first important phase in the interaction between pom+'s experts and their clients is the way how potential clients identify pom+ as an organization that provides the relevant expertise for a current challenge they face (see: Figure 12).
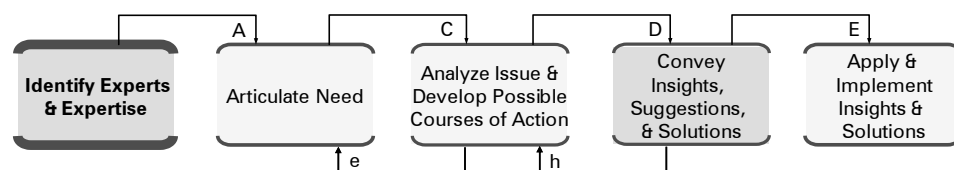
Figure 12: The 'Identify Experts and Expertise'-phase

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10 "Oft leiten wir den Kunden methodisch und nicht so sehr fachlich. Wir haben eine Moderationsaufgabe und geben dem Kunden Methodenwissen weiter. Auch (..) während der Ist-Analyse, in der wir Informationen vom Kunden brauchen, geben wir Methodenwissen weiter."

11 "Gerade wenn man von Strategien spricht, kann man schon versuchen, es einfach zu machen, aber irgendwie befindet man sich immer auf einer hohen Sphäre."

Challenge:

– Be perceived as
an expert by po-
tential clients
without giving
away too much
valuable knowl-
edge

Meeting potential clients, a first challenge is how to convince him/her of the expertise of pom+. "At the beginning of a project, in the situation of a project acquisition, it is important to convey competence in order to create trust"[12] (B. Buser). One can signal expertise by giving away part of one's own knowledge, yet the challenge is not to give away too much valuable knowledge for free.

> "We have to be cautious with the way we deal with our knowledge. Again and again, we are asked: 'Couldn't you tell us quickly what goes on with this or that key figure of the Swiss market?' Should we now give this information, would we like to sell the FM Monitor to this person or would we even like to do a little report? We have to convey some of our knowledge in order to demonstrate that we know something. On the other hand, one should not unveil too much since we have elaborated our knowledge quite toughly"[13] (G. Bilotta).

pom+ deals with this challenge in a variety of ways. It signals expertise through the awards and certifications it continues to win (e.g. 2000: first Swiss consultancy that became ISA 9001 certified, 2004: decorated with GoodPrivacy by the European Foundation of Quality Management (EFQM), 2005: winner of the Swiss ESPRIX-Award for Business Excellence), but also through reference customers, the academic titles of the consultants (many are engineers graduated from the Swiss Federal Institute of Technology Zurich), or through the publications. In the actual interaction with clients, consultants mark expertise by appearing rather self-confident (without being arrogant or unreceptive), by being well prepared, and by guiding the client with a clear and well structured approach. While in a first contact, the challenge for the consultant is to convince the client of one's own and of the institution's expertise, once a collaboration is started, the question is really to gain the *trust* of the client (see: Articulate need).

In order to increase a positive awareness of pom+ and its services among potential clients, pom+ engages consistently in the following two practices.

Practices:

– Ascertain visibil-
ity and a well

pom+ aims to strengthen its visibility by actively expanding its social network and joining a variety of associations. The company is a member of around 20 associations like the Association of Management Consultants Switzerland

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12 "Zu Beginn des Projekts, in der Akquisesituation, ist es wichtig, Kompetenz zu vermitteln, um Vertrauen zu schaffen."

13 "Wir müssen vorsichtig mit unserem Wissen umgehen. Wir werden immer wieder angefragt: „Können Sie uns nicht schnell sagen, wie es mit dieser oder jener Kennzahl im Schweizer Markt steht?" (..) Gibt man nun diese Information, möchten wir der Person den FM Monitor verkaufen oder möchten wir ihr sogar einen kleinen Bericht erstellen? (..) Wir müssen gewisse Sachen rüber bringen, um zu beweisen, dass wir etwas wissen. Auf der anderen Seite darf man nicht zuviel preisgeben, da wir das Wissen hart erarbeitet haben."

functioning (in-) formal social network by joining a variety of associations and collaborations with universities

(ASCO), the Total Quality Management (TQM) Forum Switzerland, the German Facility Management Association (GEFMA), and many others more. Next to the involvement in such associations, pom+ is also actively related with universities, such as the Swiss Federal Institute of Technology Zurich or the Institute for Technology Management of the University of St.Gallen. Such more or less formal networks are important not only to increase the company's visibility and the possible paths through which a potential client will contact pom+, pom+ can also benefit form the trust in expertise and excellence, which is associated to the brand of a particular association. Finally, theses networks are fundamental also for continuously renewing and affirming the company's knowledge[14]. In this way, pom+ is exposed to the most recent developments in its areas of activity, can build communities of practice, and engages in translating knowledge between academia and practice.

– Organize events to establish and nurture a community of practitioners and to promote own products and services

In order to gain awareness and position itself as a knowledgeable partner, pom+ organizes events in the form of half-day seminars like a seminar for board members on real estate strategies, or "pom+Highlights 2005", an event on the current trends in the facility management market. During such seminars, moderated discussions and presentations take place involving collaborators of pom+, outside experts, and successful practitioners in the area. The aims of these events are various: get new people to know pom+, create a general awareness for the importance of the consultancy service provided by the company, promote the specific products of pom+ (as for example the FM Monitor 2005), as well as leading a thematic dialogue. To avoid that these seminars taste too much like marketing events where pom+ simply promotes its services and products, pom+ includes outside experts and allocates the time for substantive discussions.

Articulate Need: Definition of a Project's Parameters

Once the relevant experts and expertise are identified, the decision makers usually have to outline the problem or decision they are facing and for which they need expertise. Clients brief pom+ about their needs, about the objectives they want to reach and the service they expect from pom+ (see Figure 13).

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14 Evers and Menkhoff (2003), in their analysis of the role of expert knowledge of consultants in the new economy, argue very similarly that professional associations have a double function with regard to expertise. They claim that the professionalization of an industry can be improved by the fact that similar organizations have a more frequent contact between them. Second, the clients will trust more in the expertise of these organizations as they are part of an association they already trust.
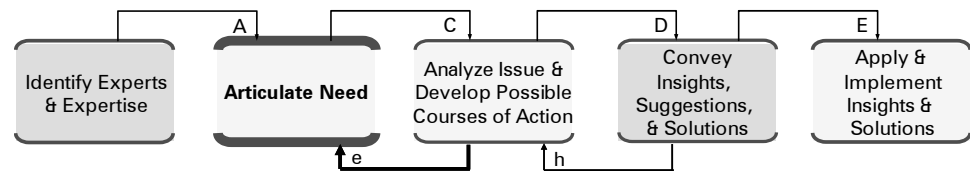
Figure 13: The 'Articulation of Need'-phase (Definition of a Project's Parameters)

Challenges:

– Overcome mistrust of client

In a new project, a first challenge for the consultants of pom+ is to gain the *trust of the client and to overcome possible, negative prejudices* of the client towards the involvement of external consultants. "The mistrust of the client is the biggest hurdle one has to overcome. There are people who do not do anything else in a project than looking for mistakes: 'But this you have done wrong!'"[15] (R. Becht). Oftentimes, for employees, the fact that external consultants are called in does not promise anything good. They perceive all kind of threats and fears (e.g. change old and approved habits, be involved in one reengineering after the other, be laid-off) and are therefore reluctant to collaborate with pom+.

> "For the employees it was like: 'Aha, now they take in an external collaborator who is moreover very young. What does he want here? If it concerns dismissals, resistance to give us the necessary information is certain."[16] (L. Schärer)

Sometimes, this lacking trust is not only due to such real fears, but it is also the result of stereotypes clients have of consultants. They believe that consultants are arrogant and think to be omniscient, whereas in a clients' view, they are just very young, inexperienced and solely armed with theoretical knowledge.

When such resistances and mistrust are less apparent and remain more hidden, it becomes even more difficult for pom+'s consultants to counteract them: "The worst is when the client pursues his own, private way. He might say, 'yes, yes' but then does something completely different."[17] (S. Jäggi). While the challenge is manifested mainly in the beginning of projects, we will show that the practices that aim to deal with it are not only relative to this phase, but are of a more general nature and are therefore discussed in the section: Practices relative

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15 „Das Misstrauen des Kunden ist die grösste Hürde, die man überwinden muss. Es gibt Leute, die machen im Projekt nichts anderes als Fehler aufzusuchen. 'Das haben Sie jetzt aber falsch gemacht'."

16 „Für die Mitarbeiter war es so, aha, jetzt kommt ein externer Mitarbeiter, das ist zudem noch ein sehr junger, was will denn der? Geht es um Entlassungen, und dort kommen Widerstände auf, überhaupt Informationen zu liefern."

17 "Das Schlimmste ist, wenn der Kunde seinen eigenen kleinen Zug fährt. Er sagt zwar ja, macht dann aber etwas anderes."

to the group dynamics.

– Avoid a "just go ahead" approach and and reach shared understanding of a precise request

In this phase, another important challenge for the consultants of pom+ is not settle for a rather open, unspecified request on behalf of the client, but to manage to define jointly a precise and specific request for the starting project. Often, it can be difficult for the client to clearly express and specify his/her demand, and also to understand the enterprise proposed by the consultants of pom+. This is especially true if the knowledge of the client is rather limited. Stefan Jäggi explains: "Just right now I have a project where the client does not know a lot himself. He simply communicates his requests and says: *just go ahead* and do something"[18] (S. Jäggi). In such instances, even if the consultants try to play-back and reformulate the requests and expectations exposed by the client, there is no guarantee that both parties have elaborated a common understanding of the main goals, outcomes, and requests for the project. In fact, misunderstandings are very probable (see: Challenges related to the mental models). Often, it is very difficult for the client to clearly formulate a clear and concrete request all together.

"I had the feeling that the client did not know very well what he wanted. He knew he wanted and could improve something with regard to the facility management of his real estates, but he was convinced that he could buy a tool and then it would work"[19] (C. Kaufmann).

This problem is more poignant in situations where there is a big knowledge asymmetry between the consultant and the client and fortunately, this is not usually the case with pom+'s clients. In most cases, they themselves are pretty knowledgeable on the issues of construction, real estate or facility management. Yet, the challenge remains of how to specify a request and to explicate a clear and concrete objective in a situation where one often simply knows that there is a problem and a potential to improve. For this reason, pom+ has elaborated quite a sophisticated process for the definition of a new project.

"Today, in the beginning of a project, we try to clearly define the project and its goals in order to assure that we are talking about the same. We ask the client if this is really what

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18 "Nur gerade jetzt habe ich einen Fall, wo der Kunde selber nicht viel weiss. Er gibt einfach seine Ansprüche bekannt und sagt: mach mal!"

19 Ich habe das Gefühl, der Kunde wusste nicht genau, was er wollte. Er wusste, er wollte und kann in dem Bereich (Gebäudebewirtschaftung) etwas verbessern, er hatte aber das Gefühl, er könne ein Tool kaufen, und dann würde es funktionieren.

he envisioned. Otherwise, it is possible to have almost concluded a project without having fulfilled the objectives of the client"[20] (C. Kaufmann).

After the classical customer request, pom+ often conducts a brainstorming session, meetings, and interviews with the customer in order to better understand his requests. "In such situations, we present something to the client and then he says: 'yes, but this and that aspect should be further taken into consideration'. In this way, we can gradually adjust to each other"[21] (B. Buser).

Practices:

– Engage in intensive face-to-face communication (meetings and workshops) to elicit knowledge, create common understanding, and to switch perspective

For pom+, it is very important to engage in quite an extensive face-to-face communication during this second phase.

"If you flood people with documents at the beginning of a project, it is very possible that they understand them differently than how they were actually intended. They believe that the consultant wants to go in a direction that they do not want to. Therefore, in the beginning, interaction is key so that the client does not come too prejudiced into meetings"[22] (C. Kaufmann).

Such face-to-face communication can consist of interviews, meetings, and workshops. Interviews are good too elicit the client's knowledge in quite a mirrored way. "With the experience you learn to ask better questions, to better disperse the questions in order to cover all aspects you need"[23] (N. Merkt). Workshops are also important to elicit technical information, but, in addition, they are crucial to get to know the working mode of the client and to identify with his/her perspective (see: Challenges Related to the Mental Models).

– Nail down a clear and concrete written request at the end of the 'Articulate

These interactive rapprochements and mutual adjustments are very important in this second phase where the customer's need is externalized and specified. Yet, it is equally important that this process does not get prolonged too long, but finds a clear end. Therefore, pom+ *nails down a clear and concrete*

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20 "Am Anfang eines Projekts versuchen wir heute, das Projekt und seine Ziele klar zu definieren, damit wir auch vom Gleichen sprechen. Wir fragen den Kunden, ob es wirklich das ist, was er gerne möchte. Ansonsten kann es sein, dass man vor einem quasi abgeschlossenen Projekt steht und man eigentlich die Ziele des Kunden nicht erfüllt hat."

21 "Bei der Akquisesituation stellt man etwas vor, dann sagt der Kunde: ‚ja, aber es müsste doch dies und jenes rein', so dass man das dann aufeinander abstimmen kann."

22 „Wenn man Leute zum Beginn mit Dokumenten zudeckt, kann es sein, dass sie diese anders verstehen als sie eigentlich gemeint waren. Sie meinen, der Consultant möchte in eine Richtung, die sie selber gar nicht möchten. Am Anfang ist deshalb die Interaktion sehr wichtig, damit der Kunde nicht mit bestimmten Vorurteilen in das Gespräch hineinkommt."

23 "Mit der Erfahrung lernt man, bessere Fragen zu stellen, die Fragen mehr zu streuen, so dass man alles abdeckt."

Need'-phase

request in form of a written project definition or project scope. "Today, we do a written requirement specification that we can show to the client and ask him whether that is what he/she wants."[24] (C. Kaufmann). Finally, for many projects, the written project definition is presented orally so that last misunderstandings can be eliminated and final readjustments can be taken into consideration.

Conduct Analysis of Issue

Main Characteristic:

Entanglement between 'Articulate Need'-phase and 'Analysis'-phase

Once the need and request are specified in an interactive manner, in the next phase, the *analysis of the issue is conducted* and possible solutions are elaborated (see: Figure 14). How does the interaction between pom+'s consultants and their clients look like in this phase?
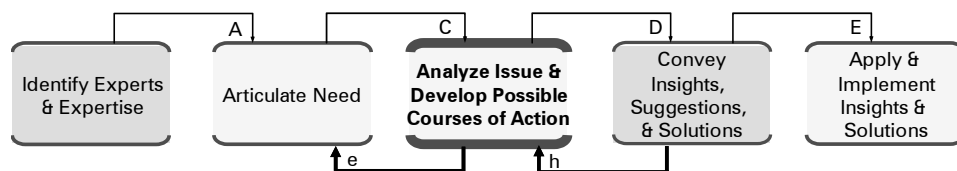
Figure 14: The 'Analyze Issue & Develop Possible Courses of Actions'-phase

We have outlined that, in the case of pom+, the phase of the Need Articulation is quite extended so that part of the analysis takes place already in the second phase ('Articulate Need'). In fact, the various interactive means of communication permit various feedback loops from the third phase ('Conduct Analysis of Issue') and the second phase (arrow 'e').

Practices:

– Collaborate very closely with clients

Apart from the relatively strong entanglement between the 'need articulation'- and the 'analysis' phase, this third analysis phase is quite particular in the case of pom+ because of another reason. While in many expert-decision maker interactions, the experts retreat for the analysis part, in the case of pom+, this phase is characterized by a high interactivity between the two parties.

"During the project, there is an interactive exchange going on. The consultant has to learn from the client. One has to understand what exactly the problem is, why the problem ex-

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24 "Heute haben wir ein Pflichtenheft, das wir dem Kunden zeigen können und ihn fragen können, ob dies das ist, was er wolle."

ists, and what the client's situation is"[25] (B. Buser).

– Elicit and struc-
ture the client's
knowledge
rather than pro-
posing com-
pletely new ap-
proaches

The consultants of pom+ consider the client to be their *major source of knowledge* and the task is really to *elicit all the relevant information* for finding a reliable solution. In general, if the people are generally committed to the project and have a basic trust in pom+'s consultants, then they usually share their knowledge and show what they all know about the company (B. Buser). In this way, pom+ does not „invent" solutions for a problem of a client, rather, its consultants consolidate, structure, and bring together propositions for measures that have already lingered around somewhere in the company and that the collaborators actually desired.

"In this way, we encounter fewer resistances - later in the implementation - because it is actually the collaborator who finally has the chance to express himself freely. Management gets information it would not get otherwise. It's really all about compressing and processing the existing knowledge. I have to decide what the important problems are and which ones we can address at a later stage"[26] (L. Schaerer).

In this phase, the contact with the client takes place in the form of emails, phone calls. Oftentimes, pom+'s consultants work with the client in his office. "We really try to work together with the client and thus get to know his way of working"[27] (S. Jäggi). In this way, frequent interactions and a close collaboration are not only important to elicit the client's valuable knowledge, but also to allow the consultant to identify with the client and understand his/her way of thinking and perspective on the issue.

**Convey Insights,
Suggestions, &
Solutions**
**Main Characteris-
tic**:
Entanglement be-
tween 'Analysis'-

Once the analysis is conducted and the results of the research are elaborated, the next phase in the knowledge communication between experts and decision makers is to convey the gained insights, the proposed suggestions and solutions to the decision makers (see: Figure 15).

---

25 "Während dem Projekt ist es dann ein interaktiver Austausch. Der Berater muss auch vom Kunden lernen. Häufig muss man erfassen, was das Problem ist, warum es ein Problem ist und wie die allgemeine Situation beim Kunden ist."

26 „So erleben wir danach weniger Widerstände, weil es eigentlich der Mitarbeiter ist, der sich für einmal frei äussern kann. Und die Geschäftsleitung bekommt Informationen, die sie sonst von ihren Mitarbeitenden so nicht bekommen würde. Es geht darum, Bestehendes zu komprimieren und aufzuarbeiten. Ich muss aber auch entscheiden, was nun wichtige Probleme sind und welche man erst zu einem späteren Zeitpunkt angehen sollte."

27 "Wir (..) versuchen, mit dem Kunden mitzuarbeiten und so seine Arbeitsweise kennen zu lernen."

phase and 'Convey
Insights'-phase
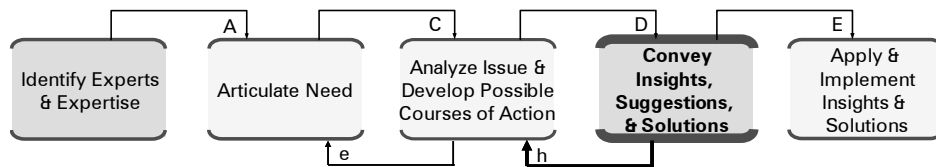
Figure 15: The 'Convey Insights, Suggestions, & Solutions'-phase

In the case of pom+, the communication of results takes place not only at the end of the project, but also during the analysis phase. Especially when having reached milestones of consulting projects, first important insights are conveyed. For example, after the conclusion of the analysis of the actual state, first results are communicated to the client through presentations, meetings, and workshops and a common ground is established. On this basis, directions for the research of possible solutions are decided. There is therefore an important feedback loop (arrow 'h') between the 'convey insights' and the 'analysis'-phase.

Challenge:

– Balance the request to prioritize and compress with the one to live up to the complexity and variety of an issue

„In situations of milestones of projects, oftentimes, members of the board are present and important decisions are taken. It is our task to consolidate the various elements and experiences and to steer the focus on the essential aspects. The members of the board cannot know and do not want to know anything." (B. Buser).[28]

When results and insights have to be conveyed to the decision makers on the client side, the challenge is to *prioritize and compress the large amount of information* the consultant has gathered during the weeks of analysis.

"The challenge is also that we got an enormous amount of information in these three weeks and we have to differentiate, what is relevant, what is not relevant? In the end, they get a report of 25 pages, in which they have to find the whole spectrum and variety of the issue"[29] (L. Schärer).

Consultants are confronted with the demanding balancing act between being both extremely concise and simple, and at the same time exhaustive

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[28] "Bei Meilensteinen von Projekten stossen oft die Leute aus der Geschäftsleitung hinzu und wichtige Entscheide werden gefällt. Hier geht es oft auch darum, die angesammelten Erfahrungen und Aspekte zu konsolidieren und sich auf das Wesentliche zu konzentrieren. Die Leute aus der Geschäftsleitung können und wollen nicht alles wissen."

[29] "Die Schwierigkeit ist auch, dass wir in diesen 3 Wochen sehr viele Informationen bekommen haben. Wir müssen in einem internen Prozess abstrahieren, was ist relevant, was ist nicht relevant? Am Schluss gibt es einen Bericht von 25 Seiten, in welchen die ganze Informationsvielfalt wieder zu finden ist."

enough to live up to the variety and complexity of the issue.

Practices:

– Communicate
  reasons and
  consequences
  to activate
  sense-making
  processes

The information does not only have to be concise and short, it also has to be meaningful in the eyes and context of the client.

"It is important that the client can recognize himself and this situation (in the information we provide). We have to be descriptive so that the client does not have the feeling that just some external guys pop in and present a few theoretical approaches. Here again, conversations and the personal contact are hugely important"[30] (B. Buser).

It is important to contextualize the information in a setting that is meaningful to the client, not only in order to facilitate the client's interpretation processes and to make him understand, but also to convince him about the importance of a certain issue or measure.

"The challenge is to convince the collaborator that the additional work and expenses, which he now has to do, will be worthwhile for the project. (..) It is therefore important to communicate very transparently. Usually, I say three things: What is approaching someone? What are the consequences? What are the reasons why we do something?"[31] (L. Schärer)

In order to guarantee a better transition from the knowledge the client buys to the actual implementation of this knowledge into action (Apply & Implement Insights & Solutions), it is important not to communicate only what is up, but also, *why it is up and what are its consequences.*

– Propose al-
  ternatives and
  clear evalua-
  tion criteria
  rather than

Another important practice of pom+ in conveying its insights and suggestions is not to present fixed solutions (e.g. for example software application products), but to provide a more comprehensive view, to outline the various alternatives at disposition, and to show clear criteria (and the weight of each criterion) by which the alternatives should be evaluated.

---

30 „Hier ist es wichtig, dass sich der Kunde wieder finden kann, dass es anschaulich ist und dass nicht einfach ein paar externe Leute aufkreuzen und mit einigen theoretischen Ansätzen auffahren. Hier ist wieder das Gespräch und der persönliche Kontakt sehr wichtig."

31 „Es geht darum, den Mitarbeiter zu überzeugen, dass der Mehraufwand, den er jetzt machen muss, sich für das Projekt lohnen wird. (..) Wichtig ist, sehr transparent zu kommunizieren. Ich sage meistens drei Dinge: was kommt auf den Mitarbeiter zu? Welches sind die Konsequenzen? Welches sind die Gründe, wieso man etwas macht?"

32 "Wir schlagen dem Kunden nicht in erster Linie eine passende Software für sein CRFM vor, sondern präsentieren Kriterien, die ich bei der Auswahl von Softwarelösungen beachten würde. Ich mache auch eine Bewertung: wie stark sollte er jedes einzelne Thema gewichten, damit man daraus eine Nutzwertanalyse daraus machen kann."

fixed solu-
tions

"In the first place, we do not propose to the client the suitable software for his CRFM. Rather, we present criteria that he/she should take into account when choosing between the various software packages. We also do an evaluation how every topic and criterion should be weighted in order to do a proper cost-benefit analysis" [32] (R. Becht).

**Apply & Imple-
ment Insights &
Solutions**

In most cases, companies engage consulting firms not only with the objective to get a screening and analysis of a situation, but also to receive advice in how to change certain processes or structures in order to then be able to implement some of the given advice. In the following, we consider this final phase (see: Figure 16), in which the expertise and insights provided by pom+ are in some form applied and implemented by the client. We describe the challenges and practices in this transition phase between knowing and doing (Pfeffer & Sutton, 1999).
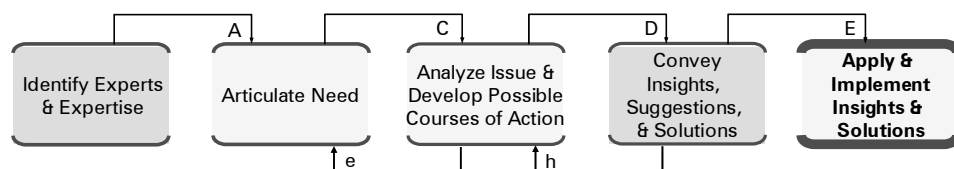
Figure 16: The 'Apply & Implement Insights, & Solutions'-phase

Challenge:

– Overcome gap
between knowing
and doing: make
those people of
client accept
propositions who
were not directly
involved in pro-
ject

In the description of the previous phases, we have already pointed to some aspects, which are important to facilitate the step from knowing to doing. In particular, we have said that there is a much better chance to implement solutions where the collaborators on the client side have the impression to have proposed them themselves and, secondly, we have mentioned how important it is for the collaborators not only to get to know the solution, but also the reason for this solution and the consequences to which it leads.

Even if pom+ adheres to such practices, the passage between the transfer of the actual information and the integration and application of it in decisions and actions remains problematic.

"Oftentimes, we propose interesting things, but the client is not ready yet to integrate them. He has to live, in some way or the other, the whole development he buys in through our service. We can't speed him up from 0 to 100 in just one year. That can be frustrating since right after the project, the reports end up in a drawer and nobody really profits from

them"[33] (C. Kaufmann).

The risk that the result of a consultancy service – symbolized by the final report – ends up in a drawer, is bigger if powerful people on the client side have not been involved in the whole consultancy process and are exposed to the results only at the end. They lack the whole process that would help them to make these propositions meaningful. Furthermore, there might be relational challenges and non-clarified functions between the various people of a client (see: Challenges related to the group dynamics and socio-emotional aspects).

Practice:

– Actively involve clients early on in the project

Given this challenge, pom+ tries to *make the client collaborate on the solution as much as possible*, use him as a source of knowledge, and give him/her the feeling that the solution is actually a product of the client him/herself. As we have outlined earlier, in this way, the client develops less resistances to change (see: Conduct analysis of issue).

Even if this transition from knowing to doing is an extremely difficult one and many insights provided by pom+ are not immediately translated into action, there are happy instances, in which they get rediscovered and implemented much later. "It is beautiful if, after some years, the client takes our documents out of his drawer again"[34] (C. Kaufmann).

Discussion of the Process Model

The discussion of how pom+'s consultants communicate their expertise to their clients has shown that the phase model provides quite an accurate structure for describing this process. We have seen that the three phases 'articulate need', 'analyze issue & develop possible courses of action', as well as 'convey insights, suggestions, & solutions' are very close and interwoven with several refinement and realignment loops. Figure 17 gives and overview on this looping behavior and shows instances of the various feed-forward and feedback loops.

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33 „Oft kommen wir mit guten Dingen, aber der Kunde ist noch nicht bereit, diese aufzunehmen. Der Kunde muss die gesamte Entwicklung, die er bei uns einkauft, muss er irgendwie mitmachen. Man kann ihn nicht von 0 auf 100 bringen innerhalb eines Jahres. Dies kann frustrierend sein, da unmittelbar die Sachen in ein Gestell getan werden und niemand wirklich einen Nutzen davon zieht."
34 „Schön ist, wenn nach ein paar Jahren unsere Dokumente wieder aus dem Schaft herausgeholt werden."
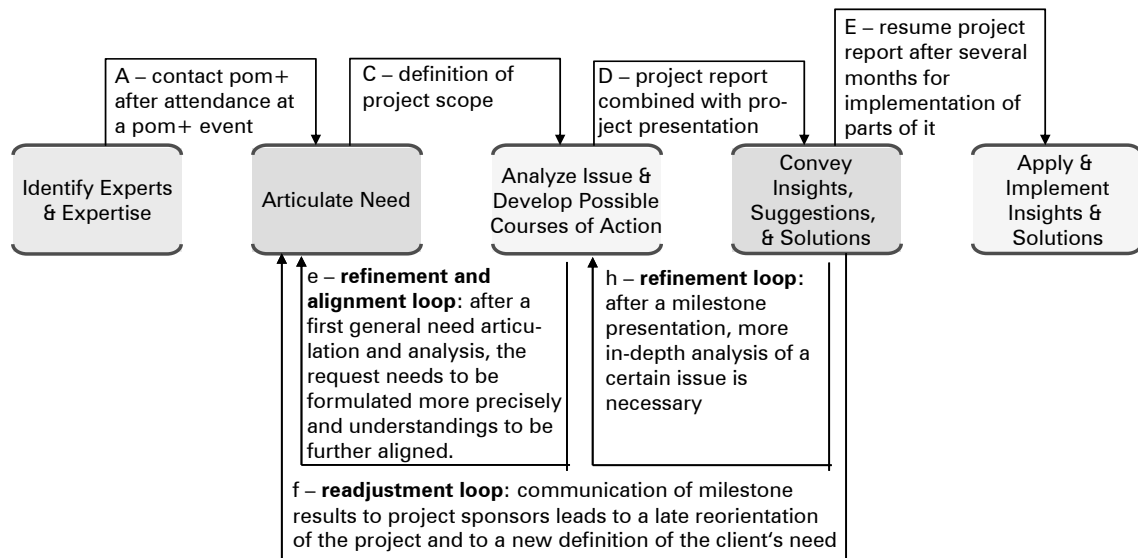
Figure 17: Instances of Feed-Forward and Feedback Loops within the Interaction between pom+'s Consultants and their Clients

In the description of the knowledge communication process, we have put attention on discussion the main challenges and practices that characterize the communication process. Figure 18 resumes these various challenges and practices.
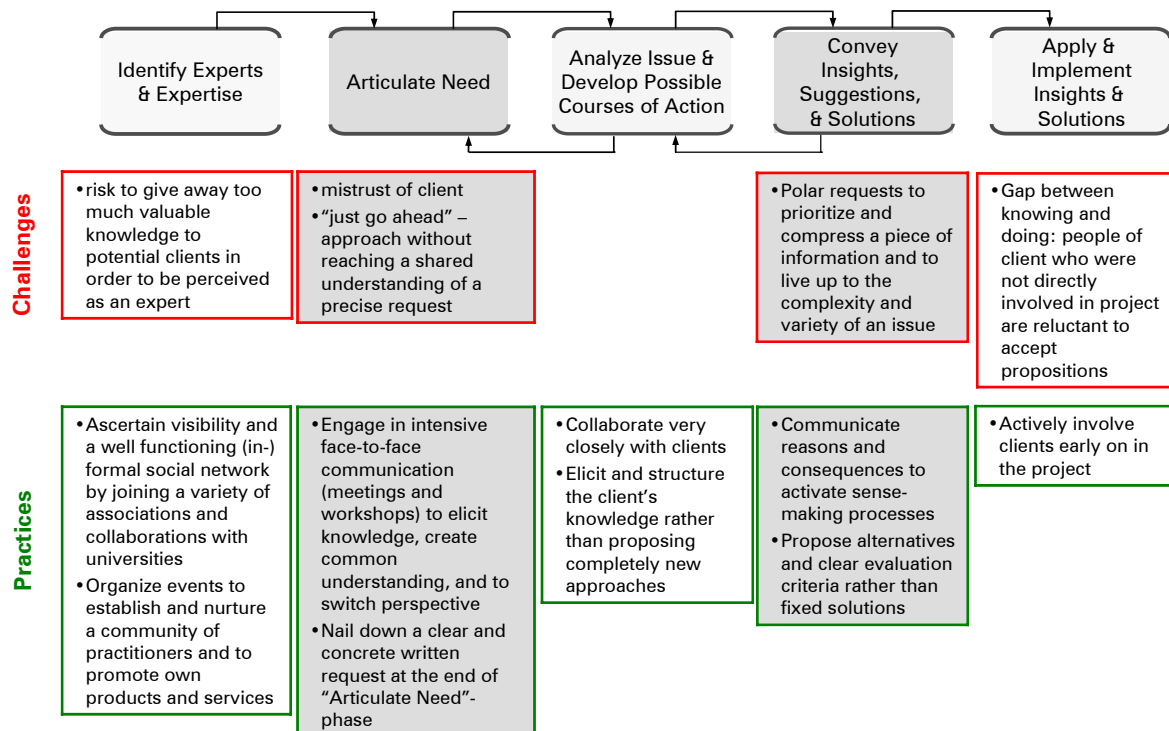
Figure 18: Major Challenges and Practices along the Phases of the Knowledge-intensive Communication Between pom+'s Experts and their Clients

Phase Un-specific Challenges & Practices in the Knowledge Communication

Some of the challenges and practices of the knowledge communication between pom+ and its clients are not specific to one phase in the communication process, but are valid across the various phases.

In the following, we will give an overview on these more generic and phase independent *challenges*, with which pom+'s experts' are faced when communicating their expertise to decision makers. We will also outline the main practices with which pom+ shapes its communication in order to surmount some of these challenges.

We will categorize both challenges and practices along the framework for knowledge-intensive conversations presented in Chapter 2. The framework's shows five dimensions – message, process, group dynamics, mental models, and outer context – communicators use when trying to make sense within their conversations. We will show whether the phase-unspecific communicative challenges and practices we present can be structured along these dimensions and will discuss how these dimensions are interconnected among each other.

Challenges Related to the Communicated Message:

– Information is too theoretical, technical, complex, and abstract

The topics pom+'s consultants are dealing with are mostly complex, abstract and very domain specific. Dealing with strategies, processes, and systems always contains something abstract, which is often projected in the future and therefore quite intangible. It is therefore a particular challenge for the experts of pom+ to simplify the message and to make themselves understandable to their clients and not to overstrain them.

„Sometimes, it happens that we do not adapt enough to the people, but run them over with what we explain. In a kick-off meeting we explain quickly what has happened until today and the client sits there, understands only half of it, and does not say a lot. (..) A the end, he takes up again the fundamental questions and we realize that we probably have been too quick or too complex"[35] (S. Amsler).

Oftentimes, it is very difficult for the consultants of pom+ to estimate which

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[35] „Es kommt hier und da vor, dass wir die Leute nicht richtig abholen und der Kunde überfahren wird mit dem, was wir erzählen. In einer Kick-off Sitzung erzählen wir schnell, was bis heute alles gelaufen ist und der Kunde sitzt da, versteht nur die Hälfte, und sagt nicht viel dazu. (..) Am Schluss kommt er dann nochmals mit den grundsätzlichen Fragen und so merken wir, dass es wohl zu schnell oder zu komplex war."

level of complexity is suitable fort he client (See: Practices Relative to the Communicated Message: Reduce Complexity in Ways that Suit the Characteristics of the Addressee). In particular, if the consultant does not know his client very well (how much does he know, how does he like to be informed?), he always risks to be too complex and too technical.

> "At the end we get the feedback: 'These were two extremely interesting days, but I always was at my limit. Certain things were difficult, but I am happy I could go through this process. Yet, in many instances I really got at my limits because of the complexity" [36] (G. Bilotta).

– Difficulty to prioritize, select, and condensate large amount of information

During the analysis phase of a project, pom+ spends much time at and with the client and collects a large amount of information. It is a particular challenge to understand, which information is important, how to do a good prioritization, how to compress it and communicate it in a way that is manageable and understandable for the client. "The difficulty in presentations is clearly (especially if you have been at the client's for three weeks) to convey one's know how in such a way that the management won't be overstrained" [37] (L. Schaerer).

Practices Relative to the Communicated Message:

– Give concrete examples and work with metaphors

There are various ways how pom+ tries to surmount the challenge not to be too abstract or theoretical. First of all, *giving examples* from the context of the client is one simple way. "It is better to give concrete examples rather than loosing oneself in technical theories" [38] (A. Pesenti). Also, pom+'s consultants often use metaphors to clarify and convey a difficult, but important aspect. A recurring difficulty is, for example, to convince the client of the importance to pursue the longer, more cumbersome road proposed by pom+ (Oftentimes, pom+'s methodological approach implies, at the first sight, a more laborious procedure). In such instances, the parking metaphor can be quite a useful one. The consultant explains the client why it makes sense to engage in the more demanding backwards-parking in order to then be able to depart more directly and more quickly.

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36 "Am Schluss kommt das Feedback: ‚Es waren zwei total spannende Tage aber ich war immer am Anschlag. Gewisse Dinge waren schwierig, ich war froh, dass ich diesen Prozess mitmachen konnte, aber ich stiess an meine Grenzen wegen der Komplexität.'

37 „Die Schwierigkeit in Präsentationen ist ganz klar - vor allem wenn man 3 Wochen dort (beim Kunden) war - das Know how, welches man hat, so zu vermitteln, dass man damit das Management nicht überfordert."

38 „Es ist besser, konkrete Beispiele zu geben als in Techniktheorie abzuschweifen."

– Work with
visualizations

Advantages:

• Provide an
additional,
immediately
and univer-
sally under-
standable
language

• Provide ac-
cess to the
information
in a way that
is more con-
crete and re-
lated to the
context of
the ad-
dressee

• Be concise
and reduce
complexity
to the es-
sential

• Augment
mnemonic
capability

• Augment
analytic ca-
pability

• Mark com-
petence

• Communi-
cate in a
more infor-
mal and
playful way

Secondly, pom+ is quite sensitive to the importance of images, graphs, and other visual representations for their knowledge-intensive communication with the client. The communication with visuals brings a variety of advantages. First of all, visuals provide an additional, immediately understandable language. We have seen that the knowledge-intensive communication between pom+'s consultants and their clients is made difficult by a number of challenges. Among these figures certainly also the fact that the two parties have quite different backgrounds and everyday experiences and therefore often talk quite different languages (see: Challenges Related to the Mental Models). Often, the consultants of pom+ use different terms or understand the same terms differently than their clients. In such a situation, visuals can provide an additional language that, in its simplicity, might bridge strong knowledge asymmetries and provide a first, visual common ground.

"I often use images, symbols, or pictograms. Everybody understands a pictogram, it is universally understandable. For clients, I usually work with simple pictograms that do not need superfluous information"[39] (N. Merkt).

Figure 19 shows an example of a visualization of pom+ that works with pictograms and symbols.
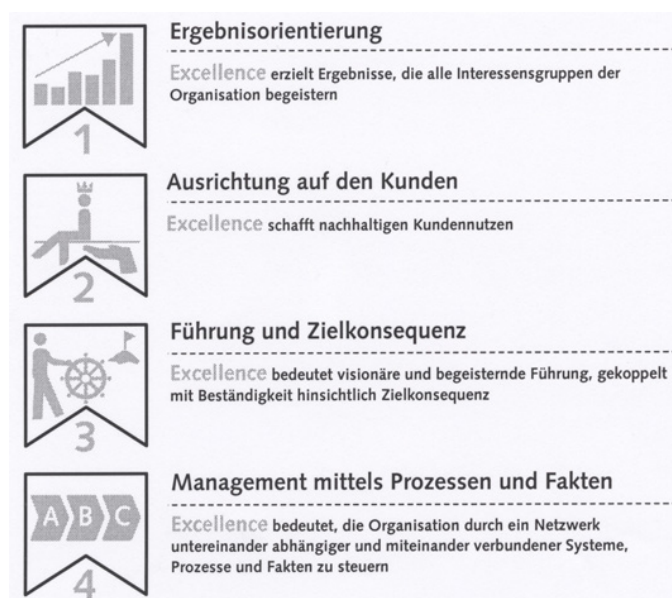
Figure 19: **Visualization that Uses Pictograms to Reduce The Complexity of the Content and to Expand the Existing Common Ground**

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39 "Ich verwende oft Bilder, Symbole, Piktogramme. Ein Piktogramm versteht jeder, es ist universell verständlich. Für den Kunden verwende ich die einfachen Piktogramme, die ohne überflüssige Informationen auskommen."

Practices in using visuals:

- Link something abstract to concrete associations by using (visual) metaphors
- Use pictograms
- Use sketching in moments of conflict

Visuals also have the function to give something abstract a concrete and tangible reality. Figure 20 shows a visualization that depicts the areas of activity of pom+, in particular the core processes (in green), the support processes or functional structure (in red) and the management processes (in grey). It is a typical type of visualization that helps the client to gain a more tangible idea of what pom+'s main activities are (it is less abstract as it has a visual reality).

The metaphoric allusion of the visual to a football court confers certain qualities of a soccer game to the corporation pom+ and the services it provides. This can be, for example, a high commitment, enthusiasm and fun, team spirit. Metaphors are further useful to relate something abstract and difficult to something concrete and already meaningful. Symbols, visual metaphors, and visual representations in general give the possibility to express the essence of an issue in a very concise way and therefore represent another technique how pom+ can handle the challenge of providing too much and too abstract information.

Figure 20: Visualization Makes Processes and Areas of Activity More Tangible: Extended Organigram of pom+

In fact, the visual language is often more concrete and works with analogies, which is why it can help clients to express something that otherwise would be difficult to put in words. "For presentations, I work with colors. One alternative gets colored in blue, the other in green, etc. The client often starts to talk in these

colours"[40] (S. Jäggi). In this way, the concrete visual language can be resumed verbally and help to turn the verbal language more concrete as well. To support talk by instant sketching and drawing provides an additional language and something concrete to which one can refer. "I often visualize during conversations. (..) What is positive about this is that I can refer to it, one element gets green, the other red, the third blue. Everybody can see to what I am referring"[41] (S. Jäggi).

In this way, visuals provide an access to the information that is more concrete and tangible, and therefore more meaningful.

"Whatever I want to convey, I try to relate it with associations. One creates another access than if one came up with big theories or analyses. (..) In this way, the client can imagine the aspect visually and he often becomes more open to the issue"[42] (N. Merkt).

By working with visual associations, the information not only gets a more concrete quality, but it also becomes anchored in the daily context of the addressee.

"Once someone has explained something with LEGO bricks. One LEGO brick represented a module and with modules one could say what one needed and we then assembled the various modules"[43] (N. Merkt).

Another example of the use of a metaphoric visual is the case of the referring to the "Alinghi" sailing crew. The largest part of the Swiss population remembers with pride that the Swiss "Alinghi" sailing boat won the America's Cup's in 2003. pom+ often works with this image and thus refers to a shared national experience. The consultants of pom+ can be certain that "Alinghi" constitutes common ground between them even if they do not know each other yet and even if their perspectives might be very distant. In addition, the boat metaphor ("we are all in the same boat") can be instrumental in addressing sensitive issues like group solidarity and spirit when faced with uncomfortable change. The "Alinghi"-image frames the issue from a positive perspective and helps to get the

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40 "Ich arbeite auch in Präsentationen mit Farben. Die eine Variante wird dann blau, die andere grün, etc. Der Kunde beginnt dann auch, in diesen Farben zu sprechen."

41 "Ich visualisiere viel während Gesprächen. (..) Positiv daran ist, dass ich danach Bezug darauf nehmen kann, das eine Element wird grün, das andere rot, das dritte blau. Alle können es sehen und wissen, worauf ich Bezug nehme."

42 Ich versuche, alles was ich vermitteln will, mit Assoziationen zu verbinden. Irgendwie schafft man einen anderen Zugang, als wenn man mit irgendwelchen grossen Theorien oder Analysen auffahren würde. (..) So kann sich der Kunde dies graphisch vorstellen. (..) Der Kunde war viel offener auf das, was auf ihn zukommt.

43 "Einer bei uns hat einmal mit Legosteinen etwas erklärt. Mit Modulen konnte man sagen, was man brauchte. Das setzen wir dann zusammen."

client "in the boat" for the project. Finally, such an image can also serve as a mnemonic device for an important concept or idea. The people involved in the project might continue to refer to it and the image can become the symbol for an idea, conviction, or motivation to which the team agreed.

"If one can first go through the methodology together and represent something visually, this is always a big help so that something gets remembered. Especially for consultants who work conceptually, it is extremely important to confront the people with images"[44] (G. Bilotta).

Yet, images and visualizations are important not only to remember something in the long run, but they help to retain certain aspects also within a single conversation. In this regard, Stefan Jäggi stated: "The idea is to retain what is discussed in order to put the different aspects in relation to each other."[45] To sort out variables, show relationships, and to make clear distinctions can be especially important also in situations of conflict.

"Once I was in a meeting, in which a conflict arose and I did not know how to react. Fortunately, someone else was there, he went to the flipchart and laid out who said what and which relations existed. This deeply impressed me since one could see that they said the same thing, but expressed it differently. As a matter of fact, both wanted to go along the same way, towards the same goal, just that the one a little bit slower than the other"[46] (N. Merkt).

Sketching during conversations shows analytic capability and thus helps to mark the expertise of a consultant. "Ad hoc sketching and structuring often conveys more competence than a reference list of clients"[47] (R. Baumann).

A good example of a visualization, that was not the result of a ad hoc sketching, but that shows how visuals can increase the analytic capability and sort out differences in perspectives can be seen in Figure 21.

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44 "Wenn man die Methodik zuerst miteinander durchgehen kann und vielleicht auch ein bisschen bildlich darstellen kann, ist das immer eine grosse Hilfe, damit etwas hängen bleibt. Gerade für Berater im konzeptionellen Bereich ist es extrem wichtig, die Leute mit Bildern zu konfrontieren."

45 „Es geht darum, das fest zu halten, was diskutiert wird, um die einzelnen Teile in Beziehung zueinander zu setzen und Abhängigkeiten auf zu zeigen. Danach kann ich nachfragen, ob ich es so richtig verstanden habe."

46 "Ich war einmal in einer Sitzung, in der eine Konfliktsituation auftrat und ich wusste nicht, wie reagieren. Zum Glück war jemand anderer dabei, der nach vorne gegangen ist und aufgezeichnet hat, wer was sagt, welche Zusammenhänge bestehen. Das hat mich sehr beeindruckt, weil man dadurch gemerkt hat, dass man das Gleiche sagt, es aber anders ausdrückt. Eigentlich möchte man auf den gleichen Weg, zum gleichen Ziel, nur möchte es der eine ein bisschen langsamer, der andere schneller, direkter."

47 "Ad hoc skizzieren und strukturieren vermittelt oft mehr Kompetenz als eine Referenzliste."
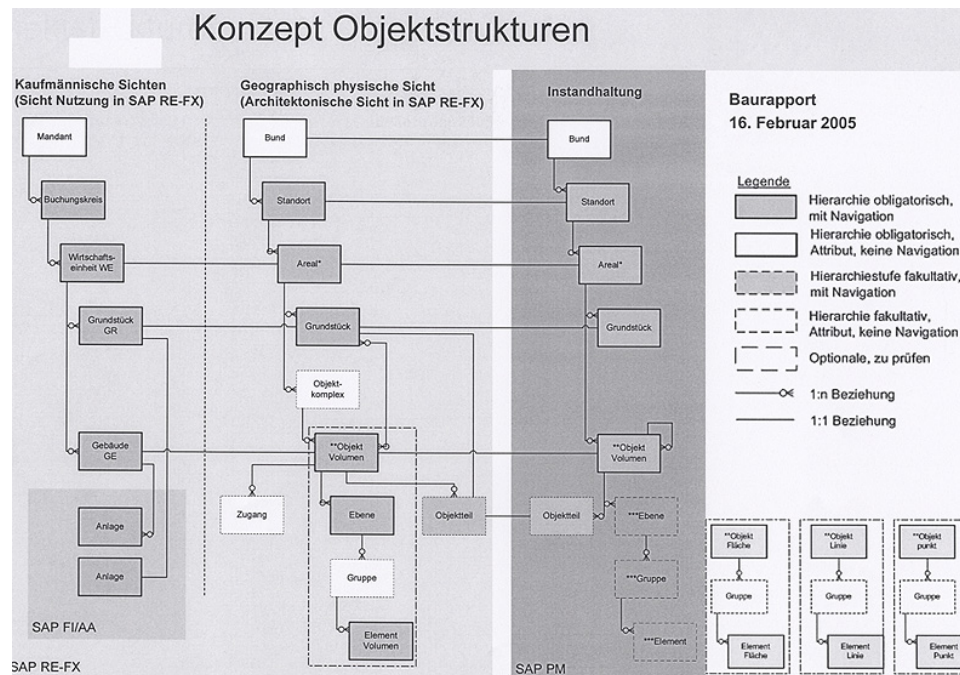
Figure 21: Visualization Clarifying Different Perspectives of a Real Estate Object

A final advantage of the work with visuals is that they include also an emotional element and lead to a more playful and cheerful communication.

„Rather than representing a time chart in a rather vacuous way, I mix it up and relate the single mile stones with images. For instance, you then know to drive in a subway and get off at a milestone. Another track can represent another part of a project"[48] (N. Merkt).

– Reduce complexity in ways that suit the characteristics of the addressee

Another practice of pom+ in dealing with the challenge to reduce the complexity of its communicated messages is to choose techniques that are adapted to the characteristics of the addressee. "Depending on the client, I try to reduce the complexity in a different manner. If it is a client, who is inclined to planning – and these are mostly architects - they like to work visually."[49] (N. Merkt) Thus, for clients who have an architectural background, working with visuals might be the most effective way to reduce complexity and communicate in a concise format. For clients who are more used to oral communication, a short oral presentation might work better as a summary than a written two-page executive sum-

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48 "Bei einer Vorgehensweise, die man normalerweise mit einem Terminplan trocken darstellen würde, lockere ich dies auf und verknüpfe die einzelnen Meilensteine mit Bildern. Man weiss dann zum Beispiel, dass man in einer U-Bahn fährt und bei einem Meilenstein aussteigt. Eine andere Schiene kann ein anderes Teilprojekt darstellen."
49 "Je nach Kunde versuche ich die Komplexität der Sache anders zu reduzieren. Ist es ein Planungskunde, dann sind dies meist Architekten, die gerne visuell arbeiten."

mary. "I have clients who stick to certain graphics, others stick to text, still others do not want too much paper, but prefer oral communication"[50] (R. Baumann).

Challenge Related to the Communication Process

– Lack of the big picture

A major difficulty in the interaction between pom+ and its clients is the *big picture challenge*. The consultant, especially if a more technical, IT related expert, risks to communicate too much of the technical details of a solution or issue. These details are difficult for the client to understand and by focusing on them, he misses out how these details relate to the more general picture. Both the client and the expert have difficulties to figure out what the really relevant aspects of the issue are and how they relate to each other.

"Our IT-specialist sometimes runs into the risk of digressing into technical details that the client cannot follow. Then you have to find a common language in order to make these technical aspects understandable. In other instances, explaining exactly how the technical aspects in the background work does not really serve the client, it rather confuses him. He lacks the connector pieces in order to understand."[51] (A. Pesenti)

Practices Relative to the Communication Process

– Retreat from group conversation and engage in bilateral talks to clarify situations

While the previously discussed practice to use visualizations might help to overcome the big picture challenge and keep in view the various main elements of a discourse, we could not identify another practice that explicitly responds to this challenge. Instead, we could separate out two other practices of pom+ that are related to the communication process. The first one concerns more macro aspects of the communication while the second concerns a single face-to-face interaction between experts of pom+ and their clients.

Sometimes, during a meeting, the communication in the group does not flow because of the behavior of a single participant who might be generally skeptical about the project or does have other concerns. In such situations, it is a good practice to make a coffee break and talk the issue over in a bilateral talk with the respective person (L. Schärer). In this sense, it is important to alternate the group communication with more intimate bilateral talks.

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50 "Ich habe Kunden, die kleben an irgendwelchen Grafiken, andere kleben am Text, andere wollen nicht zuviel Papier sondern wollen lieber mündliche Kommunikation."

51 "Bei unserem Informatiker ist eher die Gefahr, dass er in technische Details abschweift, wo der Kunde dann nicht mehr mitkommt. Dann muss man eine gemeinsame Sprache finden, um das (die Technik) begreiflich zu machen. Es gibt aber andere Situationen, wo dem Kunden die technischen Aspekte im Hintergrund nichts bringen und ihn eher verwirren. Dem Kunden fehlt dann das Verbindungsstück, um etwas zu verstehen."

– Engage in
active listening
by rephrasing
(to verify the
understanding)

    During a conversation, a meeting, or a workshop, a fundamental prerequisite for an effective communication is the capability to *actively listen to what the interlocutor tells and to verify ones understanding*. "I have to listen to the client, possess analytical capabilities, and play back what I have understood. It is important to pay attention to completeness and to the knowledge that is relevant for decisions"[52] (R. Becht). It is not only the consultant who has to engage in active listening, it is important that also the client reflects what he has understood. In this way, implicit misunderstandings are less probable and the two parties create a common understanding. "It is often useful if the client repeats again what he has understood. (..) Only by doing so, one understands where to explain something in more depth"[53] (N. Merkt).

**Challenges
Related to the
Group Dynamics and Socio-
Emotional
Aspects**

    How do relational and socio-emotional aspects (the group dynamics) influence the knowledge communication between pom+'s consultants and their clients? We have mentioned earlier how the formation of trust (see: Articulate Need) – certainly a socio-emotional aspect - is a major issue and precondition for any successful knowledge communication between pom+ and its clients. In the following, we will present other socio-emotional challenges that regard the group dynamics either between the consultants and the client or within the various contact people of the client.

– Knowledge gap
between client
and consultants create relational tensions

    A first aspect is that the knowledge gap between pom+'s experts and the client can create *relational tensions*. It is sometimes difficult for clients to admit their own ignorance with regard to a certain subject. They fear to loose face and feel attacked personally when corrected on a content level.

    "The ignorance of a client sometimes inhibits the knowledge transfer. Once I had to deal with an older, experienced manager who then realized that I – by that time I was still very young – knew a little more in this specific field than he did. And then, his ignorance really

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52 "Ich muss dem Kunden zuhören und analytische Fähigkeiten besitzen und das, was ich verstanden habe, wieder zurückzuspiegeln. Wichtig ist es, auf Vollständigkeit und entscheidungsrelevantes Wissen zu achten."

53 „Oft nützt es, wenn der Kunde nochmals wiederholt, was er verstanden hat. (..) Erst so versteht man oft, wo man noch tiefer etwas erklären muss."

54 „Das eigene Unwissen des Kunden erschwert oft den Wissenstransfer. Ich hatte es einmal mit einem älteren, erfahrenen Manager zu tun, der dann aber merkte, dass ich (und da war ich noch sehr jung) in dem spezifischen Bereich doch ein bisschen mehr wusste als er. Sein eigenes Unwissen hat dann den Wissenstransfer blockiert."

55 „Dies ist oft am Anfang beim oberen, mittleren Kader ein Problem. Sie fragen nicht, ‚wie muss ich das jetzt verstehen?' (..) Oft ist es auch nicht jedermanns Sache, zu sagen, ‚das habe ich jetzt nicht verstanden'."

blocked the knowledge transfer"[54] (R. Baumann).

Issues of pride and power are often related to the knowledge differences between clients and consultants, and the fear to loose face can become a strong inhibitor to learning. "Oftentimes, this is a problem of the upper and middle management. They do not ask, 'how should I understand this?' (..) It's not everybody's thing to say: 'This, I really haven't understood.'"[55] (A. Pesenti).

– Counterproductive group dynamics within various contact people of a client

Another set of relational aspects that are challenging for the knowledge-intensive communication between pom+'s experts and their clients are related to the *difficult group dynamics existing among the various contact persons of a client*.

"Often, in meetings, where six to ten people of a client organization participate who have different interests and responsibilities, I can see quickly that relatively strong group dynamics emerge. IT people look from their side, business administrators from the management level, and then there are those who are concerned with the planning and execution of the project. These perspectives are often very far from each other, which causes difficulties if the participants should find shared solutions. They often really wear themselves down. Someone has the feeling, he has to appear dominant and then, the others don't bring in their perspectives any more, which though would be very important. There is rarely someone who focuses on the big picture."[56] (R. Becht)

– Responsibilities and functions between the different contact people of a client are unclear

The *responsibilities and functions between the different contact people of a client are sometimes not clear*. There are instances when the consultants of pom+ work with the project manager on the client. At a later stage, when first milestone results are communicated and to the sponsor of the project is involved, it becomes apparent that the project manager and the sponsor did not really tune their expectations. As a result, a lot of work has been in vain and the project is getting behind schedule.

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56 „Ich erlebe oft in Runden mit 6-10 Leuten, die unterschiedliche Interessen und Verantwortungen haben, dass relativ rasch starke Gruppendynamiken aufkommen. Die IT-Leute schauen aus ihrer Seite, die Ökonomen aus der Führungsseite und dann gibt es diejenigen von der operativen Seite, welche an der Planung und Ausführung des Projekts interessiert sind. Diese Perspektiven sind Lichtjahre voneinander entfernt. Wenn ich mit denen in einer Sitzung bin und gemeinsam eine Lösung finden soll, dann ist dies sehr, sehr schwierig. Sie machen sich häufig gegenseitig kaputt. Jemand hat das Gefühl, er muss dominant auftreten, die anderen bringen ihre Sichtweise dann nicht mehr richtig ins Spiel (die eigentlich jedoch wichtig wäre) und es gibt selten jemand, der das Gesamtbild im Auge hat."

Practice Relative to the Group Dynamics and Socio-Emotional Aspects:

– Establish a trustworthy and amicable relationship

Function:

- Create necessary empathy for the externalization of tacit knowledge, the communication of complex issues, and the unveiling of problems

One of the key practices of pom+ is to *establish a real partnership with its clients and to engage in a very interactive, hands-on collaboration*. The consultants of pom+ try to establish a trustworthy and amicable relationship with their clients. „If you get to know the client better, things in the communication become easier. He lets one explain to him what is exactly meant by something, what it is all about, what advantages it brings, and what consequences it has"[57] (A. Pesenti). To know a person on a personal level increases the mutual empathy of the communicators. This is particularly important when communicating highly complex and domain specific knowledge and when trying to externalize tacit knowledge (von Krogh, 1998). In such situations, communicators have to put in words what is very hard to put in words, they are struggling in reducing the complexity and in estimating the knowledge of the interlocutor, and they have to 'confess' certain unpleasant problems of the company. "In the conversations with the clients, sometimes, one can read between the lines where the shoe pinches. (..) And maybe, the head of the facility management then all of a sudden says: 'what I really can't stand, is that..'"[58] (B. Buser). These are all challenges for the communication that are much easier to surmount if the communicator knows that the vis-à-vis tries to understand with a certain benevolence and empathy. Furthermore, knowing the client also on a personal level helps to better ambient the information in the context of the client and to identify with his/her mode of thinking.

"Knowing private issues of the client helps to make conclusions by analogy. What type of car does he have, how does he make decisions? It also helps in order to explain something technical with the help of his hobby"[59] (S. Jäggi).

Finally, it is also important to know the key people on the client side because of political reasons. In cases of problems and escalations, these people are very important to resolve conflicts and to successfully resume the project work.

"One always needs friends on the other side, people who are sympathetic to us and who understand us. These have to be the key players because if there happened to be an escalation, one would have to bring these people in and bring the project back on the right track.

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57 „Wenn man den Kunden besser kennt, wird die Kommunikation einfacher, er lässt sich erklären, was genau gemeint ist, was es damit auf sich hat, was etwas genau bringt, welche Auswirkungen es hat."
58 „In den Gesprächen mit den Kunden kommt manchmal auch zwischen den Zeilen hindurch, wo der Schuh drückt. (..). Vielleicht sagt dann der Leiter des Facility Managements plötzlich: ‚was mich einfach total aufregt, ist…"
59 „Wissen über private Dinge des Kunden helfen, Analogieschlüsse zu ziehen. Was hat er für ein Auto, wie fällt er Entscheidungen? Es hilft auch, um etwas Fachliches mit Hilfe seines Hobby zu erklären."

(..) This is the interpersonal dimension. We really try to win the people for us "[60] (G. Bilotta).

pom+ does a variety of activities to nurture such a amicable and trustworthy partnership between its consultants and their clients. As mentioned earlier, they engage in a lot of face-to-face communications (like meetings, workshop, etc.) rather than communicating formally through reports and other written formats (see: Articulate Need). They work on a daily basis with the client, they organize in-house seminars and events where people have the possibility for informal exchanges, and they do organize workshops and events in memorable locations (see: Practices Related to the Outer Context of the Communication). In all these occasions, clients and consultants have to get to know each other also on a personal level.

"If we are two days out in the countryside, then this has a methodological relevance, but the other thing is that you get closer on a personal level. Maybe you start to address each other in an informal way and clap on each other's shoulders. (..) It's our aim that the people are happy to work with us. This is not always the case in the consulting business: 'What do they want again?' To make friends out of the clients so that one is happy to see each other again"[61] (G. Bilotta).

For pom+, the amicable and trustworthy partnership with its clients is one of the most important preconditions for that knowledge can be shared among the two parties and the client can really integrate in his/her decisions the expertise that is conveyed by pom+'s consultants.

"One of the most important conditions for a well functioning knowledge transfer between the consultant and the client is really that it works well on an interpersonal level"[62] (B. Buser).

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60 "Man braucht immer Freunde auf der anderen Seite, Leute, die einem gut gesinnt sind aber uns auch verstehen. Und diese müssen auch die Key Players sein. Denn sollte es irgendwann zur Eskalation kommen, müsste man diese wieder ins Spiel bringen, um das Projekt wieder auf den richtigen Weg zu bringen. (..) Das ist das Zwischenmenschliche. Wir versuchen die Leute für uns zu gewinnen."

61 "Wenn wir zwei Tage im Grünen sind, dann hat das methodisch schon eine Relevanz, aber der andere Punkt ist, dass wir einander näher kommen, uns vielleicht duzen und uns gegenseitig auf die Schultern klopfen.(..) Es ist unser Ziel, dass sich die Leute freuen, mit uns zusammen zu arbeiten. Dies ist ja in der Beraterbranche nicht immer der Fall. ‚Was wollen die jetzt schon wieder?', sich Kunden zu Freunden zu machen, so dass man sich freut, sich wieder zu sehen."

62 „Eine wichtige Bedingung für einen gut funktionierenden Wissenstransfer zwischen dem Berater und dem Kunden ist wirklich, dass es auf der zwischenmenschlichen Ebene gut funktioniert."

Challenges Related to the Mental Models

– Client is not familiar with another perspective and approach (e.g. procedural thinking). Risk to rigidly impose own perspective

- Orientation on practice vs. orientation on theory and method

- Orientation on isolated aspects vs. overall perspective

- Orientation on quick fixes vs. comprehensive, integrated solutions

Many of the communicative challenges that exist in the knowledge-intensive interactions between the consultants of pom+ and their clients are related to the mental models of the two parties. The mental models are the interpretive schemes with which we select and elaborate information and make it meaningful. To a large extent, they are formed of our previous experiences and the already acquired knowledge and do enclose not only rational but also emotional and psychological aspects (Mengis & Eppler, 2005).

A first very important challenge for the consultant with regard to this aspect is to *make the client familiar with another approach to things*. "The procedural thinking is not very easy for the client. (..) A lot of persuasiveness is needed"[63] (S. Amsler). The challenge for the consultant is to structure the thinking and approach of the client, but not to squeeze him into something he/she does not want.

"I start to structure and visualize his (the client's) thoughts and then the problems start. The client structures – if at all – very differently from me and he has difficulties to disengage from his own structure"[64] (S. Jäggi).

There are at least three big differences in the orientations of the client with respect to the one of the consultant that are all highly dependent on the diverging day-to-day context of the two parties. One is the client's *orientation on practice* as opposed to the consultants' *orientation on theory and method*. Even if both views on an issue can bring their unique insights, it is difficult to combine the two and to make both parties appreciate their reciprocal value. Clients often are skeptical about theoretical approaches and see them as disconnected from their practical problems. There are various ways how pom+'s consultants deal with this challenge: some prefer to stick to the clear methodological approach, but others prefer to be responsive to the client's whish and take over – at least for a little while - the more practical and less methodological or theoretical approach as outlines this quote by Natasha Merkt.

"Sometimes, our approach is a little bit too theoretical for certain people. The theoretical path - that we need for the development of a concrete procedure – is for some people too long and too burdensome. (..) Most of the times I am responsive to the client's whish to

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63 „Das Prozessdenken ist für den Kunden oft nicht so einfach. (..) Hier braucht es viel Überzeugungskraft."
64 „Ich beginne dann, seine Gedanken zu strukturieren und zu visualisieren und da beginnen die Probleme. Der Kunde strukturiert – wenn überhaupt – anders als ich und er hat Mühe, sich von seiner eigenen Struktur zu lösen."

become more concrete. Then things start to go upside-down and become chaotic until the client realizes that the theoretical and methodological had its advantage"[65] (N. Merkt).

Another difference in orientation is that the client tends to be very focused on the quite punctual problem he/she lives at the moment whereas the consultant has more distance and looks at an issue from a broader perspective. While it can be difficult for the consultant to take the client out of his perspective it is also his responsibility in his function to think of the bigger picture.

"Maybe the assignment we have been given borders on other connections we should point out to the client. When dealing with a relocation, one always thinks about moving from A to B, but smaller things like reprinting business cards often get forgotten. My task is to take in this integrative viewpoint and show what the various implications of a decision are"[66] (N. Merkt).

We have mentioned earlier on that one of the practices of pom+ in the way how its consultants convey their insights and suggestions to their clients, is to not simply propose a single solution (e.g. one software suite), but to embed it in a larger context and to give the clients the necessary information (e.g. evaluation criteria and their importance) to choose among the possible alternatives. However, this general orientation of pom+ to *provide comprehensive, integrated solutions* sometimes contrasts strongly with the orientation of the client to *get quick fixes and ready-made solutions.*

"The client had the very strong idea that I would present a ready-made solution that he then could simply implement. I did not present such a ready-made solution because it did not exist. I could only show the various alternatives that would have to be adapted to the concrete context of application. For this reason, the client, mainly men aged between 40 and 50, was wondering: 'Does she really know what she is talking about? She cannot really show us what we wanted'"[67] (S. Amsler).

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65 "Manchmal geht man für gewisse Leute etwas zu theoretisch vor. Der theoretische Weg, den es braucht zum Erarbeiten des konkreten Plans, ist für einige zu lang oder zu mühsam. (..) Meistens gehe ich auf den Wunsch ein, konkreter zu werden. Es geht dann kreuz und quer und wird chaotisch, bis der Kunde merkt, dass das Theoretische, Methodische einen Vorteil hatte."

66 „Vielleicht hat der Auftrag, welcher der Kunde uns gibt, noch ganz andere Zusammenhänge, auf die man den Kunden hinweisen soll. Beim Umzug denkt man daran, sich von A nach B zu bewegen, aber kleinere Dinge vergisst man gerne wie Visitenkarten nachdrucken. Meine Aufgabe ist der ganzheitliche Blickwinkel. Ich muss aufzeigen, dass ein Entscheid ganz verschiedene Auswirkungen haben kann."

67 „Der Kunde hatten ganz stark das Bild, dass ich eine fertige Lösung präsentieren würde, die man in dieser Form umsetzten könnte. Da ich jedoch kein fixfertiges Produkt präsentierte, weil es dies gar nicht gibt, und ich dem Kunde nur verschiedene Varianten aufzeigen kann, die auf ihren konkreten Kontext angepasst werden müssen, fragten sich die Leute, meist Herren zwischen 40 und 50: ‚Kennt sie sich denn überhaupt aus? Die kann uns das ja gar nicht aufzeigen, wie wir wollen.'"

– Difficulty to
  estimate knowl-
  edge of ad-
  dressee and to
  adapt to it

Another problem for the communicator (both for the expert and the client) is to judge the addressee's knowledge: what is common ground for both parties?, what does he/she know, but would name and express it differently?, what does he/she not know and does he/she not need to know?

"(It is difficult) to figure out what management should know of what I know, at which level can I start to present the analysis? The difficulty is to estimate the level of knowledge of the management"[68] (L. Schärer).

– Misunderstand-
  dings of terms
  arise because of
  diverging back-
  grounds and
  perspectives,
  but remain hid-
  den until late in
  the process

A challenge that has been mentioned by a considerable number of consultants is the one of uncovered misunderstandings. Oftentimes, clients do understand the same terms very differently from how do pom+'s consultants. In certain cases, not even the various contact people of a single client do share the same understanding of a specific concept. The following quote illustrate this aspect:

"It often happens that someone from the construction industry uses the same term as someone from the IT industry, but understands something completely different. (..) For example: what is a building? From a microeconomic standpoint a building is understood as a utilization unit and as such it is also represented in SAP. Added to this definition are criteria like how to rent and charge for the building. From a legal point of view, it is all different. There is a cadastral register, in which the building is marked with a cadastral number, its borders are clearly circumscribed, and it has an insurance number. (..)"[69] (R. Becht)

Becht goes on with his example and shows that not only the microeconomist and the lawyer do not share the same understanding of what a building is, there is, in addition, the view of the manager and finally the one of the State. On a practical level, the implication of such divergent understandings is that data bases are filled with key figures of which nobody knows to what exactly they refer.

Divergent understandings of the same terms can therefore have quite seri-

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68 „Zu abstrahieren: Was weiss ich, was sollte das Management wissen, und auf welcher Stufe kann ich überhaupt beginnen, die Analyse zu präsentieren? Die Schwierigkeit ist, den Wissenstand des Managements einzuschätzen."

69 „Es gibt es häufig, dass jemand aus der Baubranche den gleichen Begriff verwendet wie jemand aus der Informatikbranche und darunter aber etwas ganz anderes versteht. (..) Zum Beispiel was ist ein Gebäude? Aus einer betriebswirtschaftlichen Sicht wird es als eine Nutzungseinheit verstanden und ist auch so im SAP abgebildet. Dazu kommen Kriterien wie man das Gebäude vermietet und verrechtet, die dann in die Definition einfliessen. Von der Rechtseite sieht dies ganz anders aus. Da gibt es ein Grundbuch, in dem ein Grundstück mit einer Katasternummer vermerkt ist und klar umschriebenen Grenzen und einer Versicherungsnummer."

ous consequences. Not only do expensive databases become useless, it can also be that a project starts in a direction which was not at all in the intention of the section leader.

> "The project leader and the section leader had a completely different understanding of certain concepts: ‚process management' for example. Some understood it as a management process, others as a support process. The section leader saw it as the management of the project entrance, project execution, and project ending. On the other hand, the committee of the project asked much more: ‚Should we give partial tasks of the project to external people or not?'"[70] (L. Schärer)

Particularly problematic of such misunderstandings is if they get uncovered only at a very late stage of the project and a lot of efforts and intermediate results therefore went in a wrong direction. Yet, it is not always easy to realize that two interlocutors are about to misunderstand each other, as states Stefan Jäggi:

> „When a client picks up a term that he had already heard in another context, he switches to this context. For me, it is often difficult to find out that he now talks about a completely different context than the one we have just been talking about"[71] (S. Jäggi).

Finally, misunderstandings do not only refer to single concepts. It can also be that a whole outcome of a meeting is understood differently by the various participants:

> "I remember a project meeting during which we had quite a broad discussion and talked about important issues. (..) Then, we revised the meeting on the basis of the protocol and realized that the head of the section, who was not there in the beginning, must have had understood something completely different. He expected something quite different from the project than the project manager. This was a bigger misunderstanding between the head of the section and the project manager"[72] (L. Schärer).

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70 „Der Projektleiter und der Gruppenleiter hatten ein völlig unterschiedliches Verständnis von einigen Begriffen. Prozessauftragsmanagement zum Beispiel. Die einen verstanden darunter einen Supportprozess, die anderen einen Führungsprozess. Der Gruppenleiter verstand unter Prozessmanagement: Projekteingang, Projektverarbeitung und Projektabschluss. Der Projektausschuss verstand darunter viel mehr die Frage: Geben wir Teilaufgaben des Projekts extern oder nicht?"

71 „Wenn der Kunde einen Begriff aufschnappt, den er schon einmal in einem anderen Gebiet gehört hatte, wechselt er in dieses Gebiet. Für mich ist es schwierig herauszufinden, dass er jetzt von einem ganz anderen Gebiet spricht, als von dem, in welchem wir uns gerade bewegten.

72 „Es handelt sich um eine Projektsitzung, in der man weit ausholte und wichtige Dinge besprach. (..) Danach wurde die Sitzung aufgearbeitet. Das Protokoll wurde zurückgestellt, danach hatten wir gemerkt, dass der Chef, der am Anfang nicht dabei war, etwas ganz anderes verstanden hatte. Er hatte etwas ganz anderes vom Projekt erwartet als der Projektleiter. Es handelte sich um ein grösseres Missverständnis zwischen Gruppenleiter und Teamleiter."

– Client is reluc-
tant to change

The last two challenges we discuss on the level of the mental models are mainly due to the characteristics of the clients. The first challenge is that a few clients show a general *aversion or hesitation to change current behavior or ways of thinking*. "The knowledge transfer can be inhibited by the simple rejection of something that is new"[73] (R. Baumann). In such a situation, it is particularly difficult for pom+'s experts to find open ears for their propositions, suggestions, and insights.

– Client is better
informed and
often has con-
trary information
at disposition

We have mentioned earlier on (see: The Expert – Decision Maker Situation) that the knowledge gap between the consultants of pom+ and their clients has become less blatant in the last years and that this brings various advantages for the communication. Yet, the fact that *the client is better informed* today than he used to can also represent one challenge for the knowledge communication.

> "The client is better informed and more prejudiced today. He finds information in the Internet, at congresses (..). We therefore always have to convince the client and show him how our views are related to others. We have to clearly outline why our approach is convincing" [74] (C. Kaufmann).

In this way, if the client has no knowledge at all within the field, then the communication between consultant and client can be extremely difficult (e.g. client lacks the knowledge to give a concrete briefing of what he/she needs, uses a completely different language, etc.). On the other hand, if the client has a good amount of knowledge and feels confident that he is knowledgeable as well, this leads to other problems as is the positioning and selling of the consultant's knowledge with respect to alternative propositions.

**Practices Rela-
tive to the Men-
tal Models**

– Put oneself in
situation of cli-
ent

One crucial practice of pom+'s consultants on the level of the mental models is to be able to *adopt the perspective of the client*, see the problem from his/her context, and understand his/her hesitations and way of thinking. Only in this way, the consultant can adjust his communication to the client, both in content and form. "Ideally, I try to put myself in the position of the client, to grasp his background and feel what he can understand"[75] (N. Merkt). The

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73 „Der Wissenstransfer kann auch verhindert werden rein aus einer Ablehnung gegen Neuem."
74 „Der Kunde ist heute informierter und voreingenommener. Er findet Informationen im Internet, an Kongressen (..) und deshalb müssen wir dauernd den Kunden überzeugen, wie sich unsere Vorstellungen gegenüber den anderen Vorstellungen positionieren. Wir müssen ihm aufzeigen, weshalb unser Vorgehen überzeugt."
75 „Ich versuche mich idealerweise, in den Kunden hineinzuversetzen, zu spüren, welche Hintergründe er hat, was er versteht."

consultant needs to estimate the level of knowledge of his client, his preferences in terms of communication formats and styles and tune his message along these lines. In fact, "the identification with the client is everything. I need to know how he reasons, what he desires, how he decides. In other words, I need to know what he wants to have covered and what his priorities are"[76] (S. Jäggi). To be able to do so, we have discussed earlier on that pom+ tries to get to know the client on a personal level and to engage in face-to-face communication (see: Practice Relative to the Group Dynamics: Establish a trustworthy and amicable relationship)

– Put own expertise in perspective, question it critically, and use client as source of information

Another major practice of pom+ is to *use the client as a prior source of information* rather than imposing an own solution, theory, or approach. With this practice, it is less probable that the client shows too many resistances to implement a solution because he feels that he himself has developed it. The consultants of pom+ have to be skilled in various techniques how to elicit the necessary information.

> "It is important, to ask the right questions. In order to do our work well, we need to receive the right information of the client. One can ask the questions in such a way to receive the answer one would like, but without the other noticing so. But not only. One can use questions to steer someone in a certain direction und make him favorable of a certain idea. The consultant needs to have in mind the direction in order to know what information he/she needs from the client"[77] (N. Merkt).

On a cognitive side, the bigger challenge of such a practice is that the consultants of pom+ need to be able to critically question their point of view, to put it into perspective, and not to see it as an absolute truth.

> "With my education I have a very specific point of view that differs from the one of forestall engineers, politicians, and so on. It is therefore very important to not see one's knowledge as absolute, but to classify it"[78] (R. Becht).

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76 „Die Identifikation mit dem Kunden ist alles. Ich muss wissen, wie er denkt, was er wünscht, wie er entscheidet. D.h. ich muss wissen, was er abgedeckt haben möchte, was seine Prioritäten sind."

77 „Wichtig ist es, die richtigen Fragen zu stellen. Wir sind ja darauf angewiesen, die wichtigen Informationen vom Kunden zu bekommen, so dass unsere Arbeit auch gut wird. Wir brauchen ja den Input und das Wissen des Kunden. Man kann Fragen so stellen, dass man die Antwort bekommt, die man möchte, ohne dass es der andere merkt, aber natürlich nicht nur. Man kann auch Fragen brauchen, um jemanden in eine Richtung zu steuern und ihn für eine Idee zu gewinnen. Der Berater muss die Richtung kennen, damit er weiss, ich muss noch dies und jenes wissen."

78 „Mit meiner Ausbildung habe ich eine sehr spezifische Sichtweise, die anders ist als diejenige der Forstingenieure, Politiker, etc. Deswegen ist es wichtig, sein Wissen nicht als absolut zu sehen, sondern einzuordnen."

Next to the challenges and practices that are directly related to the communication between pom+ and its clients and that we have discussed until now, there are some further contextual issues of the communication, which favor or hinder the knowledge integration between the two parties. These are related to time, physical space, history, structural constellations, and specific questions of quality.

Challenges Related to the Outer Context of the Communication

– Time pressure

The strong time pressure, to which clients are exposed, represents a continuous challenge for pom+ and constitutes one of the most important contextual factors of the knowledge-intensive communication between the consultants and their clients. In the briefing phase, clients do not want to take the time, to explain in detail what their problems are, and what type of solution they envision.

> "Often I can see that the people in the higher positions do not want to take the time to really deal with a problem. They just want a solution: 'just start doing something and present something" (A. Pesenti). [79]

Later in the project, when results have to be conveyed, the increasing time pressure leads to ever more concise communication formats.

– History of previously failed projects

Finally, an important contextual factor is also the history of an issue within the organization of the client. In some areas, there have been already various unsuccessful attempts to solve a problem, so that people have become really cautious and prefer not to do any further attempts because they fear other failures. "There is always some resistance. 'We have tried that already 10 years ago. That did not work already then so it won't work today, neither'" [80] (L. Schärer). Related to such project failures are also relational tensions that have been established between the collaborators in the past.

> "There are projects, in which field the client has done already a lot earlier on and has been punished since the actions did not reach the intended goal. There are single people who are marked by the preceding history. They have a problem with someone, want to do

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79 „Oft stelle ich bei Leuten in höheren Positionen fest, dass man sich zeitlich nicht mit den Problemen auseinander setzen, sondern einfach eine Lösung möchte „macht mal irgendwie, bringt mal etwas."

80 „Es gibt immer wieder Widerstand. ‚Das haben wir schon vor 10 Jahren einmal probiert. Das funktionierte damals schon nicht, also wird es auch heute nicht gehen.'

things all on their own"[81] (C. Kaufmann).

Time and history are contextual factors that cannot be changed as such, but we have shown earlier how pom+ has practices in place on other dimensions of the presented framework that take his contextual factors into account and provide solutions for these challenges. For example, on the message dimension, pom+ systematically engages in activities of prioritizing, compressing, and using visuals, in order to reach a quicker and less time-consuming communication. Even if certain contextual factors are difficult to shape, pom+ does take action on others, as we will outline in the following.

Practices Relative to the Outer Context of the Communication

– Assure quality and credibility

As a purely service based company, it is determinant for pom+ to *assure the quality and expertise* of its collaborators and of the content of its communications. In fact, we have mentioned earlier the big challenges of signaling expertise and creating trust (see: Articulate Need: Definition of a Project's Parameters; Mistrust of client). How does pom+ assure the quality of its service in order to make sure to be perceived in the long term as a trustful and knowledgeable partner? First of all, pom+ has a recruiting policy that already assures a good quality of its collaborators. Only people with a degree from a university are employed, many of them come from the prestigious Swiss Federal Institute of Technology Zurich, and some even have double degrees, one in a technical domain and the other in the one of business administration. Once the people are employed as consultants, pom+ invests in their development through a tutoring system and by offering them continuous education. New consultants are supported in their project work by disposing at a more experienced internal coach. This procedure also assures continuity in the quality of the service. Next to such individual training, pom+ also engages in the development of the organization as a whole. Each year, pom+ organizes three one-day workshops to form the whole crew on issues that are particularly important for the company. In addition, once a year, they make a one-day leisure excursion and a skiing weekend to strengthen personal ties between the collaborators and to develop a pleasant and friendly company environment. All these measures are intended, at the end, to assure the quality of the service provided. Finally, pom+ is very actively engaged in networks of professional associations, which is important

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[81] „Es gibt Projekte, in denen der Kunde schon viel im Voraus in diesem Gebiet versucht hat und aufs Dach bekommen hat, weil die Handlungen nicht zum Ziel führten. Es gibt einzelne Leute, die sind gebrannt von der Vorgeschichte, haben ein Problem mit jemand anderem, wollen Dinge an sich reissen."

to mark one's own credibility within the communities and the markets of activity.

– Limit translation function of expert (between client and third parties) and put technicians, IT-specialists in direct contact with client

Usually, there are not one but various collaborators from pom+ who are working on a project for a client. Rather than using the consultant as a translator who communicates internally what he/she has discussed earlier with the client, it is general practice of pom+ to *put technicians or IT-specialists in direct contact with the client.*

"If the programmer never sees the client, then the interface is much more difficult. In projects of pom+, the programmer always comes along to the client. (..) I believe that this is really useful. In this way, we decide together what the tasks are. It is not that I would translate something and he would again understand it differently"[82] (A. Pesenti).

By allowing technical experts like IT-specialists a direct contact with the client, pom+ minders the chance of possible misunderstandings and helps these specialized collaborators to better understand the context of their work.

– Organize events in memorable and pleasant locations that include also informal encounters

For pom+, it is further important to choose a pleasant physical surrounding for the encounters with their clients. Workshops take place in special settings, like for example in the center for culture and congresses (KKL) in Lucerne, the newly opened center of Paul Klee in Bern, or a minimalist retreat center in the mountains.

"The experience is important. A workshop entails a lot of symbolism. It is not only a question of transmitting knowledge, but also of communicating a specific imagery. Afterwards, you like to remember how we were in Lucerne two years ago. The experience is always important to convey knowledge"[83] (G. Bilotta).

In this way, pom+ carefully chooses the physical locations of its workshops so that people live an experience and create a strong mnemonic anchor for the knowledge that is communicated during these workshops. Another advantage of choosing such locations is that people are invited to get to know each other

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82 „Wenn der Programmierer den Kunden nie sieht, ist die Schnittstelle natürlich viel schwieriger. In den Projekten bei pom+ kommt der Programmierer immer mit. (..) Ich finde das hilfreich. So bestimmen wir gemeinsam die Aufgaben, welche zu tun sind. Es ist nicht, dass ich etwas übersetzten würde und er versteht es dann wieder anders."

83 „So ist auch das Erlebnis wichtig. Ein Workshop hat so viel Symbolik dahinter, es geht nicht nur um die Vermittlung von Wissen, sondern eine Symbolik zu kommunizieren. Man erinnert sich dann immer gern daran, dass man vor zwei Jahren in Luzern war. Das Erlebnis ist immer wichtig, um das Wissen zu vermitteln."

better and to build informal and emotional bonds. This helps the consultants of pom+ to understand the client's needs, his/her personality and way of thinking and to build a real partnership with the customer (see: Practice Relative to the Group Dynamics; Establish a trustworthy and amicable relationship).

Conclusion   We have described the process of the knowledge intensive communication between pom+'s consultants and their clients and structured this description with the help of a phase framework. We have argued that knowledge is not only shared and integrated once the consultants have conducted their analysis and present their results and suggestions to their clients. In fact, the idea of the consultants that walk in an organization, do some analysis and hand out a final report that nobody will read anyway, is not what we could find in the case of pom+. Rather, the knowledge intensive communication starts with the identification of the relevant experts and expertise and when the client's need is conveyed and the briefing communicated. It goes on in a collaborative working mode during the phase of analysis and finally takes place when communicating the results and propositions and while implementing them in decision making and action. We have discussed the challenges and practices specific to these various phases. Then, we have outlined further challenges and practices that are not specific to one particular phase, but that are more general to the knowledge intensive communication between pom+ and its clients.

Figure 22 gives a summary overview on these phase-independent, more general challenges and practices of the knowledge communication. Since they are manifold, we would like to summarize them with three overarching practices that are most characteristic and of pom+'s communication and relation with their clients.

Challenges

		Practices

<table>
<tr><td>• Information is too theoretical, technical, and abstract
• Difficulty to prioritize, select, and condensate large amount of information</td><td>**Message**</td><td>• Give concrete examples and work with metaphors
• Work with visualizations
• Reduce complexity in ways that suit the characteristics of the addressee</td></tr>
<tr><td>• Lack of the big picture</td><td>**Process**</td><td>• Retreat from group conversation and engage in bilateral talks to clarify situations
• Engage active listening by rephrasing (to verify the understanding)</td></tr>
<tr><td>• Knowledge gap between client and consultants create relational tensions
• Counterproductive group dynamics between various contact people of a client
• Responsibilities and functions between various contact people of a client are not clear</td><td>**Group Dynamics**</td><td>• Establish a trustworthy and amicable relationship</td></tr>
<tr><td>• Client is not familiar with another perspective and approach on things (e.g. procedural thinking). Risk to rigidly impose own perspective
　• orientation on practice vs. orientation on theory and method
　• orientation on isolated aspects vs. overall perspective
　• orientation on quick fixes vs. comprehensive, integrated solutions
• Difficulty to estimate knowledge of addressee and to adapt to it
• Misunderstandings of terms arise because of diverging backgrounds and perspectives, but remain hidden until late in the process
• Client is reluctant to change
• Client is better informed and often has contrary information at disposition</td><td>**Mental Models**</td><td>• Put oneself in situation of client
• Put own expertise in perspective, question it critically, and use client as source of information</td></tr>
<tr><td>• Time pressure
• Client is not motivated to take on time and effort required for the development & implementation of a new solution
• History of previous, unsuccessful undertakings and projects</td><td>**Outer Context**</td><td>• Assure quality and credibility
• Limit translation function of expert (between client and third parties) and involve technicians, IT-specialists directly
• Organize events in memorable and pleasant locations that also include informal encounters</td></tr>
</table>

Figure 22: Major Challenges and Practices in the Knowledge Communication of pom+

Overall Practices:

– Active collaborating & partnering

We have highlighted in various instances that a major characteristic of pom+'s interaction with its clients is *partnership* and *active collaboration*. "Often, it is a partnership. The consultant shall not appear as a know-it-all who simply wants everything to turn inside out"[84] (B. Buser). pom+ tries to build up a partnership with its clients and an active collaboration by engaging in face-to-face communication (workshops, presentations, meetings, etc.), by hands-on collaboration throughout the various phases of interaction, by getting to know each other on a personal level, and finally, by creating community-building experiences (e.g. organizing events in memorable locations). We have shown that partnership and active collaboration are important to build a relationship of trust, to be able to identify with the position of the client, to build a shared understanding, to avoid resistances to change (because they are perceived to be

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84 „Häufig ist es eine Partnerschaft. Der Berater soll nicht als Alleswisser auftreten, der einfach Sachen umkrempeln will."

imposed from outside), and to have the necessary alliances and commitment to implement certain solutions. All these are preconditions for an effective knowledge communication. Bettina Buser outlines: "One of the most important conditions for a well functioning knowledge transfer between the consultant and the client is really that it works well on an interpersonal level"[85].

– Method as mediating and integrating artefact

A second important particularity of pom+'s communication is what type of knowledge they communicate and how they do communicate it. Rather than conveying purely domain specific insights and market knowledge, pom+ believes to communicate, in the first hand, methodological knowledge. Such knowledge includes, for example, approaches how to manage processes in order to guarantee their quality or how to proceed in front of a facility management challenge, i.e. how to move from the analysis of the problem to the development of the solution, and to its application. We have shown that the communication of this methodological knowledge is particularly challenging because it implies different ways of thinking about issues and different ways of approaching them (see: Challenges Related to the Mental Models). At the same time, pom+ considers it to be more important to counsel the client in the method how to approach a facility or construction management issue, rather than proposing time the final solution for their current facility management problem.

From pom+'s standpoint, having a clear methodological approach is important for the client to understand the objective of a project and to see the way that leads to this objective.

"In the beginning, we always try to outline the method and show the client where he finds himself in the journey. It is not always easy to have everybody in the boat. One has to say: 'trust us, it will turn out fine, now we are here. We need this element because we need to do this and that later on'"[86] (G. Bilotta).

We have outlined that pom+'s methodological approach also permits to systematically use the client as a source of knowledge, to structure the information he/she provides and to play it back in this more systematic form. "There exists a lot of internal knowledge already. In part, it is only a matter of opening up a

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85 „Eine wichtige Bedingung für einen gut funktionierenden Wissenstransfer zwischen dem Berater und dem Kunden ist wirklich, dass es auf der zwischenmenschlichen Ebene gut funktioniert."

86 „Wir versuchen zuerst immer, die Methodik aufzuzeigen und dem Kunden aufzumalen, wo er sich auf dem Weg befindet. Es ist nicht immer einfach, alle gleich im Boot zu haben. Man muss sagen: ‚Vertrauen, es kommt gut, wir sind jetzt da. Wir brauchen dieses Element, weil wir später doch dies und das machen müssen.'"

problem and better structuring the knowledge"[87] (B. Buser). In this way, the strong focus on the method permits pom+ to solicit already existing knowledge, to make it more explicit, and to integrate it along a theoretical framework. It is a structure that permits to collect, reorganize and combine already existing, but diffuse and often more tacit knowledge. In this way, the method serves as an integrating artefact[88]. It has an integrating function because it allows the consultants to elicit the client's knowledge that is embedded in practice, it structures this knowledge and combines it with more abstract and theoretical knowledge of the consultant. From the perspective of the client, the method provides a structure into which he/she can model his problems. The method provides a shared platform thanks to which the consultant can grasp the clients' practices and concerns and the client, on his side, sees a direct application in his context of the consultants' ideas and knowledge.

Next to the various advantages of the use of a clear methodological approach, we have also outlined that a too rigid imposition of a methodological approach causes various difficulties.

"I hadn't understood the client. I had started in a too complex, too difficult way. (..) With the method I did not hit exactly what the client actually wanted. (..) Maybe, I came too quickly with our method, without exactly knowing his requirements. He might have been a person who preferred to approach the issue from a pragmatic and not a theoretical viewpoint. (..) As a consultant, you must be flexible enough and present a method as a proposition and leave room for other possibilities"[89] (R. Baumann).

It remains a difficult balancing challenge to know how strictly one has to impose the methodological approach, since getting rid completely of the methodological structure would quickly lead to a chaotic situation, in which the cli-

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87 „Es ist ja schon so viel internes Wissen vorhanden. Zum Teil fehlt es einfach nur, einen Knopf zu lösen und das Wissen besser zu strukturieren."

88 Carlile and Star see methods as a boundary object (objects that are shared and sharable across different problem solving contexts), which allows for the integration of knowledge across knowledge boundaries, such as across the differing knowledge of consultants and clients (Carlile, 2002; Star, 1989).

89 „Ich hatte den Kunden nicht begriffen. Ich hatte für ihn zu komplex, zu schwierig angefangen. (..) Ich traf von der Methode her nicht genau das, was er eigentlich wollte. Gleichzeitig stimmte es auch nicht von der Chemie her. Vielleicht kam ich auch zu schnell mit unserer Methode, ohne seine Anforderungen genau zu erkennen. Er war vielleicht eine Person, die eine Sache eher pragmatisch und nicht theoretisch angehen möchte. (..) Als Berater müsste man so flexibel sein und eine Methode als Vorschlag zu präsentieren und andere Möglichkeiten offen zu lassen."

90 „Ich beginne nicht damit, jemandem Methoden aufzudrücken und verwende sie nur im Hintergrund, um das Wichtige zu Erfahren. (..) Man braucht ein Vorgehen auch, damit der Kunde weiss, wohin die Reise hingeht. (..) Ich lasse die Leute zuerst einmal reden und stelle ihnen Fragen. Der Nachteil an diesem Vorgehen ist vielleicht, dass es viel Zeit braucht. Es ist aber auch vertrauensbildend, dass man zuhört, dass man sie versteht."

ent would loose any sense of orientation.

> "I do not start by imprinting someone certain methods. I use them only in the background, to get to know what is important. (..) One needs an approach also so that the client knows the aim of the journey. (..) I first let the people talk and ask some questions. The disadvantage of this approach is that it needs a lot of time. But it also creates the trust that one listens and tries to understand"[90] (C. Kaufmann).

In this way, operating with a clear methodological approach often implies additional work and more time requirements, and pom+ needs to convince the clients of its advantages and use and has to motivate then to invest the extra time. Next to the mentioned advantages of soliciting knowledge, giving structure, creating trust and signaling expertise, educating the client on a method and approach also brings the advantage for the client that he/she can apply the same method in other instances and contexts in the future.

– Face-to-face interaction for building trust, eliciting knowledge, switching perspectives, and creating shared understandings

Functions:
– to build a sufficient common ground (e.g. identify with the thinking of the vis-à-vis) and avoid misunderstandings
– to elicit and structure knowledge
– to reduce resistances to

A final central characteristic of pom+'s knowledge intensive communication is the emphasis on face-to-face formats (i.e. meetings, oral presentations). Throughout the description of the communication phases, we have worked out the various functions that can be attributed to the face-to-face communication. First, in the beginning of projects, it is important to *signal a collaborative working mode* and *to avoid misunderstandings*. The interactive mode communicates to the client that the consultant does not intend to superimpose his already-made solution, but is interested in developing a solution in a collaborative way. In fact, pom+ *sees its clients as the most valuable source of knowledge*. By engaging in interactive means of communication and participating in the client's work environment, pom+'s consultants try to understand the clients' preferences and convictions, to document the client's experiences and to *elicit knowledge* that is embedded in the practices of the client. By doing so, the client has the feeling that the final solution is, at least in part, his idea and therefore develops fewer resistances to implement them. Another advantage of engaging in interactive means of communication is that the communicators have the *possibility to rephrase what one has understood, to ambient ones message in the specific context of the addressee and therewith to develop a shared understanding*. Spending time together, grasping a lot of non-verbal cues, being exposed to the other's thinking, and getting to know each other on a more personal basis, these are all important elements for establishing a common ground sufficient for creating a shared understanding between the consultant and the client. The common

change

– to establish a trustful, amicable relationship and partnership

– in situation of crisis, to clarify issues and to manifest your commitment

ground implies aspects as being able to *put oneself in the position of the other party*, to understand his/her preoccupations, and the reasons of one's thinking. We have further shown that the stress on face to face conversations allows for building up a *trustful and amicable relationship*. We mentioned that trust is especially important when one has to externalize tacit knowledge, when one has to find words for what is cloudy and not well defined, when something is complex, and when one has to explain something he/she feels embarrassed about (e.g. admitting errors). Finally, in situations of crisis, the physical presence is important to *show commitment and to clarify issues*.

"The moments of crisis of a project are those instances that can have large consequences. Here, the personal contact, being present on the spot, and being knowledgeable how to communicate are really central"[91] (R. Becht).

In summary, the case on pom+ has put some light on how consultants specialized in the real estate, construction, and facility management sector communicate their expertise and insights to their clients. We particularly focused on the challenges that make this communication a difficult one and we showed which practices this particular consultancy has in place to overcome at least some of these challenges. Most characteristic for pom+ is that it uses the method as a mediating and integrating artefact, that it engages in an active collaboration and partnership with the client (rather than sporadic, formal interactions), and that it therefore focuses on interactive, face-to-face modes of communication. In doing so, pom+ aims with all means to establish a sufficient common ground among them and the client, which includes not simply a shared understanding of terms, but an appreciation and understanding of the reciprocal perspectives, as well as aligned objectives. With this, pom+ also aims to overcome many barriers to change and to assure a sufficient commitment by the client. pom+ does not view the knowledge communication as being unilateral; rather, knowledge integration takes place in both ways. The solution that, at the end, is more likely to be implemented cannot be anything else than the integration of the methodological, theoretically informed knowledge of the consultant with the concrete, specific, every-day experiences of the client.

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91 „In Krisensituationen sind diejenigen Momente des Projekts, die sehr schwierig sind und grosse Konsequenzen haben können. Hier ist der persönliche Kontakt, das Präsent-Sein vor Ort und das Kommunikationswissen ausschlaggebend."

Appendix 4

List of Interviewees for pom+ Case

(1) Interview with Sarah Amsler, dipl. Betriebsökonomin FH in Facility Management, consultant at pom+, Zürich, March 29, 2004

(2) Interview with Roger Baumann, former senior consultat at pom+, Zürich, March 30, 2004

(3) Interview with Ralf Becht, consultat at pom+, Zürich, March 29, 2004

(4) Interview with Giuseppe Bilotta, member of the executive board of pom+, Zürich, March 29, 2004

(5) Interview with Bettina Buser, consultat at pom+, Zürich, March 30, 2004

(6) Interview with Stefan Jäggi, Dr. sc. techn., dipl. Ing. ETH, Senior Consultant at pom+, March 29, 2004

(7) Interview with Christian Kaufmann, former senior consultat at pom+, Zürich, March 30, 2004

(8) Interview with Natasha Merkt, architect ETH and consultat at pom+, Zürich, March 30, 2004

(9) Interview with Andreas Pesenti, architect ETH and consultat at pom+, Zürich, March 30, 2004

(10) Interview with Lukas Schärer, dipl. Ing. ETH, senior consultant and Executive Master of Services Marketing at pom+, Zürich, March 29, 2004

Appendix 5

Case #3: The Knowledge Communication between IT-specialists and Business Managers (InSure)

Overview on the InSure

In this case study, we analyze, in the context of the insurance company In-Sure[92], how the knowledge-intensive communication between the company internal IT-experts and the managers of the business line unfolds. Aim of their interactions is to take informed decisions with regard to changes and developments of IT-applications, which support insurance officials in their daily work.

InSure is part of one of the leading financial services companies worldwide. It employs around 20'000 employees and has a business volume of CHF 30 billion. The group is active in Europe, North America, and Asia. It has close to 15 million clients worldwide, which are composed both of private individuals and small and medium-sized enterprises.

Activities are divided into two main units: The smaller Non-Life segment and the more important Life & Pensions segment. The Non-Life segment offers insurance products that cover the range of health and accident insurance, motor vehicle, property, fire, and general liability insurance. The Life & Pensions segment offers 1) retirement pension and saving solutions (voluntary & mandatory), 2) life and disability insurance and 3) investment products.

The IT department encloses three application development units (one for the Life segment, the other for the Non-Life segment, and the third "Common Applications" deals with applications that are general and cannot be allocated to one segment). Another part of the IT deals with the infrastructure and provides and manages all physical IT means. Finally, there is an area called "Management Support", which deals with typical staff functions like strategy development. In total, the IT department engages 200 people and relies also on close to 50 external specialists.

The IT section Life & Pensions Applications (which constitutes the narrower context or this investigation) is responsible for the development of applications

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92 For privacy reasons, we omit the name of the corporation, as well as the characteristics that make its identification definite.

for the business in Switzerland. 70 people work in this department. As Figure 23 outlines, it is structured in four sectors: Individual Life Applications, Group Life Applications, Channel Applications, and Business Support Applications. Each sector engages between 15 and 25 employees and is made of various development teams, each of a size of around five IT specialists.

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                    ┌──────────────────┐
                    │  Life & Pensions │
                    │   Applications   │
                    └──────────────────┘
        ┌───────────────┬───────────────┬───────────────┐
┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────┐
│ Individual Life│ │  Group Life  │ │   Channel    │ │Business Support│
│ Applications  │ │ Applications │ │ Applications │ │ Applications  │
└──────────────┘ └──────────────┘ └──────────────┘ └──────────────┘
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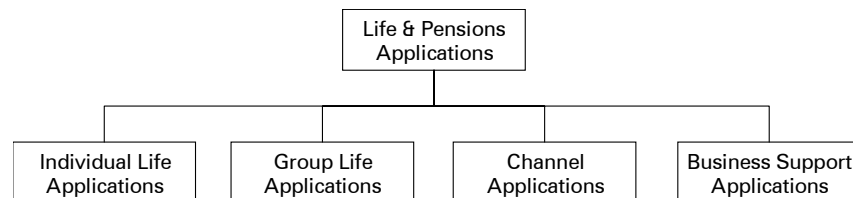
Figure 23: Organization of the IT Department Life & Pensions Applications: 4 Main Sectors

The Expert – Decision Maker Situation

Triplet:
– IT technicians (experts)
– IT managers (experts and decision makers accordingly)
– Business line managers (decision makers)

The knowledge communication of this case deals with the communication around decisions that concern the development and remodeling of IT applications and IT systems. These IT applications have to be developed or changed in order to better support business workflows and processes such as, among many others, compiling offers, managing customer information, consulting clients, managing remunerations, calculating risks, verifying costumer claims, handling the back-office tasks, or analyzing and reporting financial numbers to the CFO. Since the IT applications define the working mode of the whole business line, such decisions can have considerable implications. The issues of these decisions are mostly complex since one IT-application is highly connected to the whole IT system. "We cannot position a new application on a virgin meadow. We have an existing system with a plurality of applications that are working. With the new application, we must be most certain not to endanger the fully running production"[93]. In order to take knowledgeable decisions on these issues, the communication takes place not merely among a duplet, but a triplet of experts and decision makers. In fact, the expert – decision maker situation exists first between the IT technicians and the IT management and second between the IT (both technicians and managers) and the business line managers.

The *IT technicians* have a variety of professional backgrounds (e.g. teachers, electricians, etc.) and most of them completed, in addition, the informatics school internal to the organization. They do the actual programming of the software

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93 „Wir können nicht einfach eine neue Applikation auf eine grüne Wiese positionieren. Wir haben ein bestehendes System mit vielen Applikationen, die laufen. Wir kommen von der Seite und wollen was Neues reinstellen, müssen aber sicherstellen, dass damit die Produktion, die voll am laufen ist, nicht gefährden."

applications, have clearly defined tasks and know for each task who is the contact person from the business.

The *IT managers* mostly have a master in informatics or in related topics such as electrical engineering and many of them completed a postgraduate in management sciences as, for example, an executive MBA. The IT managers designate the employees who work as leaders of IT development teams, of IT sectors, and of the entire IT department. Each team leader is responsible for the management of four to five IT technicians, for the general coordination with the business and with that also for the smooth passage from the business concept to the technical concept. Section leaders deal with the large lines of projects, worry mainly about the allocation of resources (time, personnel, etc.), and are determinant for the yearly planning of the larger IT projects, which is decided mainly in the steering committee. Four to five team leaders directly report to the sector leader. Sector leaders interact with the managers on the business side, which are mostly part of the executive board. Such interactions take place both in formal (the monthly steering committee) and informal (ad-hoc meetings) formats.

The *business line managers*, finally, are the team managers, project managers, up to members of the executive board of the business line of the market unit Switzerland. They are specialized in business, finance, and insurance issues and conduct the daily activities of an insurance corporation.

The IT technicians are in the role of executing (programming the applications) and of counselling both the IT managers and business line mangers. The IT field is very heterogeneous and rapidly changing and each IT technician brings in his/her specific expertise on technologies and IT approaches and the IT manager needs to rely on this specialized knowledge in the design or architecture decisions at issue, as mentions one section leader:

> "Since I am a career changer and my co-workers have more knowledge than me, the question is more of how to bring about a decision (rather than deciding myself). My job is to bring together the various aspects and to find a decision jointly"[94].

The IT managers such as the IT team leaders or sector leaders, on their hand, have

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94 „Da ich eigentlich ein Quereinsteiger bin und die Mitarbeiter ein grösseres Wissen haben, ist es viel mehr eine Frage, einen Entscheid herbeizuführen. Ich muss es zusammentragen und dann finden wir den Entscheid zusammen."

95 "Ein Grossteil der Entscheide sind Businessentscheide, wo ich einfach die Grundlagen für die Entscheide liefere."

to counsel the business line managers in their decisions which technological solution can best meet their business requirements. As such, the case represents the classical expert – decision maker situation where „a big part of the decisions are business decisions and I [the IT manager] can only provide a basis for the decisions"[95] as mentions the leader of the IT application department.

Catalysts for the Knowledge Communication
a) Short term requests from business line
b) Larger projects derive from business strategy and are defined mid-term in IT strategy
c) Projects that grow internally of IT department as a result of technological development

There are basically three ways how the decision situation upon the development or modification of an application comes about.

First, it can be a request from the business line and be initiated by a change in the law or by wishes from the business line regarding the automation of a process that has been carried out manually until today. Such a request can be rather short term and small or have a mid-time horizon and involve a pretty big project. The business collects every month a list of such requests regarding smaller changes. Mid-term and bigger projects are planned in the yearly steering committee where the IT-strategy is defined. The business can communicate its wishes and visions and the IT-strategy is aligned to the business strategy. Yet, the IT is not passively waiting for input, but proactively proposes themes.

"It is not a classical relation where the business says what we (from the IT) have to do. Often I see myself where a change is needed. For example, regarding the BVG revision [the changes in the Swiss law on retirement, beneficiary, and invalidity provision], I address the business upfront and say that we should deal with this issue and define who takes over which responsibilities"[96] (IT sector leader).

Next to the projects that are commissioned short-term or mid-term by the business, there are projects that *grow internally of the IT*. For example, there can be a need to migrate an old system or to do the upgrade to the newest Windows edition or to mend an error that someone tracked in the system. These IT-internal projects are rather rare and normally, the business line is the main contractor of IT projects.

Depending on the type of requests, the process how knowledge is communicated and integrated slightly differs. It is most articulate and structured for bigger projects and change requests, which arise in the business and become either

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96 „Es ist kein klassisches Verhältnis wo das Business sagt, was wir machen müssen. Ich sehe oft selber, wo Bedarf besteht und kann darauf hinweisen. Bei der BVG Revision beispielsweise, da gehe ich auf das Business zu und sage, das kommt jetzt, kümmert ihr euch drum oder wer macht da etwas."

part of the mid-term planning of the IT unit or are articulated as bigger projects during the year. For smaller projects, the process of knowledge communication is less formalized and articulate.

The Knowledge Communication Process between Experts and Decision Makers and its Main Challenges and Practices

In the following, we will describe the knowledge communication between IT experts and the decision makers on the business side. We will use the conceptual structure of the knowledge communication process model presented in Chapter 2 for structuring the description of the actual case. We will see whether the actual case fits into the general phase model for knowledge communication, which weight the various phases carry, and how they and the feedback-loops are configured.

An IT manager describes the overall process of the carrying out of an IT-project and the interaction between the IT and the business side as follows:

> "In my view, there is first a phase of *analysis*, then one of *procurement*, then of *transfer*, and finally one of *application*. In the phase of analysis, one first has to understand, what the project is about. Then, we have to comprehend where to make decisions and where knowledge deficits exist. If those exist, we move to the procurement phase where one tries to acquire the lacking knowledge. Then one elaborates and organizes the knowledge following the organizational functions. Finally, the knowledge transfer and the integration of the singular pieces of knowledge into a whole." [97]

In comparison with the theoretical process we have proposed, this manager identifies similar phases, even though in a different order: A phase of analysis, one of the procurement of the necessary expertise (we call it identification), one of transfer and integration into the actual decision (we call it conveying insights, solutions, and suggestions). Yet, as we have claimed in Chapter 2, the knowledge communication process has various feedback loops (e.g. from analysis to identification) and does not necessarily need to start with the identification of experts and expertise.

Discrepancy Between the Planned and

Before describing the process of interaction between the IT-experts and the decision makers on the business side in more detail, we would like to pinpoint to

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97 „Für mich gibt es eine Analysephase, dann eine Beschaffungsphase, dann eine Transferphase und dann schliesslich eine Anwendungsphase. In der Analysephase geht es zuerst einmal darum zu verstehen, worum es sich beim Projekt dreht. Wo muss man überhaupt einen Entscheid fällen? Man muss verstehen, wo Wissensdefizite bestehen. Falls solche Wissensdefizite bestehen, kommen wir in die Beschaffungsphase, d.h. man versucht, das fehlende Wissen zu beschaffen. Dann braucht es ein stufengerechtes Aufbereiten und Organisieren von Wissen. Schliesslich kommt der Wissenstransfer. Und schliesslich das Abrufen vom Wissen, das heisst die Integration von dem einzelnen Wissen zu einem Ganzen."

Carried-out
Knowledge
Communication
Process

one limitation of this process description. There is some *discrepancy between the way the process is planned and how it is actually carried out*. This is mainly due to the recent development towards a stronger formalization of the processes for that the well-established routines and informal processes have to be replaced by the newer formal processes. Especially for the smaller projects (Figure 24), which are planned and conducted in a pretty short timeframe processes are still more characterized by the informal rather than the formal processes. One IT technician mentions in this regard:

"With the exception of larger projects, there are not many formal processes. The mandate, for example, can arrive in many possible ways, orally, written. (..) In effect, we have never worked with business concepts, which actually would be necessary to implement something correctly. I have to do a resource planning and I can do this well only if I exactly know the requirements from the business. Otherwise, it remains too vague"[98].

The result of the poor formalization of the process of how the business line communicates its need to the IT and how the IT translates it to formal requirements, has repeatedly led to unsatisfactory results such as delays or misunderstandings that were discovered only late in the process.

"Over and over again, we were confronted with the fact, that we had received an assignment from the business and the IT-technician took it as such and started to process it the way he had understood it. He then tested it and sent it to the production. As a result, the people from the business line were exasperated and said: 'No, only in this one particular case, we want it this way. For all the other cases, we want it completely differently.' We had too many mistakes and misunderstandings"[99].

Out of these experiences, the IT application unit - in collaboration with the business - started to define more formal processes. They were quite rigorously implemented for larger projects, but less so for the smaller, short-term projects.

Overall Charac-teristics of the

Figure 24 and Figure 25 show the knowledge communication processes between the IT technicians, the IT managers, and the business line managers as they

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[98] „Mit Ausnahme von grösseren Projekten gibt es hier nicht viele formelle Prozesse. Zum Beispiel, wie der Auftrag reinkommt, das kann in ganz verschiedenen Formen sein, das kann mündlich sein, schriftlich. (..) Wir haben eigentlich noch nie mit Fachkonzepten gearbeitet, die eigentlich notwendig wären, um die fachlichen Kenntnisse zu besitzen, um etwas korrekt umsetzen zu können. Ich muss ja dann auch noch eine Ressourcenplanung machen und eine solche kann man eigentlich nur gut machen, wenn man die Fachanforderungen kennt. Sonst bleibt sie einfach vage."

[99] "Es hat sich immer wieder gezeigt, dass wir einen Auftrag vom Business bekommen haben, der Informatiker diesen entgegen genommen hat und ihn so bearbeitet hat, wie er ihn verstanden hat. Dann hat er ihn getestet und in die Produktion gegeben. Der Fachbereich hat dann die Hände verworfen und gemeint: ‚Ja nein, nur in dem einen Fall möchten wir es so, nicht in dem anderen, dort möchten wir es ganz anders.' Fehler und Missverständnisquote war zu hoch."

Knowledge Communication Process:

- The phases 'articulate need' and 'convey insights, suggestions, & solutions' carry most weight

- Repeated refinement cycle between the phases 'analyze problem' and 'convey insights, suggestions, & solutions'

- Larger projects have slightly more articulated processes for phases 'articulate need , 'analyze problem', and 'convey insights, suggestions, & solutions'

are formally planned for smaller and for larger IT application projects. Overall, the figures show, first, that the IT and the business departments of InSure allocate much attention to the second ('articulate need') and fifth phase ('apply & implement insights & solutions'). Second, there is an important refinement cycle designed into the process for a clearer and more specific articulation of the need. Third, the small and large projects differ with regard to the phases 'articulate need', 'analyze problem', and 'convey insights, suggestions, and solutions'. These three phases are more articulated for the larger mid-term projects.

In the following, we outline very briefly the characteristics for smaller projects and will then describe in more detail the knowledge communication process for larger IT projects.

For *smaller projects*, the process is planned in the following way. The various sections and teams of the business line have clearly defined contact people of the IT application department (point 1 in Figure 24). Each section of the business continuously collects their modification wishes. With the help of an account system, they describe each request briefly and send this list to their respective IT team (point 2). The IT specialists do a rough resource estimation (time required, number of programmers, additional costs, etc.) for each request (point 3). Since the total amount of requests usually surmount the available resources, the business team does, on this basis of the first estimation of the IT, a prioritization of its modification requests (point 4). Then, members of the IT team and of the business team meet and the various requests are discussed. Next to these meetings where all applications are discussed jointly, bilateral meetings between the two team leaders are necessary and each single request has to be discussed in detail (point 5). On the basis of these discussions, the IT team can write down the technical requirements (point 6). Sometimes, with this written document at hand, the business refines its request and further discussions are necessary (go back to point 5, several such feedback cycles (arrow 'e') are possible). Once the two parties have established a shared understanding, they sign a scope contract, where they clearly circumscribe the parameters of the solution to implement and define the needed resources in terms of time and personnel (point 7). The task is then subdivided in clear chunks of work and assigned to the programmers who start to develop the application. In this phase, the interaction with the business is less intense, only if the programmer does not understand a requirement, he/she will address his/her interaction partner from the business side (point 8). Sometimes, with the development ongoing, the original request can be changed

slightly through formal modification requests (point 9). The people from the business realize that they would like some aspects to be resolved differently or the IT specialists recognize that a solution technically can not be conducted in the envisioned way. Once the application is developed, the IT tracks possible errors and then sends the reviewed version to the business, which also checks for errors. Both parties define which final changes still need to be done (point 10). At last, the application is implemented into the existing IT system (point 11).

Figure 24: The Knowledge Communication Process for Smaller Changes and Developments in IT Applications as It Is Formally Planned

For *larger IT application projects*, the knowledge communication process is characterized as shown in Figure 25. In the following, we will describe it phase by phase.

Identify Experts & Expertise	Articulate Need	Analyze Issue & Develop Possible Courses of Action	Convey Insights, Suggestions, & Solutions	Apply & Implement Insights & Solutions
1. Role of experts and **decision makers and reciprocal interaction partners are institutionally defined:** the various teams of IT experts of IT Life & Pensions Applications unit are designated to specific areas in the business 2. Informal networks within the organization leads to the calling in of single internal experts into projects (e.g. IT architects) 3. External experts are contacted by the IT teams	4. Face-to-face meetings between managers from business line and IT specialists 5. IT specialists conduct interviews with managers from business line 6. Business line writes business concept with the help of IT	7. IT (in interactive collaboration with business) conducts high level technical analysis: analysis of situation, of possible technical solutions and their impact on IT architecture, rough cost and time estimations 8. IT conducts detail analysis and elaborates three feasible technical solutions	9. Joint preparation of a preparatory study 10. Discussion in steering committee and decision on go, no-go, or revision	12. Develop application: Limited interaction between business and IT, bilateral communication mainly to clarify emerging questions plus weekly coordination meetings 13. Possible modification requests both from business and from IT 14. System test (by IT) and user-acceptance test (by business) to track the errors of the application and to define the final modifications 15. Release and implementation of the application in existing soft- and hardware structure 16. Training for users organized by business
	11. Scope contract: solution to implement, agreement on costs, times of delivery, signature from both parties			

Figure 25: The Knowledge Integration Process for Larger Changes and Developments in IT Applications as it Is Formally Planned

Figure 26: The 'Identify Experts and Expertise'-phase

Characteristics:
- Experts and decision makers are institutionally defined
- Phase is of low importance

The identification of the relevant experts and expertise (see: Figure 26) is not extremely critical or challenging in the context of this case. Expertise is in-house and contact partners are defined by the organizational structure and the formal processes. Along the different levels of the hierarchy, business line managers have clearly designated contact people on the IT side and IT experts also know very well who to contact when they need information on the business

Challenges:

– Identify infor-
  mal experts
  and grey emi-
  nences within
  the large or-
  ganizational
  context

– Deal with
  relational ten-
  sions that arise
  due to the in-
  clusion of ex-
  ternal experts

issues (point 1, Figure 25). Even if these contact people are formally defined, because of the size of the organization, it is not always obvious – especially for newcomers - to discover who is the responsible of a certain function or task. Next to the formally defined functions and designated interaction partners between the business and the IT, *informal networks* within the organization are important for the inclusion of single internal experts into projects (e.g. IT architects) (point 2, Figure 25). "When the business writes a business concept for the IT department, they often call me because they know that I have worked on many similar projects and that I know their processes pretty well"[100]. Informal networks are important also to know the people who have a lot of informal power and who can impact on decisions quite substantively: "Sometimes, the one right or left to the decision maker knows more than he himself and you would have to try to influence these people. It is often as you know, knowledge is power"[101].

External experts play a certain role in the development of new IT application systems (point 3, Figure 25). Such experts can be temporarily needed for their specialized expertise regarding a particular application, a programming language, etc. To a smaller extent, the IT department also relies on external business consultants. Yet, in the last years, their role has diminished in view of tighter financial resources and the obtained results that were not always optimal as states one IT expert:

> "For some time, our management acquired the intelligence and know-how from outside, from Gartner Group or McKinsey. (..) Sometimes, it would have been better to rely on existing systems and internal people. In these occasions, the communication did not work very well between the people from the strategy and those who have some knowledge of the daily business and the system"[102].

By drawing on external experts, the organization risks not to utilize existing internal knowledge at its best. It seems that the external experts are sometimes viewed as threats to the existing organizational reality and can create a problem-

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100 "Deswegen kommt der Fachbereich auch auf mich zu. Sie erstellen ein Fachkonzept und holen mich, weil sie wissen, dass ich schon in vielen Projekten mitgearbeitet habe und mich in den Prozessen sehr gut auskenne."
101 „Manchmal weiss der links und rechts mehr als der eigentliche Entscheidungsträger und man müsste diesen stärker bearbeiten. Sie kennen ja den Ausspruch, Wissen ist Macht."
102 „Eine Zeit lang holte unser Management die Intelligenz und das Know-how von aussen, von Gartner Group und McKinsey. (..) Es wäre besser gewesen, man hätte mehr auf das bestehende System und die internen Leute geschaut. Dort hat die Kommunikation nicht gut funktioniert zwischen denen, die ein bisschen eine Ahnung haben vom Tagesgeschäft und vom System und dem Strategiebereich."

atic context for sharing and integrating knowledge.

Practice in the
Phase 'Identify
Experts & Exper-
tise':
− Open the
informal com-
munication
channels to a
new employee

In view of the importance of informal networks in order to assure the fluid-
ity of the knowledge communication and the integration of expertise in decision
making, one practice is that the direct superior *opens a lot of formal and infor-
mal communication channels for his/her employee.*

"I try, for example, to introduce each employee, who receives a new role, to the people
from the business line so that he gets to know at least the 10 most important people from
the business"[103].

**Articulate
Need: Defini-
tion of a Pro-
ject's Parame-
ters**

Entanglement
with the two
following phases
('Analyze Issue',
'Convey Insights,
Suggestions, &
Solutions')

Once the relevant experts and expertise are identified, the business line man-
agers outline the problem they are facing and for which solution they need the
expertise and skills of the IT experts (see Figure 4).
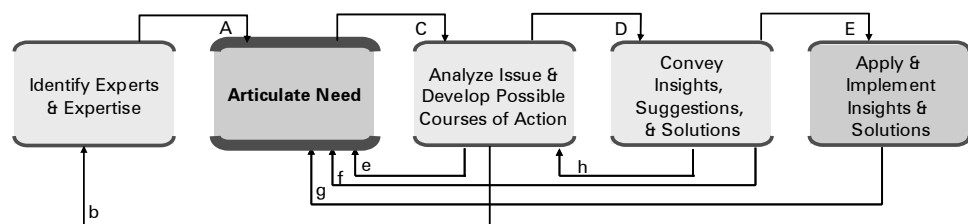
Figure 27: The 'Articulate Need & Define Project's Parameters'-phase

The people from the business cannot articulate their need and define their
requirements clear enough if they just communicate them in a written document
or call the responsible IT team by phone. Prior experience showed that the loose
articulation and formalization of this second phase in the process led to too
many *misunderstandings*.

Former Chal-
lenges:
• Unnoticed
misunder-
standings of
(parts of) busi-
ness request
due to formerly
loose articula-
tion of this
phase

"I remember, for example, the case of the tax announcements. The business wanted to
change the moment when a tax announcement had to be written. In its request, the busi-
ness did not write down one specific aspect, which we then did not take into account when
changing the application. At the end, the business was not pleased; the tax announcements
still came in the wrong moments. 'But why wrong, we did exactly, what you had said'.
'Well no, this is true not only for these cases, but you would have to see that globally.'
Then, as an urgency measure, we had to undo the changes, sit together and elaborate a very
clear and explicit change request"[104].

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103 "Ich versuche z.B. jeden Mitarbeiter, der in eine neue Rolle kommt, möglichst rasch mit den Leuten auf der
Businessseite in Kontakt zu bringen, so dass er mindestens die 10 wichtigsten Leute im Business kennen lernt."

This example shows that the misunderstandings that happened in this phase were often uncovered only much later in the process (when the changed application is already implemented in the system) and can therefore be very costly. Project delays and ineffective work are the result.

For this reason, the IT managers have started to give a lot of weight to this second phase of the need articulation. Most of all, they realized that they had to actively *involve the decision makers* from early on in the project.

> "We try to more actively engage the client from the beginning. The business has to tell us clearly what they want from us and, of course, we help it in this process. This process is sometimes difficult, also because the trees cannot grow into the sky. (..) We want to avoid that the client can come in the middle of the project and say: 'Oh, I now want it another way'" [105].

The decision makers from the business line need to understand the importance of this second phase in the process and the responsibility they have in it. Therefore, the IT unit tries to involve the decision makers by organizing various *face-to-face meetings* between the two parties (point 4, Figure 25).

> "We usually start the project with a series of workshops. We try to define the business process. Usually with the help of existing process descriptions and conjointly with the business, we start to document, what exactly is done at which moment and how" [106].

Thanks to these face-to-face encounters it is possible for the business line managers and the IT-specialists to establish a common understanding of what the project exactly is about and to define clear project parameters. Another and similar mean through which the IT aims to gain a deeper understanding of the actual request of the business, is that they conduct *interviews* with several people from the business (point 5). With the notes of the interviews, workshops, and meetings at hand, the IT team then helps the people from the business line to

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104 „Ich erinnere mich beispielsweise and den Fall mit den Steuermeldungen. Vom Business ist da eine Änderung gekommen, wann eine Steuermeldung geschrieben werden muss. In diesem Auftrag hatte das Business eine Änderung nicht aufgeschrieben und diese ist dann auch nicht realisiert worden. Dann waren sie zum Schluss nicht zufrieden, denn die Steuermeldungen kämen immer noch falsch. Ja wieso falsch, wir haben genau das gemacht, was ihr gesagt habt. Ja nein, das gilt eben nicht nur für die, sondern man müsste es gesamthaft sehen. Dann mussten wir die Änderung rückgängig machen so als Notfalllösung, wir sassen dann zusammen und erarbeiteten einen neuen, klareren und sehr expliziten Änderungsauftrag."

105 „Wir versuchen, den Kunden von Beginn an stärker einzubinden. Das Business muss uns klar sagen, was es von uns will. Natürlich helfen wir ihm dabei. Dieser Prozess ist manchmal schwierig, auch weil die Bäume nicht in den Himmel wachsen können. (..) Wir wollen verhindern, dass der Kunde inmitten des Projekts kommen kann und sagen kann: ‚Ah, ich will es nun doch anders'."

106 „Wir beginnen das Projekt meist mit einer Serie von Workshops. Erstens versuchen wir, den Businessprozess zu definieren. Anhand per bestehenden Prozessbeschreibung beginnen wir, in enger Zusammenarbeit mit dem Fachbereich, im Detail zu beschreiben, was wann wie genau gemacht wird."

formulate their written *business concept* (point 6). The development of the business concept is an interactive process between the business and the IT, as states one IT-technician:

> "It would be a task of the business to write down the business requirements, but in general, they don't do it in a way we can then translate the requirements to an IT-language and design. (..) This is why we actually describe what the business exactly wants and then go back to the business with this document to verify whether we have understood them correctly. (..) Oftentimes, the people from the business only know what they want exactly once it is written down. (..) Then we have three or four such interactions until we fully agree with the business what they actually want from us" [107][108].

From the learning of prior experiences, the IT-department has developed the practice to become a very active part even in the phase of the articulation of the need. It helps to solicit the ideas, problems, and wishes of the business by doing interviews and engaging in workshops and meetings. The active involvement in this phase on behalf of the IT is most extreme in the cases when the IT literally *writes the business requests for the business*. They do so because, although the business has difficulties in writing down what they actually need, they can recognize it once they have seen it [109].

What makes this second phase of the knowledge communication process so difficult? Why has the business such a hard time in articulating its needs well and precisely enough so that the IT can develop the technical concept and the IT application? There are various reasons responsible for this fact.

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[107] „Es ist im Grunde eine Businessaufgabe, die Anforderungen zu formulieren. Das Business macht es aber in der Regel nicht so, damit wir es dann umsetzten können in eine IT-Sprache und in ein Design. (..)So beschreiben wir eigentlich, was das Business genau will und gehen damit zurück zum Business um sicher zu sein, dass wir das Business richtig verstanden haben. Da gibt es so drei, vier Interaktionen, bis man sich mit dem Business einig ist, was sie eigentlich genau wollen. (..) Oft kommen die Leute vom Business erst dann darauf, was sie wirklich wollen, wenn es einmal niedergeschrieben ist."

[108] The re-elaboration of business requirement documents as technical requirements can be viewed as an exemplification of Wenger's conceptualization of boundary objects and reification processes. Boundary objects such as forms, documents, monuments, instruments, etc. can be used as shared objects between groups or individuals to coordinate divergent perspectives for some purpose (Star, 1989; Wenger, 1998). In the case of ‚business requirements' and ‚technical requirements', it is shown that boundary objects not only serve to connect various practices among each other, but that also meanings can be negotiated and shared understandings elaborated. It further becomes apparent that transformation processes (Carlile, 2004) sometimes need to be formed around various boundary objects in order to turn the transformation explicit.

[109] The difficulty in articulating something, but recognizing it when one sees it ('I know it when I see it') is a phenomenon that arises when people have to deal with knowledge with a strong tacit dimension. It is hard to externalize tacit knowledge through words, but it is easier to recognize it once we see it. As Weick claims, this difficulty has to do with the way, we make sense of our actions and the world around us. He refers to Wallas' sentence 'How can I know what I think until I see what I say' to argue that our sense-making process is mainly retrospective and that only after having done or said something, we can actually be more sure of what we think (Wallas, 1926: 10; Weick, 1995: 12).

One major aspect of the difficulty is that it is hard for the people from the business line to *make a precise question on something of which they have no or only little knowledge*. One IT manager coins this problem very poignantly as follows: "Information is something, of which you have yet no knowledge of[110]. And I really can't pose the right questions on something of which I do not know that it exists"[111]. In other words, the business might be able to phrase very roughly the problems or changes they encounter, but has difficulties in articulating precisely what it needs. One IT manager mentions: "The assignment from the business department is quite blurry. They know that they want more or less this and that. But they do not know enough to expose on five pages what we need to do"[112]. Similarly, another IT-technician states: "In general, their ideas are quite mazy and they just say: ‚Here we need something, there also.. (..)"[113].

In this way, people from the business line who are confronted with a problem and who recognize that a specific IT-application team can help them to solve this problem, they might not be capable to circumscribe neither the problem nor its implications precisely. Even less so, they can specify exactly what solution is required and adequate to solve the problem[114].

Another reason why it is difficult for the business to articulate business requirements is that it has to *define general rules on the basis of the daily experience of single cases*. The people from the business line live in their processes, they know what to do when, and can recall instances when they had problems with

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110 This understanding of information goes along with Bateson's famous definition of information as a difference which makes a difference (Bateson, 1972) and which must always represent a novelty to the person who receives the piece of information. (Bateson gives the example of a coin that drops in a person's palm. It is first understood as information, but with the time being in the palm, stops being news and as such information).

111 „Information ist ja etwas, was ich noch nicht weiss. Und ich kann ja gar nicht die richtigen Fragen stellen über etwas, von dem ich gar nicht weiss, dass es dies gibt."

112 „Der Auftrag des Business ist relativ schwammig. Sie wissen, dass sie vermutlich ungefähr dies und jenes wollen. Aber sie wissen zu wenig, um auf fünf Seiten genau darzulegen, was wir spezifisch machen sollen."

113 "Die haben ihre Ideen relativ wirr im Kopf, ‚hier brauchen wir noch etwas und da…'"

114 Belkin and his colleagues presented exactly this problem and called it the ASK-Problem (Anamolous State of Knowledge), yet in the context of information retrieval systems: "The ASK hypothesis is that an information need arises from a recognized anomaly [insufficiency] in the user's state of knowledge concerning some topic or situation and that, in general, the user is unable to specify precisely what is needed to resolve that anomaly" (Belkin *et al.*, 1982: 62). The manager from the business line has the difficult task to formulate a precise question on something he/she has no knowledge about. He/she can formulate his/her request only with his/her current knowledge and this might allow only for a rough and imprecise definition of the problem and the requirements for a solution.

115 „Wir brauchen ein Regelwerk, das dann für sämtliche Steuermeldungen gilt. Der Fachbereich konnte uns das nicht liefern. Diese Person war fachlich sehr kompetent. Sie konnte uns für jeden Fall sagen, ob es eine Steuermeldung braucht oder nicht. Und ich musste dann daraus ein Regelwerk erstellen. Man muss sehr präzise sein, denn der Computer ist dann sehr pingelig."

the application. Yet, in order to write software, one has to translate the single instances into general rules of the type: 'when X then Y, else Z'. All exceptions have to be considered meticulously. This passage from the single instances to the general rules is quite challenging as illustrates this quote of an IT-manager:

> "We need a body of rules, which are valid, for example, for all tax announcements. The business could not come up with such a general set of rules. My contact person on the business side was professionally very competent. She could tell us for each case, if we need a tax announcement or not and I then had to do the translation into a body of general rules. One has to be very precise because the computer is really nitpicking"[115].

− Lacking motivation and time to engage in a detailed definition of the request

A still other aspect to consider is also a motivational one. For the people from the business, their main focus is to get their insurance work done, establish new contracts, handle claims, etc. For them, the IT-application is merely an instrument that supports them in conducting their actual work. "The business wears other trousers and has a completely different focus. They don't care how, they just want that we solve them a problem"[116]. In this way, the business has other priorities, lacks time and, at best, would like to delegate the whole resolution of the problem to the IT, even the often rather tiring process that leads to an unambiguous and specific definition of their request. Yet, the IT must insist in a well articulated definition of the business requirements.

− Fear of delay and eagerness to start right away

In some occasions, a final aspect might contribute to a diffuse definition of the business request. If the general request from the business is very urgent, and IT technicians feel pressured to quickly start the project in order to get it done in time. *They fear delays and are tempted to start from spot even if the assignment of the business is not really clear yet*. In such occasions, the team leader has the important role to provide the people of the team with the necessary security that they will not be delayed with the project if they first spend a considerable amount of time in defining clearly its parameters, but that quite the contrary is the case.

− Translate business language into technical lan-

A major challenge in the knowledge-intensive communication between the IT-specialists and the people from the business line is that they are talking different languages.

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116 „Der Fachbereich trägt andere Hosen und hat einen ganz anderen Fokus. Denen ist es eigentlich egal wie, sie wollen einfach, dass wir ihnen ein Problem lösen."

guage and vice versa

"The difficult part is really the transformation, the language. The language is the central point really. The business talks another language than the IT-specialist and the IT-specialist speaks another language than the IT-management"[117].

This aspect has been mentioned over and over again in the interviews. It seems to be a general challenge in the knowledge communication, yet, it is accentuated mainly in the phase, when the business communicates its needs to the IT, as illustrates significantly the following quote of an IT-manager:

"The businessman views the problem at a different level and speaks a different language than us. In order to make the communication work, it is our task to understand their language. If someone from the business department comes and says: 'Regarding the premium reserve for external saving processes in the principality of Lichtenstein, next year, you have to give 1 percent of extra interests.' The typical IT-specialist can only shrug his shoulders and ask: 'What did he mean with that?' A team leader is not allowed to shrug his shoulders"[118].

The business itself has quite a thick expert jargon, which is hardly accessible to the IT. "They always lash about with insurance specific, technical terms, this is even worse than IT-specialists"[119]. It would certainly be ideal that the business tried as well to speak a less specialist language and adapt its communication in such a way that also a layperson can understand it. Yet, at the same time, the managers from the business line are the clients of the IT-specialists and the IT cannot expect from them to formulate their needs in a language close to the logic of the functioning of the application.

"The client has difficulties saying: 'In this and that module, you have to read the following constants from the database and multiply them with the value X, which is saved in another place'. We cannot expect from the client to know such internal aspects of the application"[120].

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117 „Das Schwierige ist die Transformation, die Sprache. Die Sprache ist wirklich der wesentliche Punkt. Das Business spricht eine andere Sprache als der IT-Spezialist, der IT-Spezialist spricht eine andere Sprache als das IT-Management".

118 „Der Fachbereich schaut das Problem auf einem anderen Level an und spricht eine andere Sprache als wir und wir müssen deren Sprache verstehen damit es funktionieren kann. Wenn einer vom Fachbereich kommt und sagt: ‚Beim Spardeckungskapital für externe Sparprozesse im Fürstentum Lichtenstein, da müsst ihr nächstes Jahr ein Prozent Zusatzverzinsung geben'. Der normale Informatiker kann da nur noch mit den Schultern zucken und sagen: ‚was hat er jetzt da gemeint?'. Der Teamleader darf nicht mit den Schultern zucken."

119 „Die schmeissen einem immer lebensversicherungstechnische Ausdrücke an den Kopf und das ist noch schlimmer als mit den Informatikern."

120 „Der Kunde hat Schwierigkeiten zu sagen: ‚Ihr müsst in diesem und jenem Modul die folgenden Konstanten aus der Datenbank lesen und dann multiplizieren mit dem Wert X, der woanders abgespeichert ist. Wir können nicht verlangen, dass der Kunde solche Interna der Applikation kennt."

121 „Auch der Informatiker kann nicht im Programmcode sprechen. Ich hatte ganz konkret einmal den Fall eines Informatikers, der hat Programmcode in eine Mail für den Fachbereich kopiert, hat dann beschrieben, was der Code meint und dann eine Frage gestellt. Dies ist zum Teil bedingt durch die Tatsache, dass jeder sehr konzentriert in seinem Bereich arbeitet."

It is the duty of the IT people to learn the language of the business and to gain an understanding for the reality of their clients, the business line. This has implications also for the way the IT should address management:

> "The IT specialist cannot talk in programming code. I very specifically had a case when an IT-technician simply copied programming code in a mail for the business line, then explained what the code meant and finally asked a question. This, in part, is the result of the fact that everybody works very concentrated in his field" [121].

The difference in the language use represents one of the biggest challenges in the IT-specialist-management interaction and a continuous translation is needed.

In the last years, the IT unit has undertaken different measures to enlarge this translator capability. In fact, most of the practices we are going to discuss in the following address this challenge of overcoming the differences in language that exist.

Practices in the Need Articulation Phase:
− Stepwise refinement of request (business request, technical request)
− Actively involve decision makers early on and ask them to write clear business requests
− IT experts themselves write down business requirements or collaborates

In order to tackle this difficult challenge of defining a clear request and assignment on behalf of the business, the IT and the business unit have developed together a variety of practices, some which we have already mentioned and we will only briefly resume.

As a first practice (and this spans the three phases of 'need articulation', 'problem analysis', and 'apply & implement insights & solutions'), they have broken down the definition of the request into various steps in order to allow for a gradual elaboration of the exact requirements, as says one IT-manager: "We need a very interactive process, in which we approximate our understanding in two, three cycles and this mainly happens in small meetings" [122]. The final definition of the request leads through the phases of analysis and conveying insights and only then is it defined definitely in the scope contract. In particular, the division between a business request and, then, a technical request (that in larger projects takes the form of preparatory study) is very important. If the IT people have at hand a clear business request, it is easier for them to translate it into the technical dimension and write the requirements from an IT-perspective. Part of this practice is also that The IT-experts actively involve decision makers in the

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[122] „Es braucht einen interaktiven Prozess, in dem man in zwei, drei Durchgängen sich annähert und dies findet meistens in kleinen Meetings statt."

closely with
business for
them to write it

early moments of the project. The business has the responsibility to write an explicit and specific business request. Yet, as this task is particularly difficult (in view, for example, of the discussed ASK-problem or the challenging task to abstract general rules from everyday experiences), the IT interacts frequently with the business and takes over a very interactive role. In some cases, even, the IT writes down business requirements itself.

− Focus on face-
to-face conver-
sations

Another aspect which facilitates the definition of a clear and understandable request is that the interaction between the two parties mainly takes place in the form of *interactive types of communication*, be that interviews, meetings, or workshops. These face-to-face encounters, allow for a gradual approximation of the two parties in their common understanding (for a more detailed discussion on the role of face-to-face conversations, see: Practices relative to the communicative process. Extensive use of face-to-face conversations).

− Very active
role of mid-
dlemen in
translating in
both activities

In order to define a business request that is understandable to the IT and to translate it into a technical one, the managers from the business side need to have a little understanding of the way the IT-expert reasons and, vice versa, the IT-expert has to have a considerable knowledge of the processes and problems of the business side.

To meet this challenge, the IT unit strategically positions *middlemen*, who are people with a duplex qualification in both business issues and IT. In the context of the definition of the requirement, the support-desk plays a first important middleman function as mentions one IT-technician. "We have a support-desk, which is the interface between us, the IT-specialists, and the client, the people from the business. They support both us and the business"[123]. The people from the support-desk have previously been working in the business line, but have done an additional education in IT management or programming.

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123 "Wir haben einen Support, der steht als Schnittstelle zwischen uns, den Informatikern, und dem Kunden, den Leuten aus dem Business und dieser Support bringt sehr viel Input rein. Diese Leute bieten sowohl uns als auch dem Business Unterstützung."

"We need a contact person closely associated to the business line who also has a technical background. This person can more easily comprehend this abstraction from the various cases to the general body of rules"[124].

The support-desk with his middleman function has to translate from one language to the other and helps to bridge between different views and background knowledge. The 'support' is especially important in the need definition, as shows this quote from an IT-technician: "These are the people who support us in the definition of the request and who, at the end, also approve this request as they do the acceptance test"[125].

The *IT-management* also holds a middleman function and has to translate back and forth between the business line and the IT-technicians. Their educational background (mainly these people have a double education in both informatics and business administration) and their daily work, which engages them more actively in the business decisions, helps them to have a better understanding of the business' context. They can better understand and adapt their way of thinking and talking and enlarge the common ground among them, as mentions one IT-manager:

"A big challenge is really the comprehension between the IT-people and the people from the business line. In this regard, I play an important interface role: the communications of the IT needs to be well aligned to the specs of the business line. But this is true also the other way round: When the business develops strategies, I have to be able to translate them so that my people can understand them. 'What does that mean for our company, what does it mean for me as a programmer?' (..) I am sort of a translator and only in this way can I effectively create sense."[126]

One role of the IT-managers as middlemen and translators is to specifically formulate the implications of a piece of information, which stems from one context, for the other organizational reality. They also have to make the reasons of a certain decision more explicit, as they are often implicitly understood in the original context, but hard to understand from another perspective. As translators, they have to make a piece of information meaningful in another context.

Middlemen not only have an important *translation function*, their double

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124 „Wir brauchen eine Kontaktperson, die eng mit dem Business verbunden ist, welche aber auch einen technischen Hintergrund hat. Dann kann sie dieses Abstrahieren von mehreren Fällen auf ein allgemeines Regelwerk besser nachvollziehen."

qualification allows them also to introduce some *lateral thinking*, which is particularly important in the phases when the big lines of the project are defined ('articulate need', 'analyze issue & develop possible courses of action').

> "Thanks to my experience and to the fact that I am more distant from the daily programming, it makes it more possible for me to break up the tunnel view and the focus on details, and to show other possibilities"[127].

– Nail down a clear and specific written scope contract to fix terms and conditions and define clear rules for later change requests

Above, we have shown that in order to define a clear request, the IT and the business departments have put in place an interactive process, which is extended to the analysis and conveying insights phase and the request is gradually refined. Most important in this process is, next to an active participation of both parties and a clear definition of their respective responsibilities, the focus on face-to-face as the main form of communication. Yet, oral communication has to be accompanied by written forms of communication. There needs to be a *formal document, which defines the request of the business and the technological solution to it in cold print*. The InSure calls this document a '*scope*', as explains one IT-manager:

> "I always held the opinion that, before starting with the programming, we need a clear contract. (..) After this scope, each change – whether it comes from our side or from the business – needs a ,change request'"[128].

By defining clearly the terms and conditions of the request from the business, reciprocal expectations are nailed down explicitly and there is fewer room for misunderstandings. The business is asked to commit itself to a specific request and knows that it cannot change its requirements continuously. In this way, there is a lower risk for the IT department that the business will continuously change its request later on in the project.

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125 „Das sind Leute, die uns unterstützen beim Definieren der Anforderungen, die nehmen uns dann auch zum Schluss die Anforderungen ab. Die machen dann den Abnahmetest."

126 Ein grosses Thema ist wirklich die Verständigung der IT-Leute und der Leute des Fachbereichs. Ich spiele dort eine wichtige Schnittstellenrolle, so dass das, was von der IT kommuniziert wird, auch adressatengerecht beim Business angelangt. Dies gilt aber auch umgekehrt: Wenn im Business Strategien entwickelt werden, muss ich es so übersetzen können, dass es meine Leute auch verstehen können. ,Was heisst jetzt das für unsere Firma, was heisst jetzt das für mich als Programmierer?' (..) Ich bin eine Art Übersetzer und nur so kann ich auch effektiv Sinn erlangen."

127 „Dank meiner Erfahrung und dem grösseren Abstand von der täglichen Programmierarbeit, ist es mir eher möglich, den Tunnelblick und den Fokus auf Details aufzubrechen und andere Möglichkeiten aufzuzeigen."

128 „Ich war immer der Meinung, dass wir, bevor wir uns ans Programmieren machen, einen klaren Vertrag brauchen. (..) Ab diesem Scope braucht jede Änderung, ob sie von uns oder vom Business kommt, einen ,Change Request'."

Analyze Issue & Develop Possible Courses of Action

Main Characteristic:

Entanglement with the previous ('Articulate Need') and following ('Conduct Analysis of Issue') phases

Once the business has managed to formulate its request in a short document (business concept), the IT-specialists start *analyzing the issue* from the IT perspective (see Figure 28).
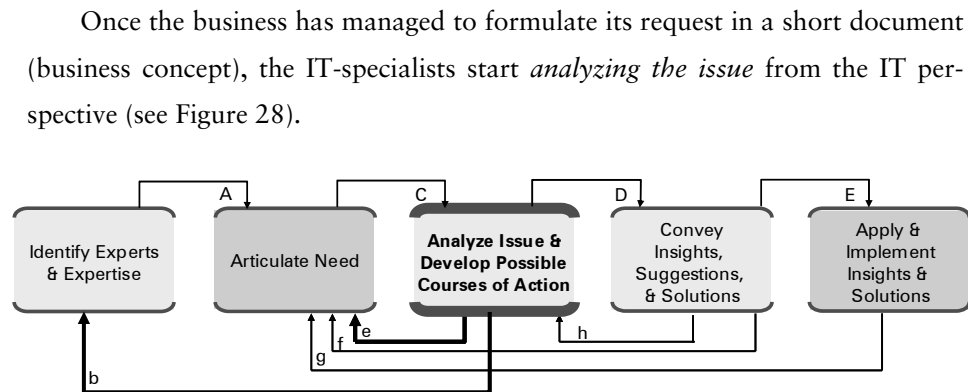
Figure 28: The 'Analyze Issue & Develop Possible Courses of Action'- phase

On the basis of the business concept, the IT team conducts a high level technical analysis of the issue (point 7 in Figure 25). They analyze the present situation, such as the software environment of the panned application. They inquire roughly into the technological options (and their impact into the existing system), which are possible in order to satisfy the requests posed by the business. Finally, they also do a feasibility analysis and can give first time-cost indications for the various options. In this phase, interaction among the people of the IT team and with the business is lively and informal. If the IT needs further information on business aspects, they contact their respective people on the side of the business line simply via email, telephone, or by passing by their office. Emerging results of this first analysis and of the technical options are discussed and the latter are readjusted depending on the considerations of the business (feedback arrow 'e'). In this way, the IT and the business do a first approach of the project from a technological perspective, align gradually their prospects and understandings and envision the general lines of the technical solution.

If these general lines of the situation and the solution are clear, the IT team does a more *detailed analysis* and elaborates three possible technological solutions (point 8 in Figure 25). These three options are made of one quite economic solution, one state-of-the-art solution, and a middle way solution. For each option, they define the exact *technical requirements*. IT-teams sometimes call-in an IT architect to review the technical concept and to verify whether it makes sense also from an architectonical standpoint (feedback loop to 'identify experts & expertise', arrow 'b').

Challenges in the
'Analyze Issue &
Develop Possible
Courses of Ac-
tion' Phase:
– Move between
  various levels
  of abstraction

– Inter-team,
  inter-sector
  barriers within
  IT unit

One major challenge in this stage of the process is to move from quite a general to a pretty specific definition of the issue and so *to move between various levels of abstraction*. While the business request outlines the general objectives to be pursued with the application, the IT specialist has to translate from the very broad definition of the objective and problem, to the very specific requirements for the technical system. The requirements must be very specific so that the programmer can deduct from them the computing code.

Another communicative challenge during this phase is the rather *poor inter-team and inter-sector exchange* within the IT unit. The problem is that „if I do not know at all that this colleague has done this, I cannot really ask him about it"[129]. This leads to a situation where there is internal expertise on a specific aspect of the field, but only a few people within the IT-department know and the own resources are not utilized in an optimal way.

> "We have realized that we have to abandon the internal barriers. Somewhere we have a sector, garden X, which looks after itself, then we have garden Y, which looks also after itself. That does not work. We are so short of labor that we have to think over the borders of the sectors"[130].

Requests for higher efficiency pressures the IT-department to engage in stronger cross-boarder collaboration. Such collaboration is important to more speedily resolve upcoming problems, develop more innovative solutions, and more effectively use the potential of the specialized expertise of each IT-specialist.

Practices in the
'Analyze Issue &
Develop Possible
Courses of Ac-
tion' Phase:
– Fight status
  quo orientation
  by proposing
  three options
  for solution
  (economic,
  middle way,

In order not to be stuck on *status-quo-solutions* and to better advise decision makers, the IT-management decided that its collaborators have to think through and propose not only one solution, but always *three feasible technical options*. It would also give a recommendation, which of these three options would be most appropriate and why.

> „I had a beautiful experience with a team that had a rather conservative orientation and often claimed: 'We always did it this way and that this is the perfect solution.' I asked them to work with options and to always elaborate three alternatives: a cheap solution, a state-of-the-art solution, and a middle way. All of a sudden, the team became more dynamic and had to break away from its deadlocked solutions. The key is to open up to some extent the

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129 "Wenn ich gar nicht weiss, dass der Kollege das gemacht hat, kann ich ihn auch nicht fragen darüber."
130 "Was wir gemerkt haben, ist, dass wir von unseren internen Grenzen wegkommen müssen. Wir haben irgendwo einen Sektor, Garten X, der schaut für sich, Garten Y, der schaut für sich. Und das funktioniert einfach nicht. Wir sind so knapp an Leuten, wir müssen über die Sektorgrenzen hinaus zusammenarbeiten."

<table>
<tr>
<td>and state of
art)</td>
<td>horizon of the own employees"[131].</td>
</tr>
</table>

In this way, the decision makers have a real choice to make. They can - if they find the time – evaluate the advantages and disadvantages of each option, but otherwise still have the possibility to simply rely on the recommendations of the IT experts. If time is particularly scarce, the detailed elaboration of the variants is, of course, rather limited.

– Organize regu-
lar sector-wide
information
events to en-
hance knowl-
edge sharing
and innovative
problem solv-
ing across
teams

To address the challenge of a too strong in-group orientation and to enhance the knowledge communication between the different IT-teams, each IT application sector has started to organize *sector-wide information events*. The IT-specialists of the sector have the possibility to expose to their colleagues what they are currently working on. They then also have the possibility to present and discuss the challenges they are currently facing. In this way, a more innovative and effective problem solving is possible.

**Convey In-
sights, Sugges-
tions, & Solu-
tions**

Once the high-level and detailed technical analyses are conducted, the next phase in the knowledge communication between experts and decision makers is to convey the gained insights and the proposed options to the business (see: Figure 29)
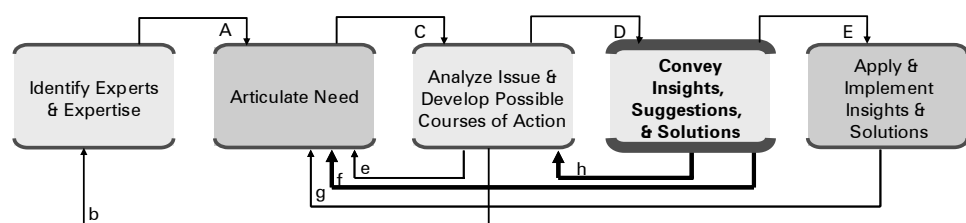
Figure 29: The ‚Convey Insights, Suggestions, & Solutions'-phase

The analysis is presented in a *preparatory study* (point 9 in Figure 25). The draft of this study is discussed in various instances with the IT-management, which sometimes advises that additional analysis is necessary (feedback-arrow 'h'). The final preparatory study shows on around 30 pages the following elements: an executive summary, an outline of the general benefits of the IT appli-

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131 „Ich hatte ein schönes Erlebnis mit einem Team, das eher ein bisschen konservativ orientiert war und oft meinte: ‚das machten wir schon immer so und das ist die perfekte Lösung'. Wir haben dann angefangen mit Varianten zu arbeiten. Und da kam plötzlich Schwung rein und sie mussten sich lösen von ihren festgefahrenen Vorstellungen. Der Schlüssel ist, den Horizont ein bisschen aufzubrechen bei den eigenen Mitarbeitern."

cation project, an overview on the objectives as they were formulated by the business, an analysis of the starting position, an overview on the identified measures and the possible options plus a recommendation of the IT for one of these options. The preparatory study is usually concluded with a final chapter on how the envisioned application integrates into the overall IT architecture and how it fits with the IT strategy. This study reflects a strong collaborative effort between the IT and the business, even if finally written by the IT. Both parties frequently interact with each other to express their preferences, suggestions, and reservations so that the study is really carried by both of them.

Once the preparatory study is approved by the head of IT applications, it is communicated to the steering committee. The steering committee is formed of the most important IT managers and the managers from the business line. The responsible IT manager presents orally the proposal that is put forward in the study. The *steering committee* (point 10 in Figure 25) discusses the proposal and decides whether to go forward with the recommended option or whether further modifications and analysis are necessary. At this stage, it is most unlikely that the proposal is declined completely, as many members of the committee were involved earlier on in the project and already agreed on the general utility of a technical solution and the business already clarified the overall budgetary possibilities. Yet, the steering committee might ask for minor revisions and the proposal has to be re-examined and analyzed by the IT specialists (feedback loop to analysis, arrow 'f'). If the steering committee approves the proposal completely (without revisions), the project goes into the design phase.

After this "go" decision, the IT draws up a *scope contract* (point 11 in Figure 25). In this contract, both parties agree on the type of solution to develop and define its exact technical characteristics. They also agree on delivery times and price. This contract is, in effect, part of the need articulation phase so that there is another important back-loop to the need articulation phase. In this way, the need articulation phase is only concluded once the issue has been analyzed and the insights, suggestions, and solutions conveyed.

Challenge:
– Pressure for conciseness and flexible scalability in level of detail

An important challenge which experts have to tackle particularly when writing the preparatory study is how to communicate the complexity of an issue in a concise, yet maintainable and complete manner. The expert must present the pieces of information in such a way that they become meaningful to the reader.

One IT-managers coins the problem as follows:

„A big challenge today is to represent knowledge in a compressed manner. In the past, people wrote big books, reports. Today, nobody reads this anymore. There was a move to the one-pagers, these executive summaries. It is also a mentality of PowerPoint, that is, no more documents, just slides. The challenge really is how to communicate something in a meaningful way in such a short space"[132].

For written communication, the challenge is particularly demanding also because, depending on the characteristics of the single reader and the current situation he or she is in, different aspects of the issue have to be emphasized and longer elaborated, as illustrates this quote:

"How can I represent knowledge in a well structured manner? I would like to convey something to a client or to a decision maker. I have to do this on a few pages and here is the first problem: how can I present complex issues in a simple manner and give the reader the possibility to deepen certain aspects? (..) I think of a possible way of presentation that allows each reader to be informed himself on his level and exactly at the level of detail, which interests him"[133].

Whenever the communication is not purely dyadic – which is true in most cases - the audience is to some extent always heterogeneous and each decision maker has slightly different interests, concerns, and background knowledge. In a world without time and cost constraints, the expert would adapt his/her communication to the particularities of each decision maker and prioritize the information items accordingly. As a complete personalized communication is not possible, the challenge is to find modes of presentation, which permit a flexible scaling of the information items and give the receiver the possibility to decide on which level of detail he/she would like to be informed on a specific topic.

Practice in the 'Convey Insights, Suggestions & Solutions' Phase:

– Establish stan-

An important practice in this phase regards the way how insights are structured and presented to management. The IT-unit has decided that reports like the preparatory studies follow a *standard structure* (as discussed above) and some basic *principles of presentation*.

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132 "Eine grosse Herausforderung heute ist das Wissen komprimiert darzustellen. Früher hat man dicke Bücher geschrieben, Reports. Heute liesst das niemand mehr. Und man ging über auf diese Einseiter, diese Executive Summaries. Es ist auch eine Powerpoint-Mentalität, d.h. keine Dokumente mehr, nur noch Folien. Die Herausforderung ist wirklich, wie ich etwas – auf so engem Raum – sinnvoll kommunizieren kann."

133 „Wie kann ich Wissen gut strukturiert darstellen? Ich möchte einem Kunden oder einem Entscheidungsträger etwas vermitteln. Ich muss dies auf wenigen Seiten tun und hier ist das erste Problem: Wie kann ich komplexe Sachverhalte einfach darstellen und dem Leser gleichzeitig die Möglichkeit geben, bestimmte Aspekte zu vertiefen. (..) Ich denke an eine Möglichkeit der Darstellung, die es jedem Leser ermöglicht, auf seinem Niveau zu informieren und genau in der Detailtiefe, die ihn interessiert."

Principles of presentations are, for example, the use of as little text as possible, but on the other hand, an extensive use of tables and a considerable use of visualization (e.g overview figures). Another practice is that all important terms are defined at least verbally and the more complex ones also visually

Administration-console

An administration-console is a dialogue, which enables selected people to change the central services.

From a technical perspective, the access mode does not differ from a „normal" pop-up window of an application.

Application with pop-up window for user

Administration console

Access layer of data
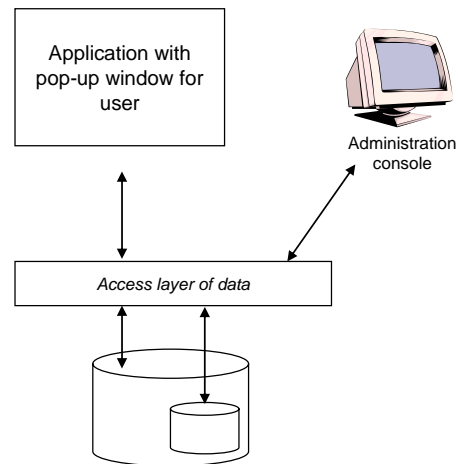
Figure 30: Example of a Definition of a Concept Using Visual Representation for Illustration (Translated from German)

Finally, another standard information item entailed in each document is the meta-information on the status of the study (e.g. proposed), the names of the authors, the person in charge, the date of the last revision, and the name of the document.

Apply & Implement Insights & Solutions

After the important "go"-decision by the steering committee, IT experts, the managers on the IT side, and the managers from the business line enter their final phase of the knowledge communication process. They apply and implement the insights and requirements elaborated in the previous phases by developing the application.

A	C	D	E
Identify Experts & Expertise	Articulate Need	Analyze Issue & Develop Possible Courses of Action	Convey Insights, Suggestions, & Solutions	**Apply & Implement Insights & Solutions**
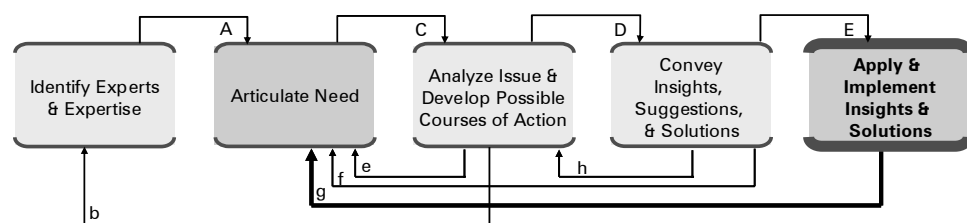
Figure 31: The 'Apply & Implement Insights, & Solutions'-phase

This final phase is very important and lasts, on average, two months. The IT unit starts to *develop the application* as the single IT specialists work on small and specific jobs. For each task they know who their contact person from the business line is. There is a lot of communication going on between the various IT specialists. With the business, the interaction is less frequent and is limited to specific questions to ascertain, for example, what the business would do in a very specific case. Each week, the IT team leader meets with the manager from the business line for a coordination meeting and the current state of the development is discussed (see: point 10 Figure 25). If during the development phase the people from the business realize that they would actually want the application to have other characteristics then the one defined in the scope contract, they need to do a formal *modification request* (see: point 11 Figure 25). The same is possible from the IT side if the IT-specialists should realize that the technical solution cannot look exactly the way they envisioned it. Each request is examined concerning its validity and necessity (feedback- arrow 'g' to 'articulate need').

Usually, an application is developed by building various components and then by assembling these components. Once the whole application is composed, the IT starts to test the application and to track its errors. To do this *system test*, they use a System Investigation Request (SIR) tool and usually find a lot of errors. The tool helps the programmers also for the coordination within the team, as mentions one IT-expert:

> „It's a hub for the information exchange. Every developer can add his notes: 'Something doesn't work here' and receives feedback from his team mates. If someone finds an error, he records it and defines an owner who has to tackle the problem"[134].

A good coordination among the team is central in this final phase of the project since time becomes ever shorter. The IT-technicians then prioritize which errors to handle first and start to work them off. This testing phase is very demanding and lasts quite as long as the actual development of the application.

Only if the application works perfectly, the IT calls in the business, which then does the *user-acceptance test*. The business tests functionalities of the application to see whether if fulfils the business requests and allows for a perfect execution of the daily insurance work. During this test, the communication between

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134 "Das ist eine Drehscheibe für den Informationsaustausch: Jeder kann eintragen: 'Da stimmt was nicht' und er kriegt dann auch von seinem Team Feedback. Wenn jemand einen Fehler findet, trägt er das dort ein und definiert einen Owner, der sich um das Problem kümmern muss."

the business and the IT-team is again intensified (see: point 12 Figure 25).

Finally, the support, together with the IT manager and the business, decide whether to release the application in the current form into the IT system. It has to be completely assured that the new application does not threaten the daily application work (see: point 13 Figure 25). Training activities organized by the business accompany the final implementation of the application (see: point 14 Figure 25).

Former Challenges in the 'Apply & Implement Insights & Solutions':

– Continuous change requests from the business

Before today's interaction process was formalized, a major problem in the implementation phase was that the business continued to bring in its change requests. "Oftentimes, the people from the business only realized that they want something different when we already are in the implementation phase"[135]. In view of the different challenges related to the need articulation phase, it seems that the business, in some ways, postponed a clear definition of its request to the development phase: Only when the business could finally see how the application would look like, they could express precisely what they wanted or not wanted and were able to define a clear request. In other words, there was a continuous feedback loop going on between the phases 'apply & implement insights and solutions' and 'articulate need' (see: feedback loop in Figure 32). This fact led to eternal modifications of the application and to large project delays. Still today, there are cases where, during the user-acceptance test, the people from the business realize that the application does not work according to their needs so that the IT has to reanalyze the issue (see: feedback loop in Figure 32).

– Late stage uncovering of misunderstandings

Another problem in this stage was that until this moment *uncovered misunderstandings all of a sudden became apparent*. It happened often, for example, that the business and the IT had agreed on a certain type of application in the need definition phase and both parties had thought that they had understood each other. When in the phase 'apply & implement insights & solutions' the application became tangible, the business realized that this was not at all what it had wanted and that, apparently, the IT had misunderstood their request.

Practice in the Phase 'Apply & Implement In-

With the formalization of the end of the need articulation phase through the scope contract, the business formally commits to what exactly is its request. To

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[135] "Oft merkten die Leute vom Business erst, dass sie etwas anders haben möchten, wenn wir bereits in der Umsetzung sind."

strengthen this commitment and to avoid continuous change requests later on in
the process, both parties have agreed in formalizing the process of applying fur-
ther changes, as mentions on IT-technician:

"Today we can ask for a formal change request since we have clearly documented what the
business wanted. We have to refer very firmly to the rules of the game and insist that one
cannot change things and due dates at discretion" [136].

With this more formal process for submitting a change request, both parties
are encouraged to think clearly about the requirements on the new application
early on in the project and avoid project delays due to continues changes late in
the process.

**Discussion of
the Process
Model**

From the description of the process and means through which InSure's IT-
specialists and the middle-managers from the business line interact with each
other, we have seen that the process model of knowledge communication pro-
vides a fairly accurate structure.
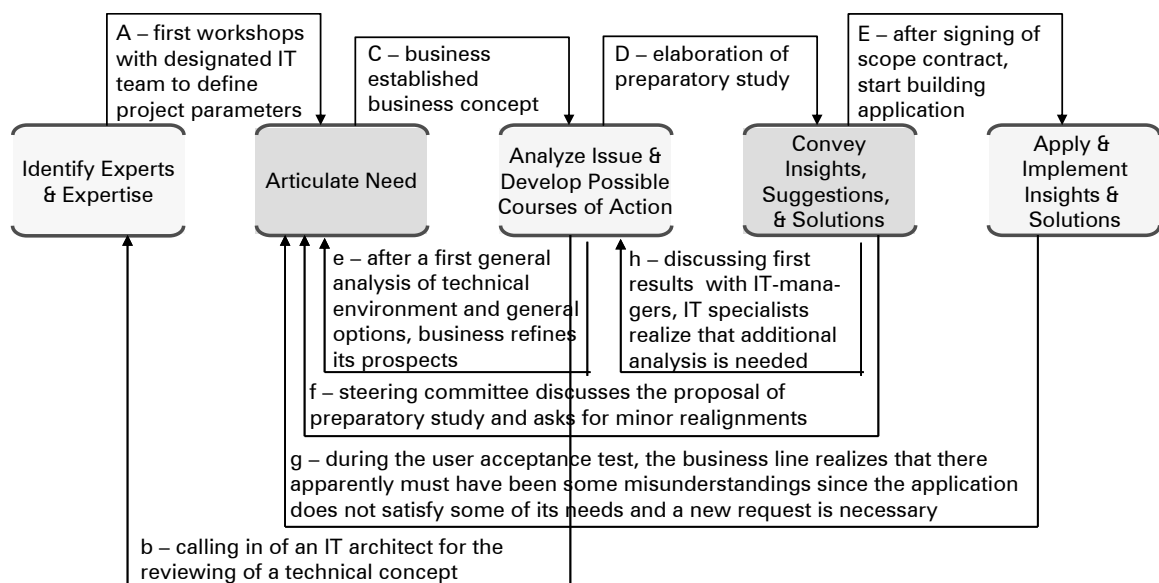
**Figure 32: Instances of Feed-Forward and Feedback Loops within the Interaction be-
tween InSure's IT-specialists and the Managers from the Business Line**

Particularly interesting in the case of InSure is that the three processes 'articulate
need', 'analyze issue & develop possible courses of action', and 'convey insights,

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136 „Heute können wir einen „change request" verlangen, denn es wurde klar festgehalten, wie das Business was
      wollte. Dann muss man einfach fest auf die Spielregeln verweisen, dass man nicht nach Belieben Dinge ändern
      kann und Termine herumschieben kann."

suggestions, & solutions' are very strongly interconnected through various feed-back and feed-forward loops. An overview of these loops providing single instances of them can be seen in Figure 32. Characteristic for these phases is both a strong focus on informal, face-to-face communication that allows for fluidity and quick and flexible alignments (e.g. meetings, workshops), as well as a focus on formal communication that holds track of fix agreements for that the looping behavior moves towards a clear direction (e.g. list with modification wishes, business concept, technical concept).
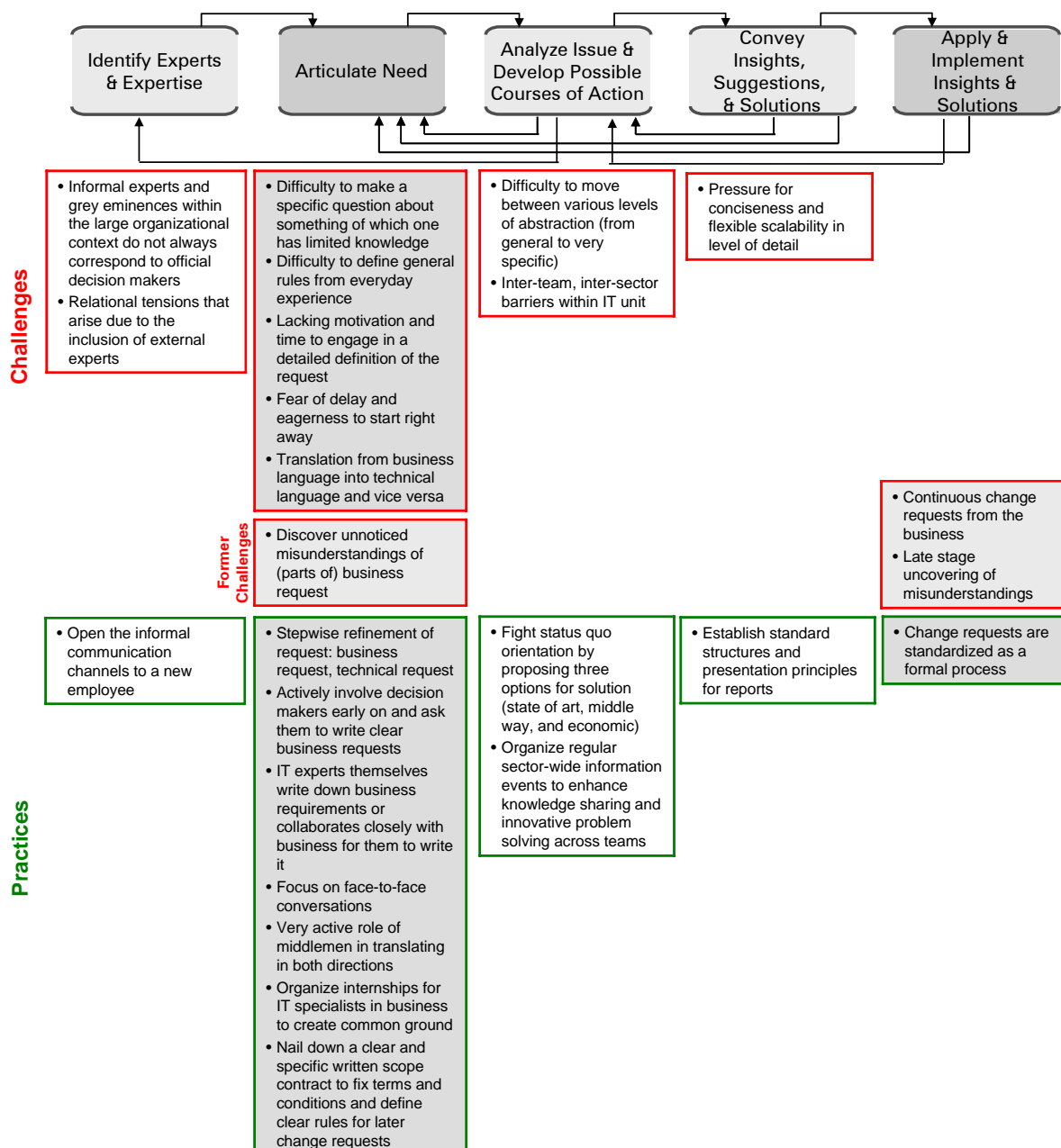
Figure 33: Overview on all Phase-specific Communicative Challenges and Practices along the Knowledge Integration Process

Figure 33 resumes all the challenges (in red) and practices (in green) along the knowledge communication process between IT-experts and decision makers, which we have discussed so far. Three of these challenges (explicitly marked) were big obstacles before the latest reorganization activities, but today, with a stronger formalization of the interaction processes, are less severe.

General (and Phase Unrelated) Challenges & Practices in the Knowledge Communication

Next to the phase-specific challenges and practices we have discussed so far, there are also more general challenges and practices, which exist in the knowledge communication between experts and decision makers and which are not specific to one phase or another. We will discuss these more general challenges and practices in the following.

We present them following the five dimensions – message, process, group dynamics, mental models, and outer context – of the conversation framework discussed in Chapter 2. In addition, we will exemplify how these dimensions are interconnected among each other.

Challenges Related to the Communicated Message:

– Lack the big picture of an issue

One of the inherent challenges of the knowledge communication process between the IT-experts and managers on the business side is their ability to gain and sustain the big picture. The following quote hits the mark of the issue:

> "One cannot always construct a complex image at first go. Everybody contributes some tesserae. That is often the problem: When can one be sure enough to know what is going on so that one can really make a reliable decision?"[137].

The big picture challenge is related both to the type of issue, with which communicators are dealing (content of their messages) and to the conversation process. Regarding the process, people might have difficulties in gaining the big picture "from spot" or they might have it in the beginning, but then loose themselves in (technical) details. Regarding the issue, complexity adds to the difficulty to gain the big picture. For example, if a change in an application has repercussions not only within the whole IT-infrastructure, but impacts also on a variety of business processes, then it is hard to see the big picture. In the discussion on a decision to take, each IT-expert brings in his/her very specific expertise and each

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137 „Man kann sich nicht immer auf Anhieb ein komplexes Bild machen. Jeder trägt ein paar Mosaiksteinchen bei. Das ist häufig das Problem. Wann kann man genug sicher sein, dass man weiss, was läuft, so dass man einen sicheren Entscheid treffen kann?"

manager introduces his/her concerns, priorities and points of view. The complexity and the ambiguity of the issue is often such that no one alone can overview the whole issue, but only as a collective the group can grasp the big picture of it.

> "Informatics is a very heterogeneous area. There are so many technologies, so many types of informatics. (..) This makes it very difficult to gain an eagle's view and understand what actually is at stake"[138].

Only by pooling and interrelating the different types of expertise, the IT-specialists and the decision makers have the possibility to see the big picture.

Not only is it challenging to collaboratively gain and sustain the big picture of an issue, it is also difficult to convey the big picture to someone else.

> "The interconnections among the various business processes and the technical systems are very high and the communication is difficult if someone does not have a broad knowledge and does not know the interconnections. It is as if you were to explain a very small part out of a ball of wool. This tiny part often has so many influencing factors and larger connections that it is often difficult to explain something without going very far afield. (..) If someone would not only do, but also understand, we would have to invest a lot of time"[139].

The quote shows at least two reasons why it is challenging to communicate the big picture of an issue. First, understanding the big picture has to do with seeing and explaining the *multiple connections*, for example, between a specific fact and the overall context. It is difficult to juggle simultaneously a multitude of causes, (indirect) implications and contextual factors and to engage in a system thinking mode inquiring into circular causalities and indirect effects[140]. In this view, the challenge of creating the big picture is also related to the mental model dimension of the framework we present here. Another reason why it is difficult to create the big picture is that a communicator has to choose a few aspects from the multitude of connections of the issue, which are most pertinent and meaning-

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138 „Die Informatik ist ein sehr heterogenes Gebiet, es gibt so verschiedene Technologien, so viele Arten der Informatik. (..) Dies macht es sehr schwierig, den Überblick zu gewinnen, um was es überhaupt geht."

139 „Die Vernetztheit von den Fachprozessen und den technischen Systemen ist sehr hoch und es ist schwierig, jemandem etwas zu erklären, wenn diese Person nicht ein breites Wissen hat und die Zusammenhänge versteht. Das ist, wie wenn man jemandem ein ganz kleines Teilchen aus einem Wollknäuel erklären muss. Es hat meist so viele Einflussfaktoren und weitere Zusammenhänge, dass es wirklich schwierig ist, etwas zu erklären ohne extrem weit ausholen zu müssen. (..) Wenn jemand nicht nur einfach machen sondern auch verstehen sollte, dann müsste mach ein x-faches an Zeit investieren."

140 Harkins claims that the ability to see the big picture is related to the ability of systemic thinking. He defines "big-picture thinking" as the "ability to conceptualize underlying or systemic causes driving a problem or issue" (Harkins, 1999: 34). Exponents of the systems thinking approach believe that people are mainly used to single out fragments and aspects of an issue and to identify linear cause-effect relationships, but are less trained in thinking of feedback loops, indirect effects, networks of causes and the development of such structures over time (Senge, 1990).

ful to the vis-à-vis. It is difficult to do such a prioritization especially if he/she has a poor knowledge of the context and knowledge needs of his interlocutor.

– Difficulty to externalize knowledge and bring it in a form that is easily understandable, but lives up to the complexity of the issue

From a knowledge perspective, one challenge is particularly interesting and is related to the communication sender. He/she encounters difficulties in putting his/her expertise in an easily understandable message to communicate. To some degree, this challenge has to do with the difficulty, to abstract from one's own knowledge of an issue, which might comprise a lot of complexity, an easily understandable discourse. One IT-technician mentions: "It is difficult to describe one complex issue in such a way that the other can understand"[141] and another says on this regard: "I cannot simply display the whole complexity at once. I do not have this knowledge continuously present. It somewhere dozes within me and only if I engage in it more profoundly, it comes to light"[142].

This quote shows that the challenge to reduce the complexity of a message and to structure one's thoughts in such a way that they become understandable to the vis-à-vis, is strongly related the mental model dimension. In fact, the challenge of representing complexity in an adequate way is related to the expert's difficulty to activate his/her knowledge and to find a way how to access it. The quote seems to allude to the difficulty to externalize part of one's knowledge into a well articulated message. It is a type of knowledge of which the person knowing is not even completely aware, the knowledge 'dozes' in her/him. The knowledge has a strong tacit dimension (and is not fully explicit) and is hard to communicate[143], as this final quote illustrates:

> "In the detail-specifications, we have clearly defined how one has to handle the application. Yet, you never manage to bring to a 100% on paper. Even the one who designed the tool, afterwards, he does not really manage to bring it on paper"[144].

Thus, a major challenge in the communication is how the experts can access and structure their knowledge, how they can break down its complexity and find words for it that are easily understandable.

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141 „Es ist schwierig, einen komplexen Sachverhalt so zu beschreiben, dass dann der andere drauskommt."
142 "Ich kann auch nicht einfach so die ganze Komplexität auf einen Schlag ausbreiten. Ich habe dieses Wissen auch nicht ständig präsent, das schlummert irgendwo und erst, wenn man sich tiefer damit beschäftigt, kommt es zum Vorschein."
143 See: (Nonaka, 1994)
144 „Wir haben in den Detailspezifikationen genau definiert, wie man mit der Applikation umgehen muss. Aber, das kriegt man nie 100%ig auf das Papier. Auch derjenige, der das Tool gestaltet hat, kriegt es nachher nicht wirklich aufs Papier."

Practices Relative to the Communicated Message:
– Scale information across media and representation formats: Combine visuals (for overview) with short text (in-depth, structured, and explicit information) and oral communication (commitment, context, shared Understanding)

One important practice in the knowledge-intensive communication between the IT department and the business line is to combine different media and forms of representation (visual versus written texts) in order to convey a same idea, information or insight. "The communication is most effective if it is a mixture between a graphical elaboration, a possibly very short description and then a meeting"[145]. The different media and types of presentation help to meet different challenges related to the communication of knowledge and a clever combination of them might be most effective. While the *face-to-face communication* is particularly suited to convey the context of an information, show its implications, give an overview and elaborate jointly new ideas and insights, the *written format* allows for clearer structure, more in-depth information, and gives the reader the possibility to change the linear flow of the text, jump within the document and focus only on the aspects, which are most pertinent to him/her. The *visual format* has still other advantages as it provides an additional language and facilitates a shared understanding. By combining these three forms of communication, an IT-expert or decision maker can profit from the advantages of each one and overcome their respective weaknesses.

> „At the same time, it is important that a figure and figurative representation is not only empty air and that behind it there is a document where details are discussed. Then, also a personal communication is needed, which accompanies this image and document. You cannot just send them, but you have to jointly sit behind and explain them"[146].

In this way, the oral communication can add to the written one by contextualizing and exemplifying what the written information item means in the specific context of a team or for the development of a given application.

> "To some extent, I am also the organ of the strategy. You can find most IT-strategies in the intranet, but they are not thought for self-study. They have to be elaborated according to the target and there needs to be people who can interpret them correctly and bring them in into project work"[147].

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145 „Am Wirkungsvollsten ist sicher eine Mischung zwischen einer graphischen Aufbereitung, einem möglichst kurzen Beschrieb und dann einem Meeting."

146 „Gleichzeitig ist es aber auch wichtig, dass hinter einer Figur und einer bildlichen Darstellung ein Dokument steht, wo Details beschrieben werden, damit es nicht nur warme Luft ist. Dann braucht es auch noch die persönliche Kommunikation, die dieses Bild und dieses Dokument begleitet. Man kann diese nicht einfach so verschicken, sondern muss sich gemeinsam daran setzten und sie erklären."

147 „Ich bin auch ein bisschen das Sprachrohr der Strategie. Diese Strategien liegen zwar im Intranet auf, sie sind aber nicht fürs Selbststudium gedacht. Sie müssen adressatengerecht aufgearbeitet werden und es braucht Leute, die das richtig interpretieren und in Projekte einbinden können."

We call this practice of combining different media to convey an idea or insight to *"scale" information across media and representation formats*. A same content can be accessed in a variety of ways and an addressee has the possibility, depending on his affinities, needs, and interests, to focus on the format he/she prefers.

– Work with visualizations

Advantages:

1. Fosters own and others' understanding by:
  • Making abstract issues tangible
  • Activating imagination
  • Structuring and simplifying issues
  • Facilitating the creation of the big picture

One important practice in how IT-experts and decision makers try to communicate their expertise is by making extensive use of different forms of *visualization*. They use ad-hoc visualization during formal and informal meetings and more thought-out visualizations in their written communication (i.e. reports). On the one hand, IT-specialists claim that visualizations help to turn abstract issues *more tangible* and therewith facilitate the *imagination* and the *understanding* of the issue: "I often need metaphors or images so that one can better envisage what I am talking about. Also, my thinking is oftentimes visual and in front of my inner eye, I see loops that twinkle shortly"[148]. Working with visualizations also fosters understanding because it helps to *structure* an issue and to communicate this structure in an easy and understandable manner. "A few colored comments help to see it visually. I use rectangles, circles, and clouds to represent processes or logical dependencies. I try to simplify and structure"[149]. Thanks to its capacity of structuring, the use of visualization also helps to gain the *big picture* of an issue. The head of the IT department mentions on this regard:

"That is why I have brought to you this [a poster, see: Figure 34] as a possible idea on how to discuss and elaborate a topic with the help of a graphical object. It shows interests that have to be distributed quickly. There is a location, where the interest rates are defined. One makes a fixed package and distributes it all over. It is the case that everybody has to test these when one incorporates the package in the application. Nobody had the overall picture of the sum of the places to where the package was distributed. That is why we elaborated this figure and it shows all that is needed in order to change the interest rates within one day. This representation turned to be a powerful communication instrument, first to elaborate the issue, but now also to communicate with the business line. Before, there were so many misunderstandings around this process and with a good figure you can really achieve a lot. And as we have such a limited space and time for our communications, the way we package our information is really central"[150.]

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148 „Ich brauche oft Metaphern oder Bilder, damit man sich vorstellen kann, worum es da geht. Auch mein Denken ist visuell. Vor meinem inneren Auge sehe ich Schlaufen, die nur kurz aufblitzen."

149 „Ein paar farbige Kommentare helfen, damit man es bildlich sieht. Ich brauche Vierecke, Kreise und Wolken, um Abläufe darzustellen, oder logische Abhängigkeiten aufzuzeichnen. Ich versuche, zu vereinfachen und zu strukturieren."

150 „Deswegen habe ich das hier mitgebracht als eine mögliche Idee, anhand eines grafischen Objekts ein Thema zu diskutieren und zu bearbeiten. Es zeigt die Zinsen, die in kurzer Zeit verteilt werden müssen. Es gibt eine Schaltstelle, wo die Zinsen festgelegt werden. Man macht da ein festes Paket und verteilt es überall. Es ist so,
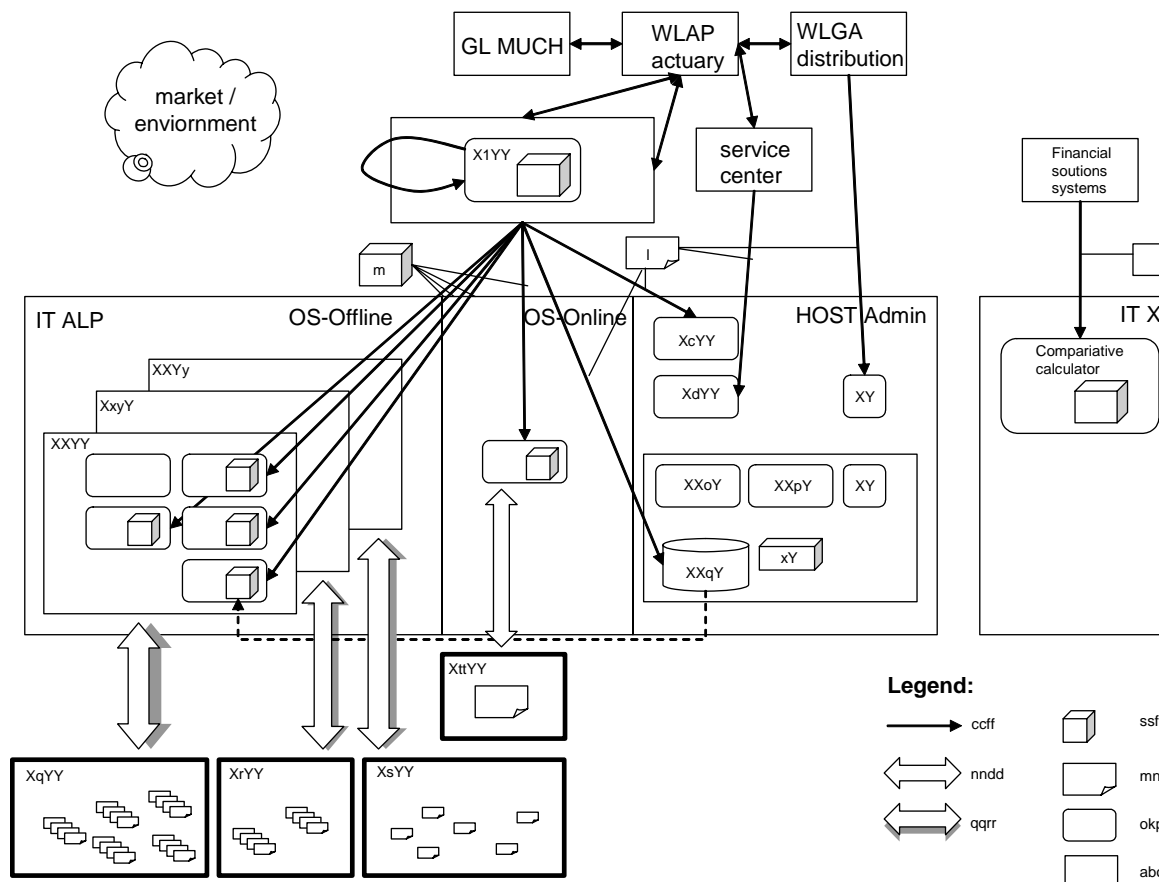
Figure 34: **Example of a Visual Overview on the Applications Involved and the Technical Process for the Calculation of Interests (real designations changed)**

The quote illustrates how by assembling the various aspects relevant to an issue and relating them with each other, a figure or image can help to gain the big picture of an issue. Yet, there is another aspect why the visual form can help to gain, or better to maintain the big picture. „In our meetings, I sometimes use the 'MindManager' tool and this works very well. One is concerned more with developing ideas rather than dealing with technical details"[151]. Apparently, the collaborative visualization helps to stay on the more conceptual level of the dis-

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dass es alle wieder testen müssen, wenn sie es in ihre Applikationen eingebaut haben. Niemand hatte das Gesamtbild, wohin das Paket überall verteilt wird. So erarbeiteten wir ein Bild und zeigten auf, was es alles braucht, damit man innerhalb eines Tages die Zinsen umstellen kann. Diese Darstellung wurde zu einem sehr mächtigen Kommunikationsinstrument, einerseits um das Thema zu erarbeiten, aber jetzt auch mit dem Business. Wir konnten ihnen mit Hilfe dieses einen Bildes aufzeigen, was alles abläuft. Es gab ganz, ganz viele Missverständnisse rund um diesen Prozess und mit einem guten Bild kann man wirklich ganz viel erreichen. Und da der Platz und die Zeit für unsere Kommunikationen so beschränkt ist, ist es wirklich wichtig, wie wir unsere Informationen verpacken."

151 „In unseren Sitzungen verwende ich manchmal das 'Mindmanager' Tool und das funktioniert sehr gut. Man ist dann mehr damit beschäftigt, Ideen zu entwickeln und kümmert sich weniger um technische Details."

course and not to get lost in a too detailed discussion on technology. In this way, with the support of the visual tool[152], it seems that the risk of loosing the big picture and of getting lost in a sea of technical details is lowered.

2. Fosters innovative solutions by:

- Activating collective participation

Visualization does not only help to structure an issue and to gain and maintain the big picture. Visualization also has a social function as it helps to *activate collaboration*.

"I have realized over and over again that whenever someone in a meeting starts drawing an image, on a writing pad or anywhere, then people start talking around this drawing. It really helps to isolate the important aspects and to concretize the conversation topic"[153].

Not all visualization forms foster collaboration in the same way. Spontaneous paper and pencil sketching is often preferable than well designed PowerPoint slides, which often seem to be so complete that active collaboration and a joint development of an issue is hindered.

"I believe that they do not have to be such super ingenious PowerPoint presentations. It can equally be a flipchart and four colors. There, you can draw gradually and you can also cross something out. I believe that this is more important to develop something. It incites everybody to collaborate actively. If I just show a slide and ask: 'Do you agree with that?', then everybody says: 'yes, yes'"[154].

3. Fosters mnemonic capacity

Visualizations also serve as an *anchoring and mnemonic device* as illustrates the following quote of an IT-manager:

"When I use visualizations, it is often not the topic, but an image, a mental anchor, which is referenced in a conversation. 'You showed an image at that point, didn't you?' and therewith, the people mean a whole topic. (..) Once I tried to show the complexity of our business, which exists because of the variety of products and sales channels we have. I first showed a surface area of one color and said: 'this is our business seen from afar'. Then I started to show distinctions and divided the area ever further in colored sub-areas. In the end, this became a very heterogeneous patchwork. (..) This image very

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152 As the visualization effort here is supported by a software tool, the visualization can be more flexibly handled: "I always have the chance to develop the mindmap exactly in the direction, where I then don't find any more space on the paper or flipchart. This is way I very much like such tools" („Ich habe immer genau das Glück, das Mindmap in die Richtung zu entwickeln, wo ich dann auf dem Blatt oder Flipchart kein Platz mehr habe. Deswegen kommen mir solche Tools sehr gelegen.")

153 "Ich habe immer wieder festgestellt, dass wenn immer jemand in einem Meeting eine Zeichnung macht, auf einem Block oder irgendwo, dann beginnen die Leute, um diese Zeichnung herumzureden. Es hilft wirklich, das Gesprächsthema einzukreisen und zu konkretisieren".

154 „Ich finde, es müssen nicht so super geniale Powerpoint-Präsentationen sein. Es können genau so ein Flipchart und vier Farben sein. Dort malt man Schritt für Schritt und kann auch was durchstreichen. Dies finde ich wichtiger, um etwas erarbeiten zu können. Es regt alle an, aktiv mitzuarbeiten. Wenn ich hingegen einfach eine Folie auflege und frage: ‚Ist es so?', dann sagen alle: ‚Ja, ja'."

much impressed the people and became a fixed reference point"[155].

An image can be more easily remembered than an abstract and complex idea[156]. In addition, the interaction with a visual often implicates also an emotional involvement, which increases on its part the mnemonic capacity. Finally, also the facilitated active participation leads to a better remembering of the issues. An image can function than functions as the visual anchor of that collaborative event.

> A final advantage of visualizations is that they can be used for concise documentation of a conversation or of a main idea that emerged in a discussion. An IT-expert mentions: "I often ask people at the end of a meeting to bring me the next time a sketch of this specific aspect we elaborated today"157.

Disadvantage of work with visuals:

▪ Leads to misunderstandings because of poor explicit agreement on semantics of visual language

Next to the considerable potential of visualization for knowledge communication, one major difficulty with visuals is that conversation partners do not explicitly agree on a clear semantic for the visual language they use, which is why misunderstandings can emerge. The following quote illustrates this problem:

> "One goes to the flipchart and starts drawing boxes, arrows... But behind each symbol one draws there is also a semantic. And this semantic is not standardized, each one interprets an arrow a little bit differently. I have two systems, system A and system B and I draw an arrow between the two. What does that mean? Does the data flow in this direction or does the system A call up system B? One has to clarify semantics. Of course, if I know the person next to me, I know that he draws principally in this way and I in that way. But if one does not know each other so well yet, it is hard to find out these semantics. An unambiguous notation is very important"[158].

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155 „Häufig wird dann nicht das Thema, sondern irgendein Bild, ein geistiger Aufhänger referenziert in einem Gespräch: ‚Du hast doch dort ein Bild gezeigt' und damit meinen die Leute dann ein ganzes Thema.(..) Ich habe zum Beispiel versucht, die Komplexität unseres Geschäfts aufzuzeigen, die entsteht durch die hohe Vielfalt an Produkten und Vertriebskanälen. (..) Zuerst zeigte ich eine Fläche, eine einfarbige und sagte, das ist von weitem unser Geschäft. Und habe dann angefangen, Unterscheidungen aufzuzeigen und habe die Fläche immer weiter aufgeteilt in farbige Teilflächen. Am Schluss wurde das ein sehr heterogener Flickenteppich. Das hat die Leute sehr beeindruckt und wird jetzt häufig referenziert."

156 The mnemonic capacity is enhanced both if people need to engage into a deep semantic processing or if they are involved emotionally. Images have both qualities. See also Pavio's (1971, 1986) argumentation on visual imagery where he claims that recalls from images (in relation to verbal text) are more rapid, happen more holistically and allow for freer associations (an image "offers a complex set of spacial arrangements at a glance, showing both the object and its relationship to its surrounding" (Opdahl, 2002: 47))

157 "Ich frage meine Leute oft, mir auf das nächste Mal eine Skizze über diesen spezifischen Aspekt mitzubringen."

158 „Man geht dann zum Flipchart und fängt an, Boxen zu zeichnen, Pfeile... Aber hinter jedem Symbol, das Sie zeichnen, liegt ja auch eine Semantik. Und diese Semantik ist nicht normiert, ein Pfeil interpretiert jeder bisschen anders. Ich habe zwei Systeme, System A und B und macht ein Pfeil dazwischen. Was heisst das? Fliessen die Daten in die Richtung oder ruft das System A einfach das System B auf? Man muss diese Semantiken erklären. Klar, wenn ich das Gegenüber kenne, weiss ich, er zeichnet das prinzipiell so, ich zeichne das so. Wenn man sich aber noch nicht so genau kennt, ist es schwierig, diese Semantiken aufzudecken. Eine einheitliche Notation ist sehr wichtig."

On the one hand, the visual language is useful for the knowledge-intensive communication because it is less rigidly defined than the verbal one. The loose semantics can be advantageous for experts and decision makers if they want to turn tacit knowledge explicit or to jointly develop new knowledge. People can express something, of which they have more of an intuition, with an image that serves them as an analogy. They can express relationships of various pieces of information by positioning them on a visual that acts as a fussy category.

Yet, loose or no semantics where the colours chosen have no informative, but just a decorative purpose and where shapes have different meanings, leaves room to a multitude of interpretations and with that to a variety of misunderstandings.

o Work with
  metaphors &
  quotes
  Advantages:
  • Facilitates
    understand-
    ing
  • Enhances
    mnemonic
    capacity

Metaphors and *quotes* can be used to gain some similar benefits in the knowledge-intensive communication than the ones we have discussed for the use of visuals: metaphors and quotes *facilitate the understanding of an issue and enhance the mnemonic capacity* of the communication partners.

"It is important that the counterpart in the communication can recall the few important aspects of one's communication. This is why I often work with images, establish analogies, and use my quote library. For example, to illustrate the importance of maintenance work within the total tasks of an IT-specialist, I often use the image of brushing one's teeth. If one does not brush one's teeth every day – and that costs five minutes each time – it can be that 10 years later, the teeth fall out. Then the costs and the pains are much more substantial"[159].

Another metaphor that became part of the organization's myths is the awakening of the sleeping beauty to illustrate how the organization and the whole insurance industry work today at much faster speed. To point up the same idea, other IT-managers referred to the image of a driver who used to stroll in the streets with his Renault 4 and who now has to run formula one races. Historic is also the image of the elk test of the Mercedes A class to illustrate the importance of quality controls and of their meticulous execution. In all these examples, metaphors are used as mnemonic anchors. By linking an issue to an imaginary world, its importance can be underlined and more easily be remem-

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159 „Wichtig ist, dass das wenig Wichtige, das man sagt, beim Gegenüber hängen bleibt. Ich arbeite oft mit Bildern, versuche Analogien herzustellen und verwende oft auch meine Zitatensammlung. Um zum Beispiel zu unterstreichen, wie wichtig Unterhaltsarbeiten im Rahmen der Arbeiten eines Informatikers sind, verwende ich oft das Bild des Zähneputzens. Wenn man nicht jeden Tag Zähne putzt, das braucht zwar jeweils nur 5 Minuten, dann kann es sein, dass in 10 Jahren die Zähne ausfallen. Dies kostet dann viel mehr und schmerzt auch deutlich mehr."

bered.

A second advantage of the use of metaphors is that they help to simplify an issue and to focus just on the one core aspect of it.

> "One has to simplify and cannot be afraid of explaining something in such simple terms that also an infant from nursery school could understand. Pictorial language is very useful to make to business understand"[160].

One difficulty with metaphors is that the analogy is suited only to illustrate part of the issue and is problematic for other aspects of the same issue. In addition, people might focus too much on the metaphor rather than on the issue for whose illustration the metaphor was used. "The stupid thing with metaphors is that I mostly find the error in the metaphor and not in the problem"[161].

– Define terms explicitly & develop glossaries

In view of the frequent misunderstandings of terms (see later on: Challenges related to the mental models), some IT teams have started to develop glossaries with definitions of terms that are related to the team's area of expertise. The head of the workflow team states:

> „We started to do a glossary to define the concepts with which we work so that everybody who works with us knows what we conceive of a 'task', a 'process', or a 'work step'. It is important that our interaction partners share the same understanding and speak the same language"[162].

– Define small audience circles to better align the communication

Another way to avoid misunderstandings and to best align one's communication to the characteristics of the audience, both IT-experts and decision makers try to choose quite a small target audience for one's communication. In this way, one can better tailor the content and form of the message to the specific characteristics of the interlocutor.

> „The communication works best when the target audience is small. Then, I know the profile of the people I am writing to and I can tailor my message very precisely. If it is a

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160 „Man muss vereinfachen und darf sich nicht scheuen, etwas so einfach zu erklären, dass es auch einem Kindergärtner eingängig wäre. Bildhafte Kommunikation ist mit dem Business wirklich sehr zentral."
161 „Das Dumme mit Metaphern ist, ich meist die Fehler in der Metapher und nicht im Problem sehe."
162 „Wir machen deswegen ein Glossar, damit die Arbeitsbegriffe definiert werden und damit alle, die mit uns zusammenarbeiten, wissen, was wir unter einer Aufgabe verstehen, was ein Prozess ist, was ein Arbeitsschritt, etc. Es ist wichtig, dass unsere Interaktionspartner das gleiche Verständnis haben wie wir und dass wir die gleiche Sprache sprechen."
163 "Am Besten funktioniert die Kommunikation, wenn der Empfängerkreis klein ist. Dann kenne ich das Profil der Leute und kann sehr adressatengerecht schreiben. Wenn es ein Techniker ist, kann ich technisch schreiben und muss nicht versuchen, umgangssprachlich zu kommunizieren. Mit dem Management muss man Schwerpunkte anders setzen, mehr strategische Punkte betonen."

technician, I can use technical terms and do not have to try to use colloquial speech. With managers, you have to choose other focal points and stress strategic aspects"[163].

Practices Relative to the Communication Process

– Extensive use of face-to-face conversations

In the case of InSure, the most important modality of the knowledge communication between IT-technicians, the IT-managers, and the managers from the business line, is the *face-to face conversation*. This is true both across hierarchical levels as among peers. The head of the IT unit, for example, has scheduled a weekly meeting with his five direct reports jointly, a bilateral weekly meeting with each one of them, a monthly meeting with each project leader, a monthly meeting with the managers on the business side, called the steering committee, and a monthly bilateral meeting with each important client from the business side. In addition, a lot of ad hoc communication and meetings take place. Face-to-face communication is equally important also for IT-technicians: „We are three people who deal with the projects on a conceptual level and all sit in the same room. All is very spontaneous and a lot of ad-hoc communication takes place. I prefer it when communication is direct"[164].

Why is the face-to-face interaction the preferred way how IT-specialists and managers interact?

Functions:

– Assures shared understanding

First, the face-to-face communication allows for a stepwise approximation towards a *common understanding*. In a conversation, people can immediately perceive the reactions of their conversation partners and on the basis of their feedback, they can readjust and specify their mode of expression. "If you make everybody sit around a table (..), you can simply be more certain that there won't be any misunderstandings"[165].

In part, the understanding is enhanced because face-to-face-conversations allow for *contextualizing a piece of information and outlining what its reasons or implications are.*

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164 "Wir sind drei Leute, die sich konzeptionell mit dem Projekt beschäftigen und sitzen im gleichen Zimmer und es ist alles ziemlich spontan und es findet sehr viel ad hoc Kommunikation statt. Ich habe es lieber, wenn die Kommunikation direkt ist."

165 „Wenn man aber alle an einen Tisch setzt (..), kann man einfach sicherer sein, dass es keine Missverständnisse gibt."

"If the topic is complex, a meeting is good so that everybody receives a basis and understands what the issue is about. It is also possible to very specifically outline what are the implications of a project" [166].

People can give an *overall view* on an issue and can show why it is important at this point in time to deal with it and what, for example, are the business implications of the technical solution or how ones own working procedures are affected by a certain decision. This contextual information is important in order to have a basis for the interpretation of further information.

– Fosters coincidental contact with new information

Second, conversations are central to the knowledge communication because they *foster coincidental contact with new information*.

"I believe that communication is something chaotic, but one always tries to structure it. (..) Something that I have forgotten, I will only think about it if I grasp the word by coincidence during a break. 'What are you talking about?' Then it is also the right moment. The piece of information has to reach me at the right moment in order to be able to anchor it" [167].

The organization has to provide such free spaces (in terms of time and physical spaces) where knowledge can – but does not have to - be shared and developed and employees can have types of conversations, which otherwise would not be possible. Some interviewees mentioned the famous coffee talks during breaks, others that they very consciously arranged lunches with employees. In a coffee break or lunch, the IT expert breaks out for a moment from his rather narrowly defined tasks and is exposed to pieces of information, which are either new or already known to him, but because of the particular context he is working in at this moment in time, lead to a new meaning. Exposing employees to such 'free spaces', is a form of 'managing' conversations in a loose way, which gives voice to the chaotic aspect of the communication of knowledge.

– Nurtures interpersonal well-being

Third, conversations are an important condition for the integration of knowledge between IT-specialists and managers because they *nurture the interpersonal contact and wellbeing*.

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166 „Bei komplexen Themen ist eine Sitzung gut, damit alle eine Grundlage erhalten und verstehen, worum es geht. Auch um wirklich konkret aufzuzeigen, was für Auswirkungen ein Projekt hat."
167 „Ich glaube, Kommunikation ist etwas Chaotisches und man versucht immer, sie zu strukturieren. (..)Etwas was ich vergesse, dann denke ich nur daran, wenn ich das Wort zufällig in einer Pause aufschnappe. „Wovon sprecht ihr da?" Dann ist es auch der richtige Zeitpunkt. Die Information muss zum richtigen Zeitpunkt eintreffen, damit man sie verorten kann."

"It is the personal contact in the coffee break or in meetings, which accounts for the communication to flow. (..) It is important to get to know the people personally in order to better understand the other side. This helps to limit the misunderstandings and also to use the time more effectively"[168].

– Assembles all the pertinent expertise around a table

Forth, face-to-face interaction is important to pool the various specialized expertise, which is necessary in order to take a decision.

"Issues deal often around technical aspects, which I personally cannot and do not want to evaluate. In such occasions, I normally assemble all the people from my sector or from other sectors around a table and we start discussing the issue. I have realized that this is much more efficient than if each one prepares a preparatory study in his on cubby-hole"[169].

– Allows to deal with delicate issues

A final reason why face-to-face interactions are preferred to other forms of communication is less related to the communication of knowledge: Conversations are most suited to communicate delicate issues. When a person has to address an issue where opinions differ quite strongly or when he/she has to tackle a difficult and delicate subject, face-to-face communication is almost always the preferred mode of communication. The communicator can express the importance of the issue and his/her own engagement in it by standing there personally. In addition, in the interactive mode he/she can name the issue very carefully and misunderstandings can be retrieved quickly.

"We speak of reorganization and not of re-dimensioning. For the employees this is an important difference because they know that nobody gets laid-off. These are types of information, which one prefers to communicate orally. The spoken word is more ephemeral than the written text"[170].

The quote shows also that because of the ephemeral nature of conversations, some people have the illusion that their word is less binding and that by using this form of communication, they can shirk their own responsibility.

Limitations of

This last remark leads us from the long argumentation why conversations

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168 „Es ist der persönliche Kontakt in einer Kaffeepause oder in einer Teamsitzung, die es ausmacht, dass die Kommunikation fliesst. Wichtig ist, die Leute persönlich kennen zu lernen, um die andere Seite besser zu verstehen. (..) Das persönliche Kennen lernen hilft einem, die Missverständnisse zu beschränken und auch, um die Zeit effektiver zu nutzen.“

169 „Oft geht es um technische Dinge, die ich selber nicht beurteilen kann und will. In solchen Fällen mache ich es im Normalfall so, dass ich alle Leute von meinem Sektor aber auch von anderen Sektoren an einen Tisch zusammenziehe und dass man das Thema dann zusammen durchdiskutiert. Ich habe gemerkt, das ist irgendwie effizienter als wenn man da jeder für sich in seinem Kämmerchen ein Grundlagenpapier erstellt.“

170 „Man spricht von einer Umstrukturierung und nicht von einer Redimensionierung. Das ist für die Mitarbeiter ein wichtiger Unterschied, denn so wissen sie, es wird niemand entlassen. Das sind Arten von Informationen, die man lieber mündlich kommuniziert. Das gesprochene Wort ist flüchtiger als einem schriftlichen Text.“

Face-to-Face:

– Ephemeral
nature and
non-
persistence

are so important for knowledge communication to the discussion of some limitations of face-to-face conversations.

The one important disadvantage is that *conversations are ephemeral* and that insights, decisions, agreements are not recorded systematically.

"If one does a lot in a spontaneous way, then only a little is documented and this can lead to misunderstandings. (..) A conversation... it emerges and then disappears again. One has to retain it in some way. Otherwise, you go out of the meeting, one person has understood it in this way, the other in another. And both have the idea that the other is in charge of the issue"[171].

In view of the ephemeral nature of conversations, and the risks of misunderstandings, forgetting of important issues, and the unclear definition of responsibilities, the different IT-teams use some forms of meeting minutes. In some cases, they not only serve to record a conversation, but also to structure it.

"After each meeting I do a protocol... well basically (laughs). For team meetings I don't do it. There we just record the open issues on a flipchart and tick them one after the other. In this way, it serves us also to structure the meeting" [172].

There is no standard form or process for such protocols, but within some teams there are clear agreements. In one team, for example, each protocol needs to show the tasks, the status of the tasks and who is responsible for it. The same day of the meeting, the protocol is sent to all participants who are asked to give feedback and if they do not react, they silently agree to content of the protocol.

– Limited struc-
tural precision

Another smaller limitation of conversations is they are *loosely structured*. Earlier, we have mentioned (see: Practices in the need articulation phase / Focus on face-to-face conversations) that the flexibility of conversations is important for the two parties to gradually converge into a shared understanding and to externalize tacit knowledge. Yet, after a first flexible approach to the issue, a clearer, more persistent structure is necessary.

"The conversation is only the beginning, like the draft for an essay. From there a structure

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171 „Wenn man sehr viel spontan macht, wird auch wenig dokumentiert und dies kann dann zu Missverständnissen führen. (..) Ein Gespräch... es entsteht und verschwindet wieder. Man muss es auf eine bestimmte Weise festhalten. Sonst geht man aus einer Sitzung heraus und der eine hat es so verstanden und der andere so und dann gehen zwei Leute mit absolut unterschiedlichen Vorstellungen heraus und beide haben eigentlich das Gefühl, der andere ist dafür verantwortlich. "

172 „Nach jeder Sitzung mache ich ein Protokoll... so grundsätzlich (lacht). Bei Teamsitzungen machen wir das nicht. Dort halten wir einfach die Pendenzen mittels des Flipcharts fest und haken diese dann nacheinander ab. Auf diese Weise dient es uns auch zur Strukturierung des Meetings."

has to be developed and it has to be defined; how exactly will I proceed?"[173]

Next to the ephemeral nature and its non-persistence, face-to-face interactions represent a major modality how knowledge is integrated between the IT-experts and the decision makers.

– Invite business to selected IT meetings

One major concern of IT-specialists and the managers from the business line is how to increase the common ground among them. We have mentioned, for example, the role of middlemen, of internships and of face-to-face interactions on regard.

Another practice that facilitates the creation of a common ground is to invite the managers from the business line to selected IT meetings and so to sensitize them with the concerns and reality of the IT teams.

"We also invite the people from the business to us. What we cannot do is that the people from the business do internships in our unit. That would be much too specific. But what we can do is to invite them to a team meeting or to other events of the IT where we say what is technologically on going, with what we will be confronted in the upcoming months or years, etc."[174].

Challenges Related to the Group Dynamics and Socio-Emotional Aspects

Socio-emotional aspects are essential to the successful integration of knowledge between IT-specialists and managers. Oftentimes, people speak only on the surface of technical facts, managerial considerations, or economical arguments. But what they most worry about are informal alliances, allegations, and power constellations among their colleagues, and they will interpret others' factual arguments with the suspicion of a political motivation and serve themselves of apparent factual considerations in order to reach their political objectives.

"There are cases where emotions play a larger role than the factual circumstances. People can block certain decisions because they have not understood each other or because they suspect something else, politics, innuendos... Then a lot deals with the personal position of

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173 „Das Gespräch ist nur der Anfang, wie ein Entwurf für den Aufsatz. Daraus muss dann eine Struktur entstehen: Wie gehe ich vor."

174 „Wir laden die Leute vom Fach auch einmal bei uns ein. Was man sicher nicht machen kann, ist, dass die Leute vom Business bei uns einen Stage machen würden. Das wäre schon viel zu spezifisch. Aber wir können sie zu einer Teamsitzung einladen oder zu einer anderen Veranstaltung, wo wir sagen, was technisch am Laufen ist, was in den nächsten paar Monaten oder Jahren auf uns zukommt, etc."

175 „Es gibt manchmal Fälle, wo Emotionen eine grössere Rolle spielen als der Sachverhalt. Man kann gewisse Entscheide blockieren weil man sich nicht verstanden hat und weil man irgendetwas anderes vermutet, Politik, Unterstellungen... Dann geht es sehr viel um das persönliche Machtverhältnis, obwohl ich dies gar nicht so gemeint habe."

power even if I have not intended it this way"[175].

In the following, we will outline some more specific challenges and practices related to the group dynamics that tend to emerge in the IT-specialist-manager constellation.

– Relational tensions: Lack of trust and consideration

In the interviews, a few IT-technicians mentioned that relational tensions complicated the communication, not so much with the business line, as more with the IT-management.

"The managers can be quite detached. (..) They don't know the concerns of the employee and they [..] show little comprehension for his problems. Sometimes I feel that what I say does not really reach them even if it has been understood. (..) One gets the impression that a problem is considered only because it limits the productivity or because some specific objectives cannot be obtained and not really because it bothers the employee in his work. Yet, the comprehension is an important precondition for a fruitful discussion"[176].

The basis for a collaborative communication is threatened by a low comprehension of management for the concerns of the employees and a feeling of not being considered as a person, but just as a source of production, upon which can be executed measures for improving productivity. This latter concern is illustrated by the following quote of an IT-technician:

„One would like to squeeze the same performance with ever less people. I have, for example, a new superior and he has to show to be with right in his new position. There are expectations he wants to fulfill and we, on the lowest level, have to pay for it"[177].

Finally, another cause of relational tensions can be the perception of lacking trust from the superior.

"Management should have more trust. We always have to document everything, justify, and make things transparent. This takes a lot of time. In the end, the result is the same. We say we need that much time and this with or without a document outlining the exact evidence. They always require a detailed documentation in order to take decisions and this is

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176 „Das Management kann ziemlich abgehoben sein. Es versteht zu wenig, was den Mitarbeiter bewegt. Das Verständnis für Probleme des Mitarbeiters ist nicht vorhanden oder wird nicht gezeigt. Mein Empfinden ist oft, dass das, was ich sage, nicht ankommt, obwohl es eigentlich verstanden wird. (..) Ein Problem wird zur Kenntnis genommen, aber man hat fast das Gefühl, es ärgert, weil die Produktivität eingeschränkt ist und irgendwelche Ziele nicht erreicht werden können und nicht, weil es den Mitarbeiter in seiner Arbeit behindert. Das Verständnis ist jedoch eine wichtige Voraussetzung für eine fruchtbare Diskussion."

177 „Man möchte mit immer weniger Leuten immer noch die gleiche Leistung rauspressen. Ich habe beispielsweise einen neuen Chef und er muss zeigen, dass er zu Recht auf der neuen Position sitzt. Es sind Erwartungen da, die er erreichen möchte und auf der untersten Stufe müssen wir das dann ausbaden."

quite difficult"[178].

Most of the times, such relational tensions do not become explicit topics of discussion. Yet, they build a context, within which it is difficult to criticize constructively, to share and develop knowledge, and to reach new solutions, as expresses one IT-technician: "Sometimes, one is so absorbed by the emotional issues that it is a double challenge to talk about the same, even just business-wise"[179].

In part, these relational tensions, as mentioned only by a few interview partners, are reflections of larger organizational developments (see: Challenges related to the outer context of the communication: Organizational reorganization). InSure lived through a large reengineering process, which led to lay-offs, redistribution of existing job-functions, a more formal definition and execution of processes as well as the carrying over of a new, almost exclusively in universities educated IT-specialist generation. In times of such transformations, uncertainties, fears, and resentments are lived intensely and managers are often (mis-)perceived as the promoters and the people in charge of these organizational changes. In this way, corporate incidents can have repercussions on the group dynamics, which reigns between the IT-technicians, the IT-managers and the managers from the business line.

– Feel intimidated by formal hierarchy

Formal hierarchical levels can lead to informal dynamics between experts and decision makers, which are problematic for the sharing of knowledge. On IT-manager recalls from her experience:

"Often there is an inhibition threshold ‚from down to top in the communication between IT technicians and IT managers or also between IT technicians and the managers from the business department. ‚How should I talk with him?' And there it is my task to inquire with the right questions and to try not to use a too strong technical language. And if the IT-technicians know that they can do it with me then they can also do it with the managers from the business line"[180].

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178 "Das Management müsste mehr Vertrauen haben. Man muss ihnen alles belegen, begründen und Dinge transparent machen. Das braucht sehr viel Zeit. Am Schluss ist das Resultat das Gleiche. Wir sagen, wir brauchen so und so lange, mit oder ohne genauen Beleg und Begründung. Sie wollen immer alles genau dokumentiert haben, damit sie entscheiden können und das ist dann relativ schwierig."

179 „Manchmal hat man mit dem Emotionalen genug zu tun und es ist eine doppelte Herausforderung, dass man wenigstens auf der fachlichen Ebene vom Gleichen spricht."

180 „Oft ist in der Kommunikation von den IT Technikern mit den IT Managern oder mit dem Business ein bisschen eine Hemmschwelle ‚von unten nach oben' da: ‚Wie rede ich mit dem?' Und da ist es meine Aufgabe, mit

Practice Relative to the Group Dynamics and Socio-Emotional Aspects

– Cultivate personal contact

Over and over again, interviewees mentioned that a very central aspect of the knowledge communication between the IT-specialists and the managers is a *well working interpersonal relationship*.

"Central for a successful knowledge transfer is a positive comity with the interlocutor, to whom one wants to convey knowledge. One has to talk on the same level and not to condescend or stress the differences between specialist and non-specialist. The interlocutor should feel the respect and that the other has a big interest to understand. One has to care for a relationship that is characterized by mutual respect, personally and professionally. Trust is a very important precondition"[181].

The relationship between experts and decision makers has to be characterized by mutual respect, trust, and care. As IT-experts often intervene in the daily working processes of the business, the risk is high that the business feels threatened or offended by the suggestions of the IT and that it starts blocking the collaboration.

"We have to convey that we do not want to take away anything from the business, but that we want to help the business so that it can carry out its work more quickly and more efficiently. But here, we already have to be cautious because, implicitly, we say that today they do not work quickly or efficiently. (..) If the business does not collaborate, we simply cannot display the process. I know a lot of examples where projects failed because of such issues"[182].

In order to *cultivate good interpersonal relationships*, much of the communication takes place in face-to-face conversations (see: Practices relative to the communicative process / Extensive use of face-to-face conversations). In this way, with each business-related communication, the employees get to know each other also on a personal level.

– Communicate in a transparent

To build up mutual trust and respect, important guidelines in the communi-

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den richtigen Fragen zu bohren und darauf zu pochen, eine nicht allzu starke Technikersprache zu verwenden. Und wenn IT Techniker erfahren, dass sie das mit mir können, dann können sie das auch mit dem Business."

181 „Ein Aspekt, der den Wissenstransfer überhaupt erst möglich macht, ist ein wirklich gutes Einvernehmen mit dem Gegenüber, dem man das Wissen vermitteln möchte. Man muss auf der gleichen Ebene miteinander sprechen, nicht von oben nach unten oder von Spezialist zu Nichtspezialist. Man darf nicht unterstreichen, dass diese Unterschiede wichtig sind. Im Gegenteil, das Gegenüber sollte den Respekt spüren, dass es ein grosses Anliegen ist, dass man verstanden wird. Man muss eine Beziehung pflegen, die sich auszeichnet von einem gegenseitigen Respekt, persönlich und fachlich. Vertrauen ist eine ganz wichtige Voraussetzung".

182 "Man muss vermitteln, dass man dem anderen nichts wegnehmen möchte, dass man helfen möchte, dass das Business seine Arbeit schneller und effizienter machen kann. Aber da muss man schon wieder aufpassen, man sagt dann implizit ja auch, dass sie es heute nicht schnell und nicht effizient machen. Wenn das Business nicht mehr mitmacht, können wir schlicht die Prozesse nicht abbilden. Ich kenne viele Beispiele, wo Projekte nur an solchen Dingen gescheitert sind."

and open way in order to convey authenticity and trust

cation are to engage in *frequent and open communication*, to address own mistakes as well as difficult issues.

> "For the mutual trust, it is very important to communicate openly where one stands and which issues are problematic. If a person has made an error he/she should say: 'Sorry, I did not know it better'. In this way, one remains authentic. (..) One should also have the courage to address difficult issues"[183].

Building on a trustful relationship also means to start with having trust in the colleagues as well as believing in the reciprocity of this trust.

Challenges Related to the Mental Models

– Differences in orientations (technical – cost, desired – feasible, planned-from day-to-day) lack of common ground

The *mental orientations of IT-specialists can differ quite substantially from the ones of managers* and this might hinder a successful communication. To sketch these differences in a stereotypical manner, we can say that the technical orientation of the IT-specialist is confronted with the rigid cost orientation of the manager; the IT-technician is close-lipped, the manager instead is outgoing and client-oriented manager; the IT-technician is oriented on processes-in-use (processes as they are lived on a day-to-day basis) while the manager is oriented by exposed processes (the way processes are said to be)[184]. Finally, IT-technicians have insight knowledge on the technical possibilities and are therefore oriented on what is feasible or reasonable; whereas the managers on the client slide are oriented on what they need and on hypothetical technical possibilities. One IT-technician mentions an example on how differences in orientation can hinder communication: "The upward communication is almost more difficult since there, the topics are different: strategies, new products, orientations. I am technically oriented, not cost oriented. Here, the discrepancies are sometimes pretty high"[185]. Another one mentions: "They [the managers] orient themselves on theoretical processes or models and these do not really fit with the praxis"[186]. These diverging orientations result in different ways of approaching a new project or of assessing a situation and solution.

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183 „Für das gegenseitige Vertrauen und den Respekt ist sehr wichtig, dass man einander offen legt, wo man steht und welche Dinge problematisch sind. Wenn man einen Fehler gemacht hat, sollte man sagen: Sorry, ich habe es nicht besser gewusst'. Auf diese Weise bleibt man authentisch. (..) Man muss auch den Mut haben, schwierige Themen anzuschneiden."

184 For a more elaborate distinction between 'espoused theories' (written or oral self-descriptions of one's/an organization's behavior, values, beliefs) and 'theories-in-use' (those more implicit values, beliefs, and assumptions manifested in personal/organizational practice) (Argyris & Schön, 1978).

185 "Die Kommunikation nach oben ist fast noch schwieriger weil deren Themen ganz anders sind: Strategien, neue Produkte, Ausrichtungen. Ich bin technisch orientiert und nicht sehr kostenorientiert. Hier sind die Diskrepanzen manchmal noch gross."

186 „Sie orientieren sich an theoretischen Prozessen oder Modellen und diese passen nicht wirklich auf die Praxis."

"Everybody has his view and assesses facts from his professional context and his experiences. The IT-technician weights issues differently than the IT-manager and also differently than someone from the business line"[187].

In a situation where values, practices, background knowledge and perspectives differ quite substantially and the two parties do not speak the same language, the big challenge is "to find a common understanding or consensus of what is really necessary and important"[188]. One IT-manager illustrates this problem in the following way:

"Imagine an IT-person who is introverted and likes to brood with bits and bytes. Now, he is in a situation with a client, who is not at all interested in technology and simply says: 'My guts' feeling tells me that here I need something. Just go ahead'. Of course, the IT-specialist thinks in a whole different paradigm and the question is, will they ever be able to understand each other?'"[189].

The communication between people with such different orientations rarely moves on a level where a deep understanding can be established. Knowledge is presumed, which actually is not present. Equally, interests might be very different so that an IT-technician is very fascinated by an aspect, which the manager finds impertinent and boring. "It is most important not to talk with a person about something she/he is hardly interested and only listens with half an ear"[190].

The challenge in this constellation is to *find a common ground that connects these diverging orientations*: "The intersection of the two understandings of the piece of information is relatively small and this is really the central point"[191]. Experts and decision makers have to identify this intersection and build on in it in order to further increase it. This does not mean that differences have to be eliminated. On the contrary. It is important to stand in for the own perspective, to keep the differences in orientation, but try to make one's own perspective

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187 „Jeder hat eine andere Sicht und gewichtet den Sachverhalt aus seinem beruflichen Umfeld, aus seinen Erfahrungen. Das ist ein relativ schwieriges Gebiet. Der IT-Techniker gewichtet Dinge anders als der IT-Manager und nochmals anders als jemand aus dem Fachbereich".

188 „Es ist sicher auch eine Herausforderung, ein gemeinsames Verständnis oder einen gemeinsamen Konsens zu finden über das, was wirklich notwendig und wichtig ist".

189 „Stellen Sie sich einen IT-Menschen vor, der ein bisschen introvertiert ist und mit Bits und Bytes vor sich hinwurstelt. Er trifft nun auf eine Situation mit einem Kunden, der sich überhaupt nicht interessiert für Technik und einfach nur sagt: ‚Irgendwie habe ich ein Bauchgefühl, das mir sagt, hier brauche ich was. Mach mal!'. Der Informatiker denkt natürlich auf einer ganz anderen Schiene und die Frage ist, werden sich die beiden jemals verstehen können?"

190 „Es ist aber auch wichtig, dass man mit der Person nicht über etwas spricht, was sie gar nicht interessiert und nur halb zuhört."

191 „Die Schnittmenge der beiden Verständnisse der Informationen ist schon relativ klein und das ist wirklich der wesentliche Punkt."

accessible and interesting to the interlocutor.

> "Sometimes when I meet a representative of the business line, I am confronted with a lot of wishes and of course, the client is the king. On the other side, the challenge is to turn the feasible into the reasonable. Sometimes one has to say that it is better not to do something because it would mess up something else and we always work with a mortgage that lasts for the next 20 years"[192].

The same is true also for the process how to define a clear request, which was once much less formal and articulated and today has become a process with clear deliverables and phases. It is important to stick very clearly to the new formal process in order that all too well established patterns of behavior slowly can be changed.

> "We still have different time horizons, a vision of a well-defined and ordered process and one of a 'I-would-like-to-live-into-the day'. At the moment, it is a very difficult process to get used to the new rules of the game. But we have to be very clear on that if we want to increase our efficiency"[193].

The stereotypical view of the differences in orientation between experts and decision makers and the lack of common ground have to be relativized. In the communication between the business line and the IT there is a strong shared interest due to the reciprocal dependence of both parties. The business can only work with well functioning IT-applications and the IT can only work in collaboration with the business. From there follows a continuous interaction between the two parties and at the end also a common object (the IT-application). All these aspects very much favor the creation of a common ground. In fact, an IT-manager states:

> "The communication with the business works pretty well. We produce something, with which they will work afterwards. In spite of all the difficulties, we still talk about the same"[194].

The IT application is the object around which both parties are communicat-

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192 „Wenn ich mich mit dem Fachbereichsvertreter treffe, da treffen Wünsche auf mich und natürlich, der Kunde ist der König. Auf der anderen Seite ist die Herausforderung diese, die Wünsche auf das Machbare und das Sinnvolle hinunter zu brechen. Manchmal muss man sagen, dass man etwas besser nicht macht, weil man etwas verbockt oder weil man mit einer Hypothek arbeitet, die einem für die nächsten 20 Jahre bleibt."

193 „Wir haben immer noch unterschiedliche Zeithorizonte, von einer Vorstellung einer well-defined und geordneten Zeit bis zu einer ‚möchte-gern-in-den-Tag-hinein-leben'. Das ist im Moment ein schwieriger Prozess, sich an diese neue Spielregeln zu gewöhnen. Wir müssen aber da hindurch, damit wir eine Effizienzsteigerung heranbringen können."

194 „Die Kommunikation mit dem Fachbereich geht eigentlich gut. Wir produzieren etwas, womit sie danach arbeiten. Trotz allen Schwierigkeiten sprechen wir noch vom Gleichen."

ing and it is the focus of attention for both parties[195]. It serves as a shared arte-
fact to create common ground[196] and around which to organize collaboration.

Another general challenge in the knowledge-intensive communication be-
tween experts and decision makers that can be located on the level of the mental
models is the one of uncovering implicit misunderstandings. Misunderstandings
can arise because of differences in use of terms by either using the same term
meaning different issues or by using different terms meaning though the same[197].

"Even the business line and us, we often work together, but still often use very different
terms for expressing the same or for something else (laughs). That is really a difficulty.
Management speaks yet another language. We have to work everything out in details, cir-
cumscribe it and we are not allowed to use abbreviations"[198].

Misunderstandings typically arise in relation to words such as 'workflow',
'software production', 'admin-console', or regard, for example, the difference
between 'software' and 'application'. The risk of such misunderstandings is par-
ticularly high if the interaction partners rarely know each other.

"You can see that with new sector leaders to which you are not yet completely used. I
suspect we talk of the same, but name it differently. (..) We start discussing, almost be-
come emotional and a little agitated. But then we realize that we speak of the same, but
name it differently" 199.

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195 Bechky (2003) made a similar point in an ethnographic study of a production floor, in which she analyzed the
communication of knowledge between different occupational communities. While a shared understanding be-
tween two communities was difficult because of different conceptualizations and loci of practice, it was facili-
tated through the fact that both communities had a same work objective (e.g. creating a same product).

196 See: (Kraut *et al.*, 2003; Olson & Olson, 2000)

197 Bechky (2003) discussed the same phenomenon and showed how misunderstandings across occupational
communities arise because of „decontextualization", a use of language that one community assumes to be uni-
versal, but that is incomprehensible to another occupational community, which is not sharing the same context.
Specifically, Bechky showed how engineers attribute different meanings to the same word than assemblers to
designate a machine or work process to designate different things or they use different words to represent the
same objects. While engineers have a more conceptual, schematic understanding, assemblers tend to have a
more spacio-temporal and procedural understanding. The misunderstandings that derive are either readily dis-
covered or remain unknown for a considerable amount of time. Bechky made the interesting argument that
these misunderstandings can be reconciled through the use of „tangible definitions", that is the use of physical
objects (such as machines) for illustrating one's understanding in a very tangible way. She claimed that ma-
chines, for example, serve as ‚boundary objects' and help to create a common ground among the occupational
groups. On the other hand, she found that technical drawings from the engineers were not suited to create
common ground as they were too abstract and unfamiliar and did not invoke „the loci of practice and concep-
tualization of the product that each group had" (p.325).

198 „Bereits der Fachbereich und wir, die wir ja oft zusammenarbeiten, verwenden oft sehr unterschiedliche Begrif-
fe für das Gleiche oder eben für etwas anderes (lacht). Das ist oft eine Schwierigkeit. Das Management spricht
nochmals eine andere Sprache. Da muss man alles ausführen, alles umschreiben, man darf nicht Abkürzungen
verwenden."

199 „Man sieht das beispielsweise bei neuen Sektorleitern, an die man sich noch nicht so ganz gewöhnt hat. Ich
vermute, wir sprechen vom Gleichen, drücken uns aber anders aus.(..) Man diskutiert dann, wird fast emotio-

– Difficulty to convey the know-why of a proposed measure and to gain the other's understanding for one's perspective

A final challenge related to the different mental models of IT-specialists and managers is that, in the communication, one not only has to convey what is at issue, but also why it is at issue. In other words, not only the 'know-that' is important, but also the 'know-why'.

> „My biggest challenge is to show why we actually want to know something in specific. Otherwise, they have the feeling: 'Ahh, now there comes the manager again and needs to know some idiocy to justify something'. This is really my biggest communicative challenge. I have to make it clear to the people why I need something and in this way I have to bring in the management perspective"200.

Without the 'know-why', the other has difficulties in understanding the importance or necessity of something or the implications it has for the organization. With the need to share the 'know-why', the communicators have to convey part of their perspective on issues and this is a much more difficult task than simply sharing a 'know-what'.

Challenges Related to the Outer Context of the Communication

– General uncertainty due to recent reorganization

The challenges and practices we have so far discussed are very closely related to the single interactions and the different means of communications. While the characteristics of these communications and the routine interaction patterns contribute to the structure of larger social entities such as the organization as a whole, on the other hand, each interaction is embedded in a larger (organizational) context and influenced by it[201]. A last set of challenges therefore is related to the outer context, in which the knowledge communication takes place.

A major contextual aspect of the knowledge communication between IT-technicians, IT-managers, and the managers from the business line is that InSure passed through a major reorganization recently. People had to be laid off, others reallocated or had to take over additional functions. Employees lived through a period of larger instability, feared to loose their jobs, and had to adjust to other forms of working (e.g. more formally defined processes and procedures). In such a context, relational conflicts are in the air and emotional aspects are more important than the sharing and integration of knowledge. It is interesting also that

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nal, echauffiert sich ein bisschen. Man stellt dann aber fest, dass man vom Gleichen spricht, es jedoch anders darstellt."

200 „Meine Herausforderung ist es, aufzuzeigen, warum wir etwas eigentlich genau wissen wollen. Sonst haben die das Gefühl, ahh, jetzt kommt da wieder der Manager und muss da jetzt wieder irgendeinen Blödsinn wissen, um etwas rechtfertigen zu können. Das ist wirklich meine grösste Kommunikationsherausforderung. Man muss den Leuten klar machen, warum man etwas braucht und auf diese Weise, die Managersichtweise hineinzubringen."

201 This reciprocal relationship between the single interactions and the larger social context refers to the historic discourse of sociologists between structure and agency (see for example: Giddens, 1984: xxvi).

a very strict division between experts and decision makers, at least in the IT department, is no longer feasible.

> "This year, we had a huge reduction of staff in the IT and we cannot afford pure managers who just take decisions. Everyone in my position needs a certain IT know-how and needs to understand what is going on among his people"[202].

– Time pressure: Lack of time for communication leads to misunderstandings

A final and very important contextual constraint is time. In the last years, time became an ever rarer resource. Leading an effective communication, on the other hand, is seen as an objective, which requires very much time. Sometimes, tradeoffs have to be made with other activities, which are more closely related to production. One IT-technician explains to which extent time pressure increased in the last years.

> "We all have to react very quickly. For example, policy project interests. They used to be adjusted once a year or every second year and we had three to four months for the decision process. Today, we have to decide within one day"[203].

Within this setting of very tight timeframes, time for communication is often very limited as mentions this IT-manager:

> "I only give minimal information. I don't have the time to educate the people as profusely and as in-depth as I would like. This is another problematic point. (..) I just say what the task is and briefly explain the larger context, but just what is absolutely necessary"[204].

If time lacks even for explaining in little bit more detail the context of a project or IT-undertaking, then the time for less directly functional communication is even scarcer. Another IT-manager adds:

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202 „Wir hatten einen massiven Stellenabbau in der IT in diesem Jahr und können uns eigentlich nicht mehr reine Manager leisten, die nur noch Entscheide fällen. Jeder, der in meiner Position ist, braucht ein gewisses IT Knowhow und muss verstehen können, was bei seinen Leuten vorgeht."

203 „Wir müssen jetzt sehr schnell reagieren. Beispiel Offertenzinsen. Die wurden früher alle Jahr, alle zwei Jahre einmal angepasst und man hatte 3-4 Monate für den Entscheidungsprozess Zeit. Heute muss man das innerhalb eines Tages entscheiden."

204 „Ich gebe ihnen nur die minimalsten Informationen. Ich habe gar nicht die Zeit, die Leute so breit und so tief auszubilden. Dies ist ein weiterer Problempunkt. (..) Ich sage nur, das ist die Aufgabe und erkläre kurz, was die grösseren Zusammenhänge sind, aber nur das, was gerade nötig ist."

"My major problem is time. I would love to spend more time with my people and try to understand what they do in detail. In this way, they could receive feedback and input from outside"[205].

Such type of communication would be important to increase the learning processes and IT-specialists could learn from past experiences, but also collaboratively find novel solutions to known problems. Yet, as the time is scarce, the communication is limited to those aspects, which are absolutely indispensable.

Practices Relative to the Outer Context of the Communication

– Organize internships for IT specialists in business to create common ground

A very important practice of the IT department, which provides the context in which the knowledge communication can take place, is that it organizes internships for their IT-specialists in the business line. The people in charge consider it to be a major practice how they can address challenges as the ones related to the lack of common ground or to the differences in language and orientation.

"I consider everything that regards education as extremely important, not in the form of courses, but of internships in the business. There, my people really learn how the business works. For two, three, or four weeks they go to the business line and work together with the people there. They might not be a 100% productive, but they see very specifically on what the people from the business are working. That is really a very important key success factor for the comprehension"[206].

The IT department invests a great deal in such a form of education. The heads of the IT department hope that by sending their IT-specialists to the business, their people can grasp not only some basics on the insurance business, but get to know also the business' mode of working, its people main concerns, the issues, which put them off, the stories that turned to local myths, and the language they talk amongst each other[207]. By knowing these aspects, it is easier for them to enhance the mutual understanding between the two parties.

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205 „Mein grösstes Problem ist die Zeit. Ich würde sehr gerne bei meinen Leuten sitzen und versuchen zu verstehen, was sie im Detail machen. So bekämen sie auch einmal ein Feedback von aussen oder auch Impulse bekommen."

206 „Alles was Ausbildung angeht, nicht in der Form von Kursen sondern von Praktika in den Fachbereichen, erachte ich als sehr wichtig. Dort lernen meine Leute wirklich, wie das Business funktioniert. Sie gehen dann für zwei, drei, vier Wochen in den Fachbereich und arbeiten dort mit. Sie sind vielleicht nicht 100% produktiv, sehen aber sehr konkret, woran der Fachbereich arbeitet. Das ist wirklich ein sehr wichtiger Erfolgsfaktor für das Verständnis."

207 Nonaka and his colleagues make a similar point when underlining the importance of direct and shared experience for the sharing of tacit knowledge. They claim that since this type of knowledge is very hard to put in words, people can mainly share it by engaging in personal observation and doing (Nonaka, 1994; Nonaka & Konno, 1998; Nonaka & Toyama, 2002).

It is most important that we have people in the IT who are very close to the business. One way to enable this is to send IT-specialists to the business in internships. (..) In this way, they learn to interact with their clients on a high level"[208].

– Invite all people who bring in the necessary knowledge into a meeting

A final important aspect of the context of interactions regards the selection of people who are invited to participate at a communication, and in particular, at a meeting. An IT-manager mentions in this regard: "It is extremely important that the right people sit together at the right moment in time"[209] and another adds:

"If it becomes really important, two or three people have to sit around a same table. If I have a question and the other says that he goes to verify a specific aspect, then I will never get an answer to my original question"[210].

Challenges

- Lack the big picture of an issue
- Difficulty to externalize knowledge and bring it in a form that is easily understandable, but lives up to the complexity of the issue

- Relational tensions: Lack of trust and consideration
- Feel intimidated because of formal hierarchy

- Differences in orientations (technical – cost orientation) and lack of common ground
- Hidden misunderstandings
- Difficulty to convey the know-why of a proposed measure and to gain the other's understanding for one's perspective

- General uncertainty due to recent reorganization
- Time pressure: Lack of time for communication leads to misunderstandings

Message
Process
Group Dynamics
Mental Models
Outer Context

Practices

- Scale information across media and representation formats: Combine visuals (for overview) with short text (in-depth, structured, and explicit information) and oral communication (commitment, context, shared understanding)
- Work with visualizations
- Work with metaphors & quotes
- Define terms explicitly & develop glossaries
- Define small audience circles to better align the communication

- Extensive use of face-to-face
- Invite managers from business line to selected IT-meetings

- Cultivate personal contact
- Communicate in a transparent and open way in order to convey authenticity and trust

- Organize internships for IT-specialists in business to create common ground
- Invite all people who bring in the necessary knowledge into a meeting

Figure 35: Phase-unspecific Challenges and Practices of the Knowledge Communication

Figure 35 gives a synthetic overview on both the challenges and practices unspecific to the communication phases, which we have discussed and categorized through the presented framework for knowledge conversations. The circular flow depicted among the various dimensions of the communication refers to the strong interconnections between the five dimensions. We have discussed such

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208 „Es ist wirklich sehr wichtig, dass man innerhalb der IT Leute hat, die sehr businessnah sind. Eine Art, um dies zu ermöglichen, ist, dass man Informatikern Praktika im Fachbereich organisiert. (..) Auf diese Art lernen sie, mit den Kunden auf einem hohen Niveau zu sprechen."

209 „Es ist extrem wichtig, dass die richtigen Leute zum richtigen Zeitpunkt zusammensitzen."

210 „Wenn es wirklich wichtig wird, müssen zwei oder drei an den gleichen Tisch sitzen. Wenn ich eine Frage habe und der andere sagt, er gehe das abklären, geht das vom einen zum anderen und ich bekomme nie die Antwort auf meine ursprüngliche Frage."

interrelations for example when showing that aspects of the outer context (e.g. the organizational reorganization) as they are perceived by the IT-experts have an impact on the group dynamics that are installed between them and the managers.

Conclusion

Overall Practices:

– Define Clear Knowledge Communication Phases and Manage Looping Behavior

In the organizational context of InSure, we have analyzed how IT-specialists, IT-managers, and the managers from the business line integrate their domain-specific expertise in the decision processes leading to a new/changed IT application. The business needs these IT applications for the execution of its insurance work. We have described the knowledge-intensive interactions between these three parties along IT-application development projects and have structured this description with the help of a phase model for knowledge communication. We have discussed the more general, phase unspecific challenges and practices of the process of knowledge communication with the help of the framework for managing knowledge-intensive conversations.

In view of the method of inquiry on which we mainly relied– qualitative interviews – our description of the knowledge integration process has been limited to the exposed theories of the interviewees, and we have almost no knowledge on how the knowledge communication actually takes place. Yet, we have some indications on how the process is said to take place and on how the process is said to should take place.

We have seen that while traditionally, the knowledge communication process was not managed along clear phases, in the last years, InSure started to define and *manage the knowledge communication process along different phases* and to introduce more formalization. The different phases had to become well-crafted and had to show clear markers that define the end of a specific phase. The 'need-articulation' phase, for example, is no longer a one-shot activity, but the organization realized that a continuous refinement of the demand is necessary. In addition, the phase finds today a clear formal end in the scope contract signed by both IT-experts and decision makers on the business side (without such an end, the phase was 'exported' up to the decision implementation phase and led to significant project delays). At the same time, the attempts to more strongly formalize the knowledge communication process, show that the knowledge com-

munication process cannot be seen as a purely linear process[211]. *Feedback circles* are one of the most important characteristics of the process. Resuming the example from the 'Articulate need' phase (phase II), the requirements for the IT-application cannot be defined clearly in the scope contract without the IT-experts first conducting the high-level and detail analysis (phase III: Analyze issue), then conveying their insights through a written study (phase IV: Convey insights, suggestions, & solutions), and then going back to the analysis phase. We illustrated the importance of the *circling or looping* practice also with regard to the uncovering of misunderstandings. If the process is completely linear and the need articulation is a one shot activity, there are few possibilities to uncover a misunderstanding of terms and the risk is high that they will be uncovered only at the moment when the final application is implemented. On the other hand, if the business uses a certain term in its business request, the IT people take it as they understand it (and understand it differently), do a first high-level analysis and then present their results to the business, the chance is high that the business will uncover the misunderstanding and remediate the problem. These two examples show how important the practice of *circling* is for the successful integration of knowledge.

The subdivision of the knowledge communication process into clear linear phases and feedback circles represents, often, not the way how the process is actually taking place, but more the way management would like it to be characterized. IT-experts still start to develop the IT-application without a clear scope contract signed. In this way, *the more recently introduced formal process and the more engrained informal processes continue to coexist*. The phase model of the knowledge integration process we have presented can grasp most of all this more formally imposed structure, but stands in some contrast to the more informal routinized processes of how the knowledge is integrated between the IT-experts and the decision makers from the business line. Finally, we have seen that the *single phases of the knowledge communication process are not of the exclusive responsibility of either the experts or the decision makers*. Rather, both parties have responsibilities in each phase of the process. For example, one could think that it is the task of the decision maker to define clear requirements for the wanted IT application. Yet, we have seen that for the decision makers, it is an

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211 This goes in line with the observation of Sommerville (2001) that because of the impossibility to specify all requirements in advance, the software-design process cannot be conceived as a simple linear progression of the phases 'requirement analysis', 'software design', 'programming', 'testing', 'debugging'

impossible job to clearly define their need on their own (e.g. because of the mentioned ASK-problem or the difficulty to abstract general rules out of the everyday experience). An *active collaboration* with the IT-experts is therefore central in this phase of the interaction. In the same vein, the analysis phase can not be conducted by the IT-experts alone, but requires also some engagement of the business.

– Assure a Sufficient Common Ground and a Shared Understanding by Engaging in a Type of Communication that is:

– Collaborative (Through Face-to-Face)

– Flexible (Through Scaled Information)

– In-situ (Through Internships), and

– Mediated (Through Middlemen)

In the description of the knowledge communication process, we have focused our attention particularly on the role of face-to-face interactions, the use of visualization, and on the communicative challenges and practices, which threaten or enable the knowledge integration. Some of these challenges and practices are specific to a particular phase of the knowledge communication process (see: Figure 33), others are present across the various phases and of more general nature (see: Figure 35). As these are a large amount of challenges and practices, we will briefly resume those practices, which were mentioned most frequently in the interviews and emerged as the core practices in the knowledge integration attempts between IT-experts and decision makers.

We could show that the *face-to-face interactions* play a central role in the way how IT-experts and decision makers integrate their knowledge. In effect, the systematic use of face-to-face conversations, in the form of workshops, interviews, meetings, and bilateral talks has revealed to be a major practice for an effective integration of knowledge. Especially in the need articulation phase, face-to-face interactions are key, as they allow for a gradual approximation of the understandings of both IT-experts and decision makers. An elaboration of such a shared understanding is facilitated because of the face-to-face's characteristics of interactivity and physical co-presence. With each conversation, the communication partners get to know each other a little better and can also extend their reciprocal personal knowledge. Conversations therewith help to extend the common ground among the interlocutors and foster interpersonal well-being. In addition, IT-technicians and managers mentioned that conversations foster a coincidental contact with new information, make it more possible to deal with delicate issues, and finally, create a situation, in which the expertise necessary for taking a decision is assembled around a same table.

On the other hand, the communicational form of face-to-face conversations also entails some limitations for the successful integration of knowledge. Conver-

sations are volatile and it is challenging to retain the knowledge created, shared, and integrated through and within this form of interaction. We have further shown that conversations put limits to the structural precision in so far as their flexible form usually goes at the expense of a clear structuring of the issue with which conversers are dealing. Conversers jump from one aspect to the other, follow immediate associations, and do not structure the issue in a thought-out manner.

In view of these limitations of conversations, we have discussed a second major practice in the communication between the IT-experts and the decision makers from the business line: a systematic combination of different forms of communication in order to convey a specific issue. We have called this the *scaling of a topic across various media and representation formats*. The practice is to communicate an issue through a variety of media and representation formats and to overcome the limits of one by the strengths and advantages of another one. In particular, the IT usually communicates an issue by a combination of a short verbal text, a visual representation, and a face-to-face communication. We have discussed that the visuals are used to facilitate the understanding process by making abstract issues more tangible, by activating imagination, and by structuring and simplifying an issue, the latter an important aspect when needing to gain the big picture of an issue. An image further facilitates the remembering of an idea or aspect. Yet, the semantics of a visual text is oft looser defined than the one of a verbal text and its meaning remains more open to varied interpretation. In order to avoid misunderstandings, the practice is to give the visuals a clearer interpretative direction by accompanying them with text. In a context where most organizations are confronted with the challenge of information overload, mentioning the same piece of information also in face-to-face conversations assures that the intended target will actually be exposed to it, will better understand its importance and the implications of it for his daily working reality. The scaling of information not only helps to overcome the drawbacks of the single communication formats, it is also useful to address the big-picture challenge we have discussed. Providing the same information in overview through the visual summary and through the face-to-face communication and in detail through the written text, the receiver can navigate in a flexible manner across these various levels of detail and deepen his knowledge only with regard to those aspects, which particularly interest him.

Across the various communication formats, there persists a challenge, which

stands at the very core of the knowledge integration efforts between IT experts and decision makers from the business line and two explicit, structural practices InSure has developed in order to better tackle them. The challenge consists of a dilemma of how to deal with the concomitant, but polar need for specialization and common ground. We have shown that specialized knowledge and skills are necessary to take and implement a decision regarding an IT-application and that in view of the implications of these decisions on the workflows and processes of the business line, the business needs to be in power of the decision making. In this way, there is a need to functionally separate expertise and decision power. On the other hand, IT-experts and the decision makers from the business line must share some common ground in order to have a sufficient understanding of the other's language, perspective, and mode of reasoning, and be able to effectively communicate.

InSure has developed two structural practices, which address this challenge very directly. The first practice we have discussed is to position *middlemen*, who have a duplex qualification and who can function as translators between the pure IT-specialists and the managers with no knowledge at all of IT-issues. A first such middlemen position is hold by the "business support", a unit which supports both the people from the business and the IT-people in IT-application projects. These people usually have an education in informatics, but have professional experience in the business line. A second type of middlemen are the IT-managers, who usually have a duplex educational background in informatics and business administration and, due to their work, are much more engaged in business processes and therefore have a better understanding for their perspective and concerns. The second practice of InSure to better handle the problem of a lacking common ground is that it is widespread custom to send IT-specialists for some weeks in the business line to work as a trainee. In these *internships*, the IT-experts have the possibility to get to know better the daily work, concerns, and modes of reasoning of the business.

To conclude, the analysis of the knowledge communication between IT-experts and decision makers from the business line of InSure Ltd. has shown that a knowledge management approach from a communicative perspective has to address macro process issues, as well as aspects, which sustain across the different phases of the knowledge integration process. In fact, we have seen that there is a need to define clear knowledge integration phases, but not to manage them in a purely linear way. Feedback loops are a key issue from a process perspective

and they need to be well managed in order to address challenges as the ASK-problem (difficulty to make a specific question about something of which one has quite limited knowledge). With regard to the challenges, with which cannot be dealt by managing macro-process issues, we have discussed that InSure placed a major emphasis on a collaborative (through face-to-face communication), flexible (through the scaling of information), in-situ (through the organization of internships for IT-experts), and mediated (through the positioning of middlemen) type of communication. With these practices, the corporation aims to overcome the challenges inherently bound to the expert – decision maker situation – such as common ground and big picture – and creates an enabling context for the integration of knowledge.

Appendix 6

List of Interviewees for the InSure Case

1) Interview with the head of an IT development project (leads 16 people), Switzerland, November 03, 2003

2) Interview with the head of an IT applications developing team (leads 7 people), Switzerland, November 03, 2003

3) Interview with the group leader in workflow and electronic archiving (leads 7 people), Switzerland, November 03, 2003

4) Interview with the leader of the sector Channel Applications (leads 40 people), Switzerland, November 03, 2003

5) Interview with an IT architect (within a team of 7 people)

6) Interview with the head of department of Life Application IT, (leads 70 people)

7) Interview with the head of an IT applications team (leads 10 people), Switzerland, November 03, 2003

8) Interview with the head of the department Life & Pensions applications (leads 180 people), Switzerland, November 03, 2003

9) Interview with the leader of a team for business support for CFO Applications (leads 25 people), Switzerland, November 03, 2003

10) Interview with an IT specialist of stand-alone applications (member of a team of 10 people), Switzerland, November 03, 2003

11) Interview with the head of Customer Applications, Switzerland, November 03, 2003

12) Interview with an IT-specialist in Individual Life Applications, Switzerland, November 03, 2003

13) Interview with a project leader for a business platform within the Life & Pension Application (heads two teams), Switzerland, November 03, 2003

14) Interview with the head of Group Life Administration (leads 30 people), Switzerland, November 03, 2003

Appendix 7

The Decision Maker Version of the Case Study Used for the Experiment

The Pragmatic Development and Use of Know-how: Knowledge Management *Light* at Securitech Ltd.

"Knowledge is not only a decisive competitive factor for research-intensive, multinational corporations, but also for a smaller, know-how-dependent firm such as ourselves, which is now expected to win market share in supra-regional competition."   Managing Director of Securitech Ltd.

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A   The Business Context

Securitech Ltd. is a limited liability company headquartered in Zurich, which has been active in the areas of fire protection, break-in protection and corporate security for approximately 25 years. It was originally founded as an unincorporated company, and led by the company's founder for approximately ten years, until he sold it to the management team, which helped to expand the company from around eight to, now, over ninety permanent employees. For fifteen years, a team of six managers has led the firm, although half of these had been with the company for less than five years. Of Securitech's 95 employees, around 80 were directly involved in client projects. Securitech's client portfolio is centred around medium-sized and large industrial companies throughout the greater Zurich area, as well as in the neighbouring regions. These required advice and products for security systems in warehouses, production sites and offices. The range of services offered by Securitech runs from the simple installation of a fire alarm system or a security system to the integrated planning of a company security concept for crucial annex buildings or the handling of dangerous materials.

Securitech is organised into three profit-centre like sectors, i.e. fire protection and prevention, break-in protection and alarm systems, as well as integrated corporate security. In terms of turnover, the two first sectors each accounted for approximately 40 percent of the total. The remaining 20 percent from corporate security consulting, however, accounted for almost half of Securitech's profit. For this reason, the company's management had decided to more strongly accelerate growth in the area of integrated corporate security, not merely to continue as supplier and installer of security products, but to increasingly present itself as a competent corporate security consultant in the (supra-regional) market. A major obstacle in the pursuit of this strategy is, nevertheless, the relatively rigid profit-centre orientation of the majority of the employees, which is

especially harmful to the sector-overreaching activities in the context of integrated corporate security. In addition Meyer, the technical director, had several times critically reflected on Securitech's learning capacity of the management, and ironically noted that "we call experience what we have been doing wrong for the last ten years – we don't really learn from our successes and failures." Most members of project teams, according to Meyer, "rush from one project to the next without looking right or left."

In addition to all this, it is just in the sector of integrated corporate security where the main know-how is concentrated in a few engineers, who are in great demand in the job market. Several departures of highly qualified employees in the past year hurt all three business sectors. One had the feeling that a large mass of project experience and technological knowledge has been lost in one go. At the same time, technological change is sweeping the security industry faster than ever before, and many employees expressed their difficulties in keeping up with the newest product developments (to say nothing of the reserve shown in the use of computers and related applications). On the client side, this occasionally leads to a lack of respect for the know-how of the Securitech security consultants, probably also because Securitech finds it difficult to properly show and market their wide range of knowledge regarding security concepts and technologies. Facing these challenges, Securitech has developed the vision to be a knowledge-based, learning organisation that is active on a supra-regional level and deals with significantly more complex projects.

<p style="text-align:center">*   *   *</p>

B   The Five Proposed Knowledge Management Activities

On the basis of this state of affairs, the managing director of Securitech decided that Furrer, an experienced project-manager of Securitech who already had developed various knowledge management activities in his former job, should work out – together with an expert in the field of knowledge management - five *light* but specific knowledge management measures. Furrer and the external expert would then discuss these measures with the two responsible members of the management. Together, they would decide, which three of the five measures they should actually implement. The following five proposals are under discussion:

1.   Knowledge Architecture

This project envisions the creation of a *knowledge architecture* of the areas of Securitech's core competencies, for an improved positioning and marketing of the company's knowledge for client acquisition, but also for the recruitment of new employees. The planned graphic illustration aims to show how the different competencies of Securitech worked in unison, and how they were distributed within the firm (which sector has which know-how).

2. Know-how Organizational Chart

The *know-how organizational chart* sets up a type of "knowledge shadow organisation" that aims to improve the network of competencies within Securitech and to overcome profit-centre-based thinking. In addition, this measure is intended to determine responsibilities for certain technology areas ("who is a specialist and contact person in what area and documents it accordingly."). Additionally, this initiative is also intended to foster the concept of "communities of practice" within Securitech.

3. Knowledge Fair

The third proposed knowledge management measure consists of the organisation of a semi-annual *knowledge fair* with posters in the local cafeteria regarding important client projects, technologies and problems.

4. The Knowledge-Cockpit

The forth proposed knowledge management measure is a regular gathering of a *knowledge cockpit* by means of various indicators, for the unitary assessment (and early warning) of the state of Securitech's knowledge.

5. The Learning Curve

The *learning curve* project plans the organisation of regular lessons learned workshops for all large-project teams, to make the learning capital of the finished projects accessible to other employees.

<p style="text-align:center">*   *   *</p>

C Your Assignment

In a one hour meeting, Furrer and the external knowledge management expert have to present the five knowledge management measures they have elaborated to two members of the management. Furrer and his expert already know that there is a lack of funding for all five initiatives and only three of them will be pursued further. At the end of this meeting, the three most convincing projects will be determined and the action steps to implement them will be decided.

Imagine being part of this meeting: You take over the role of being a member of the management to whom the projects are presented. Your conversation partners are 1. another manager like you; 2. Furrer and; 3. the external knowledge management expert. During the one hour discussion you will complete the three assignments described below. Furrer and the external expert can inform you on how the five knowledge measures look like. On the other hand, you have the feeling that

they still lack some important corporate information, you should share with them. As final result of the one hour discussion, hand in the 4 evaluation criteria, and the 3 chosen projects.

1. During the first 30 minutes, **define four criteria by which you will evaluate the knowledge management measures**. To do so, share with the two experts your information, insights and suppositions on the Securitech's vision and objectives, but also on its internal and external problems and challenges. Remember, you as the mangers have deep insights into the corporate situation of Securitech (its structure, problems and objectives). Actively share this corporate information with the experts, since it is very important in order to decide with what criteria you will evaluate the knowledge management measures. Thus, in order to define the assessment criteria for the knowledge management measures, consider the overall situation of Securitech, but also of what you have learned until now on knowledge or project management either in class or through you previous internships or working experiences.

2. During the next 30 minutes, **discuss the five planned knowledge management measures, evaluate them and decide which three of the five you actually want to implement**. Ask the experts to give you and overview on all five elaborated knowledge management measures, since you are informed on them on a very superficial level. Evaluate the proposed knowledge management measures on the basis of the four assessment criteria you have defined in the previous 30 minutes and decide which three you actually want to pursue further.

Appendix 8

The Expert Version of the Case Study Used for the Experiment

The Pragmatic Development and Use of Know-how: Knowledge Management Light at Securitech Ltd.

> "Knowledge is not only a decisive competitive factor for research-intensive, multinational corporations, but also for a smaller, know-how-dependent firm such as ourselves, which is now expected to win market share in supra-regional competition."   Managing Director of Securitech Ltd.

A   The Business Context

Securitech Ltd. is a company headquartered in Zurich, which has been trading in the areas of fire protection, break-in protection and corporate security for approximately 25 years. Securitech's clients require advice and products for security systems in warehouses, production sites and offices. The range of services offered by Securitech runs from the simple installation of a fire alarm system or a security system to the integrated planning of a company security concept for crucial annex buildings or the handling of dangerous materials. In the last years, the security industry is experiencing a technological change that is faster than ever before, and many employees have difficulties in keeping up with the newest product developments. For fifteen years, a team of six managers has led the firm, although half of these had been with the company for less than five years. Securitech has 95 employees and experienced quite a high employee turnover in the last years. Given the current situation, Securitech aims to be a knowledge-based, learning organisation that deals with significantly more complex projects.

<center>*   *   *</center>

B   The Five Proposed Knowledge Management Activities

On the basis of this state of affairs, the managing director of Securitech decided that Furrer, an experienced project-manager of Securitech who already had developed various knowledge management activities in his former job, should work out – together with an expert in the field of knowledge management - five *light* but specific knowledge management measures. Furrer and the external expert would then discuss these measures with the two responsible members of the man-

agement. Together, they would decide, which three of the five measures they should actually implement. The following five proposals are under discussion:

1 Knowledge Architecture

This project envisions the creation of a *knowledge architecture* of the areas of Securitech's core competencies, for an improved positioning and marketing of the company's knowledge for client acquisition, but also for the recruitment of new employees. The planned graphic illustration aims to show how the different competencies of Securitech worked in unison, and how they were distributed within the firm (which sector has which know-how).

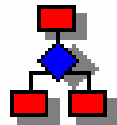| 1. Knowledge Architecture		
Logo: 	Benefit: The visual depiction of our core competencies and their interaction enables clients and new as well as potential employees to understand our know-how better. In addition, it will aid us in structuring the know-how organization chart (see 2).	Costs: One-off drafting by core team and graphic artist: approx. CHF 25,000
	Execution: Will be prepared/reviewed max. once per year	
Target group: All (potential and current) employees and clients		
Process: 1. Determination of our core competencies (integrated security planning, fire prevention, break-in protection, labour and production safety) during the next business management meeting with the participation of important experts (Frei, Sutter, Gerhardt) 2. Working out of interdependent and sub-know how areas 3. Presentation of competencies as an attractive map 4. Printing of respective posters, flyers 5. Notification of employees by superiors 6. presentation of the map in recruitment and sales discussions 7. Annual updating of the map as appropriate		
Documentation Posters and flyers will be filed in the L:/Knowledge/Architecture directory.		
Person(s) responsible: Anton Furrer		
Check: Measurement though poster distribution in canteen and presentation in every team. Use in sales situations.		

Furrer and the knowledge management expert plan to accommodate around twenty different sectors and sub-sectors of know-how with some measure of clarity in a diagrammatic depiction. Based on this arrangement, the aim is to create practice groups. Furrer is convinced that such a diagram of the knowledge architecture would make a notable impression at client meetings or recruitment sessions and that clients and competitors assessed it as professional, innovative or maybe even enlightening (in part because it could create a common context whereby it is possible to orient oneself in conversations and meetings). Yet, one fear of Furrer is that nobody in the Securitech Ltd would have the technical skills to actually draw the diagram. For this reason, they

probably would have to work with an informational graphics specialist. Next to the rather high costs of such a person, the problem would be that this person, after drafting the knowledge architecture, most likely would know more about the know-how of Securitech AG than many employees, but would then leave the company with all its acquired knowledge.

2 Know-how Organizational Chart

The *know-how organizational chart* sets up a type of "knowledge shadow organisation" that aims to improve the network of competencies within Securitech and to overcome profit-centre-based thinking. In addition, this measure has the aim to determine responsibilities for certain technology areas ("who is a specialist and contact person in what area and documents it accordingly."). Additionally, this initiative is also intended to foster the concept of "communities of practice" within Securitech.
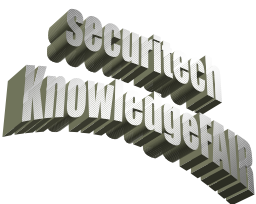
2. Know-how Organization Chart		
Logo: **Securitech Know-how**	Benefit: Allocation of responsibility for specific technologies or processes to designated employees ensures a secure basis for the building up of knowledge.	Costs: No quantifiable cash investment. Time investment of around 20 know-how area specialists: approx. 5 hours per week = approx. CHF 10,000 per week. (imputed costs)
	Execution: Regular screening of relevant trends as well as periodic briefings and reports to all employees by means of the employee newsletter or documents made accessible on the Server.	
Target group:		
Technology and process specialists of Securitech AG, as well as key account managers and project leaders.		
Process:		
1. Extracting approx. 20 know-how areas from our knowledge architecture		
2. Identification of relevant experts		
3. Allocation of tasks and responsibilities among the experts		
4. Experts organise practice groups and send initial orientation E-mail		
5. Experts set up area on server		
6. Five group leaders will present their area at the first knowledge fair (see point 3)		
Documentation		
The experts will set up their areas under L:/Knowledge/Groups.		
Person(s) responsible:		
Gregory Meyer: Head of production and technology		
Check:		
At least one technology report per know-how expert and year. At least two briefings to employees. At least two practice group meetings per year. Know-how-Organigram is available in the company presentation. Updates with Meyer.		

To draw up a knowledge structure and the relevant responsibilities would be relatively easily. However, Furrer's biggest concern with this initiative is that the specific actions would depend heavily on the individual expert leader so that, at the end, no actions actually would take place. Because of this risk, Furrer and his knowledge management expert are not quite sure whether it

would be better to identify the "hot topics" and build on existing informal groups, instead of insisting on practice groups.

3 Knowledge Fair

The third proposed knowledge management measure consists of the organisation of a semi-annual *knowledge fair* with posters in the local cafeteria regarding important client projects, technologies and problems.

3. Knowledge Fair		
Logo:	**Benefit:** Systematic and global knowledge transfer between the various project teams of all Securitech sectors.	**Costs:** Hall rental: CHF 700 Approx. 30 educational units: CHF 40,000 Other costs: CHF1,300. **Total** : approx. CHF 42,000 per year
	Execution: 1-2 times per year, in the form of a half-day event coupled with technical reports and case studies.	

Target group:
All project leaders and project staff.
Process:
1. Preparation of posters by project teams to introduce their area of expertise
2. Submission of topics and clustering through Hurter => exhibition layout plan
3. Set-up of booths by operations department, invitations per memo by Furrer
4. Start: 8:30 am, two technical reports and subsequent holding of fair until 1:00 pm
5. Individual informational briefings in booths the whole morning. Short presentations in booths possible
6. Report on fair in employee newsletter by Hurter
Documentation
The posters of the project teams will be filed under L:/KnowledgeFair/ Year/Poster. The two introductory reports will be filed under L:/KnowledgeFair/Year/Reports.
Person(s) responsible:
Hans Hurter: assistant / project management support.
Check:
At least one general company meeting per year with attendance by at least 70 percent of project staff. At least one partial meeting with attendance by at least 40 percent of project staff.

Crucial for the success of the knowledge fair is the committed participation of the employees. For this reason, one of the challenging questions of this measure is how to ensure that all project teams actually produce a poster, that at least 70 percent of the project staff takes part in the knowledge fair and that the feedback questionnaire is completed by about two thirds of the participants. To have the necessary commitment of the employees, it is crucial that this measure would be well communicated. Furrer therefore thinks to create logos not only for this particular measure, but for all the knowledge management initiatives they will implement. Another important issue is also of how to organize the fair so that it becomes an event that not only is a tool to invite people to share their project experiences, but also increases the identification with Securitech as an organization and motivates the employees in their daily work.

4 The Knowledge-Cockpit

The forth proposed knowledge management measure is a regular gathering of a *knowledge cockpit* by means of various indicators, for the unitary assessment (and early warning) of the state of Securitech's knowledge.

4. Knowledge-Cockpit		
Logo: Securitech Cockpit	Benefit: Periodic success and risk vetting through a core set of meaningful indicators of knowledge increase and decrease, respectively knowledge use/development, at Securitech.	Costs: Data collection costs: 4 hours per department semi-annually: approx. CHF 15,000
	Execution: Semi-annually through all levels (from teams through departments and whole-business)	

Target group:
All project leaders and project staff.
Process:
1. Identification of critical knowledge areas (= target-determining)
2. Compiling indicators – modeled on 'balanced scorecard' – in business management meeting
3. Initial collection of indicator data and linking to Cockpit
4. Periodic data collection and analysis
5. Fine tuning and annual comparisons as the occasion arises
Documentation
Indicators will be maintained in the access database.
Person(s) responsible:
Max Baumer (CFO)
Check:
At least one semi-annual run with 8 indicators from the areas of technology-know-how, client knowledge, profitability and processes.

When Furrer elaborated the proposal for this measure, he found it quite challenging to develop an adequate set of indicators. Too few indicators would not cover the various aspects, fields and uses of knowledge. On the other hand, too many indicators would be difficult to manage. Also, since the employees would be responsible for the data collection in their sector, Furrer fears that it would mean to ask them too much effort for this particular initiative. Therefore, the biggest challenge to implement this measure successfully probably is to develop a clever system of manageable indicators that might be structured along two dimensions. Two possible dimensions could be innovation and efficiency. The three indicators in the area of innovation could then be the so-called rookie ratio (the percentage of new employees, who had been with the company for less than one year), the new client ratio (percentage of new clients) and the new product ratio (percentage of new products on offer, i.e. which have been available for less than six months). The indicators in the area of efficiency could be the winning ratio (number of won clients in relation to submitted

the area of efficiency could be the winning ratio (number of won clients in relation to submitted offers), the training ratio (number of diplomas received per professional examination taken) and the consulting ratio (percentage of consulting projects).

5 The Learning Curve

The *learning curve* project plans the organisation of regular lessons learned workshops for all large-project teams, to make the learning capital of the finished projects accessible to other employees.

5. Learning Curve		
Logo: *Securitech* *Learning Curve*	Benefit: This systematic milestone-analysis will help the team to avoid repeating mistakes, improve processes and reduce unnecessary work/expenditure, as well as preserving important findings for the future.	Costs: Team meeting room, meta-planning tools and room. => Approx. 3 half-day workshops per year and team: no quantifiable cash costs, imputed costs approx. CHF 80,000 (to be charged to project budget)
	Execution: Approx. three times per year as a half-day event with presenter from another project group.	

Target group:
All project leaders and project staff.

Process:
1. Stakeholder analysis of the project
2. Survey of the most common questions, mistakes, successes, experiences with external contractors etc.
3. Process review (what went well, what didn't work => findings and actualisation)
4. Plan of measures to be taken
5. Looking forward
6. Documentation saved on L server

Documentation
The metaplan working papers of the project teams will be filed under the path name L:/Knowledge/Learningcurve. Where projects have been completed, a short case study will be produced and filed in the same directory.

Person(s) responsible:
Large-project leaders. Project management support Hans Hurter

Check:
At least one completely documented learning curve workshop per year / large-project team.

Furrer and the knowledge management expert are quite confident that this project would become a success. What they still do not have clearly in mind is the way how they want to document the 'lessons learned'. A very handy appraisal format would be determinant whether people who did not assist the workshops could actually learn from the lesson.

*   *   *

C Your Assignment

In a one hour meeting, Furrer and the external knowledge management expert have to present the five knowledge management measures they have elaborated to two members of the management. Furrer and his expert already know that there is a lack of funding for all five initiatives and only

three of them will be pursued further. At the end of this meeting, the three most convincing projects will be determined and the action steps to implement them will be decided.

Imagine being part of this meeting: You will take over the role of either Furrer or the knowledge management expert. You will talk to two managers of Securitech Ltd., who only have a very limited knowledge on your initiatives. You as the experts are the ones who have deep insights on how the five knowledge measures look like. On the other hand, while you were elaborating the five knowledge management measures, you realised that you still lack some important corporate information. The mangers can provide you with that information. During the one hour discussion you will complete the two assignments described below. As a final result of the one hour discussion, hand in the 4 evaluation criteria, and the 3 chosen projects.

3. During the first 30 minutes, define **four criteria by which you will evaluate the knowledge management measures**. To do so, share with the two managers your information, insights and suppositions on the Securitech's vision and objectives, but also on its internal and external problems and challenges. Since you still lack some important information on these corporate issues, actively ask the managers to give you more insights on the specifics, problems and goals of Securitech. This information is important in order to decide with what criteria you will evaluate the knowledge management measures. Thus, in order to define the assessment criteria for the knowledge management measures consider the overall situation of Securitech, but also of what you have learned until now on knowledge or project management either in class or through you previous internships or working experiences.

4. During the next 30 minutes, **discuss the five planned knowledge management measures and evaluate them** so that the two managers can decide **which three** of the five **to actually implement**. Give the managers an overview on all five elaborated knowledge management measures. Remember, you as the experts have spent a lot of time developing these measures and know much more on the issue. You can contribute valuable insights and suggestions, but the decisions, which ones to pursue further are then taken by the two managers. For the evaluation of the measures, use the four assessment criteria you have defined in the previous 30 minutes. Let the two managers decide, which three knowledge management measures to pursue further.

Appendix 9

The Information Cues of the Expert and Decision Maker Versions of the Case Study

Information Cues	Expert	Decision Maker
Corporate Information Cues		
General		
• medium sized company (90 employees)	x	x
• new management team		x
Organizational Structure:		
• profit center: fire (40%), break in (40%), corp. Sec (20%)		x
Strategy:		
• grow in corporate security segment		x
• enlarge action scope from regional to supra-regional level		x
• establish vision to be a knowledge-based, learning organization that deals with significantly more complex projects.	x	x
Problems and Challenges:		
• learn few from past experiences (successes / failures)		x
• knowledge concentration in a few employees particularly in the corporate security business		x
• knowledge amnesia due to employee turnover	(x)	x
• profit center orientation -> particularly problematic for corporate security business		x
• poor marketing of expertise -> poor valuing of expertise on client side		x
• keeping up with fast technological change and quick product development	x	x
Project Information Cues		
Knowledge Architecture		
Logo	x	
Benefits:		
• improved positioning and marketing of the Securitech's knowledge for client acquisition, but also for the recruitment of new employees	x	x
• practice groups elaborating knowledge areas -> sensitization, coming together	(x)	
Drawbacks:		
• don't have skills within Securitech	x	
• hire expensive external person		
• loose knowledge when that external person has finished the job		
Cost: CHF 25'000	x	
Target: all employees		
Linkage to Other Initiatives: know-how org chart	x	
Implementation Process	x	
Documentation	x	
Person Responsible	x	
Output/Year: posters with graphical representation of knowledge architecture (electronic, physical)	x	(x)

Information Cues	Expert	Decision Maker
Know-how Organizational Chart		
Logo	x	
Benefits:		
• improve the network of competencies within Securitech and overcome profit-centre-based thinking	x	x
• determine responsibilities for certain technology areas	x	x
• foster the concept of "communities of practice" and building a knowledge base	x	x
Drawbacks:		
• specific actions would depend heavily on the individual expert leader so that, at the end, no actions actually would take place	x	
Cost: CHF 10,000 per week (work hours)	x	
Target: Technology and process specialists, key account managers and project leaders	x	
Linkage to Other Initiatives: (knowledge architecture)	x	
Implementation Process	x	
Documentation	x	
Person Responsible	x	
Output/Year: A knowledge shadow organization. Regular screening of relevant trends as well as periodic briefings and reports to all employees by means of the employee newsletter or documents made accessible on the Server.	x	(x)
Knowledge Fair		
Logo	x	
Benefits:		
• systematic and global knowledge transfer between the various project teams	x	
Drawbacks:		
• commitment of the employees -> good communication needed	x	
Cost: CHF 42,000	x	
Target: All project leaders and project staff	x	
Implementation Process	x	
Documentation	x	
Person Responsible	x	
Output/Year: semi-annual knowledge fair with posters in the local cafeteria regarding important client projects, technologies and problems	x	x
Knowledge-Cockpit		
Logo	x	
Benefits:		
• periodic success and risk vetting through a core set of meaningful indicators of knowledge increase and decrease, respectively knowledge use/development	x	
Drawbacks:		
• develop an adequate set of indicators	x	
• much effort asked from staff	x	
Cost: CHF 15,000	x	
Target: All project leaders and project staff	x	
Process	x	
Documentation	x	
Person Responsible	x	
Output/Year: set of meaningful indicators of knowledge increase and decrease, respectively knowledge use/development	x	x

Information Cues	Expert	Decision Maker
Learning Curve Logo	x	
Benefits:		
• make the learning capital of the finished projects accessible to other employees	x	x
Drawbacks:		
• documentation of lessons learned	x	
Cost: CHF 80,000	x	
Target: All project leaders and project staff	x	x
Process	x	
Documentation	x	
Person Responsible	x	
Output/Year: regular lessons learned workshop (3xyear)	x	x

Notes:
x: information cue is fully and clearly available to the person with the specific role
(x): information is cue only indirectly and less explicitly available to the person with the specific role
text: information cue that is completely unimportant for the decision making process

Appendix 10

Overview on the let's focus Suite

The *let's focus Timeliner* is a tool that is thought to systematically structure conversations that aim at planning, documenting or reviewing processes. It contains four parallel time lines which can vary in their size and description. These streams can be structured into daily, weekly or monthly segments, and then filled with activities and events (let's-focus, 2006). Is suited for planning tasks (DeSanctis, 1987).

The *let's focus Ruler* supports tasks, in which teams or individuals have to undertake and compare evaluations along several dimensions (e.g. client- or competitor evaluations). The ruler makes it possible to discuss and take into consideration over forty decision variables concurrently. In this stance, the tool can also be used to develop scenarios or strategies. (let's-focus, 2006).

The *let's focus Tracker* supports the planning, moderation, and real-time documentation of workshops or meetings. Through the tool, participants can visualize the meeting goals and the agenda steps that are needed to achieve them. Main contributions of the meeting or workshop can be positioned along the track. The main idea behind the let's focus Tracker is to graphically depict the course of the current meeting. In this way, meetings can be better structured and it can be easily uncovered if a conversation digresses into side tracks. At the end of a meeting, the completed track can serve as synthetic minutes. Contrary to the other tools of the let's focus suite, the let's focus Tracker is not bound to a specific task, but can be an instrument to structure the communication process of all sorts of meetings (let's-focus, 2006).

The particularity of the *let's focus Positioner* is a large library of interactive and in part animated templates of diagrams and visual metaphors that a user can load as a background and use as a loose or more strict structuring device on which to position his/her content. As the Positioner is the tool with which we conducted the experiment, we describe it in more detail in Appendix 11.

Appendix 11

Functionalities of the let's focus Positioner 2.1
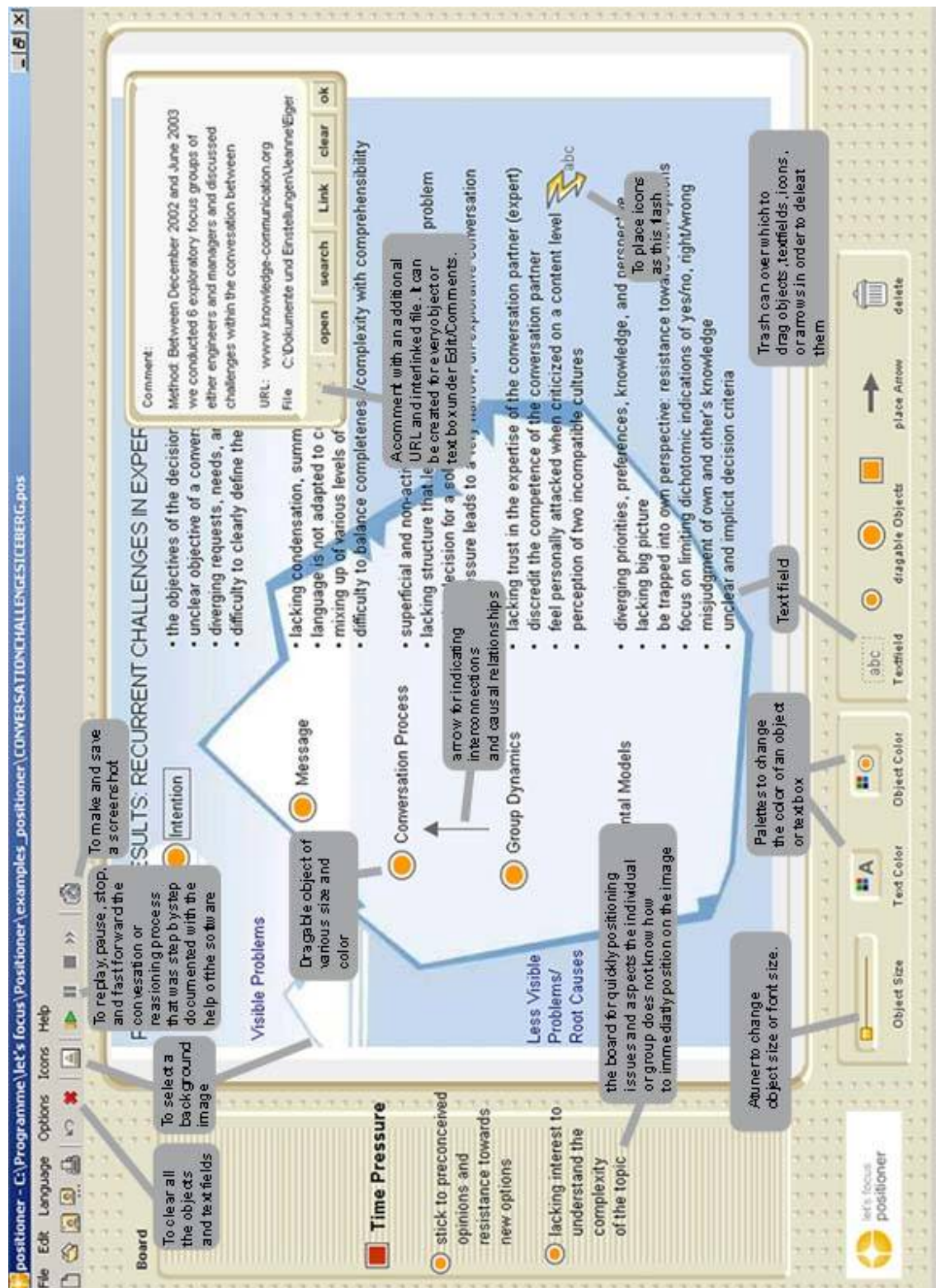
In the following, we describe the functionalities of the *let's focus Positioner* and discuss briefly its intention and supposed use.

Select a Background

A distinguishing feature of *let's focus Positioner* is that its user (e.g. the moderator of a meeting) can choose between a variety of backgrounds. These are either diagrams (i.e. Ishikawa, Balanced Scorecard, Five Forces, Expert Web, Value Chain, or Ansoff Matrix) or visual metaphors (i.e. a radar, an iceberg, a bridge, geographical maps, a ladder, a pyramid, a wheel, or a funnel), some of which are discretely animated. Users can also load personal backgrounds (e.g. photographs). Users are free to choose whether they would like to use just one image or diagram for the whole conversation or whether they would like to work with two or three visuals that support specific phases of the conversation process. The suggestion is that a trained facilitator would realize when a group is stuck in a certain approach and could propose a different image

The idea is that the individual or group selects a visual guideline or cognitive and communicative frame with which to approach and structure an issue or conversation. The frame is cognitive in so far as it shapes the way people view and structure a problem or task. These diagrams and metaphors comprehend also a communicative aspect since they provide a common ground and language to all the participants of a conversation. By providing content-specific visualizations and structuring methods (as opposed to content-unspecific visualization like a simple mapping technique) (Fischer *et al.*, 2002), the tool facilitates collaborative processes and outcomes.

Select a (Pre-configured) Template

let's focus Positioner provides a set of prefabricated templates to structure a meeting that aims, for example, at a stakeholder analysis, or at the evaluation of an merger. The templates combine a background image (diagram, visual metaphor) with some default text-fields and objects. The idea is similar to the one of the background functionality. In this case, however, the provided structure is more tightly guiding.

Place Objects

Users can drag and drop objects that have the form of a circle or of a square with a textbox next to them. Each (important) contribution and thought can be documented as an object. The color and size of both object and text can be changed.

Place Text Fields

Users can place textboxes that have no adjacent object to them. Visually, they can be used for aspects, which do not represent a major "point" or statement in the discussion. For example, they can be used as descriptions for the various parts of the diagrams and metaphors.

Place Arrows

Users can draw arrows that show the interrelationships (causalities, flows, developments, origins, etc.) between various objects.

Place Icons

Users can select from a large array of icons (flash, target, bulb, bomb, green/red traffic lights, etc.) and place them next to textboxes or objects. In this way, they can emphasize a certain aspect and give it a visual indication of the type of information that is displayed (e.g. "idea", "danger").

Delete

Users can put objects, text fields, icons, arrows, etc. in the trashcan by dragging the elements over the trashcan. It is not possible to delete the objects by pressing the delete key. The developers believe that, from a communicative perspective, it is important to actually throw an idea away and not simply to make it disappear by the push of the button, as if it had never existed.

Board

The board is the space on the left hand side of the software window. Users have the possibility to deposit an idea or aspect in this area. It can be used as a "parking lot", on which people can park an aspect and come back later on, in order to first finish the current argument. Also, it can be used to deposit aspects, of which conversers do not know where to put them along the diagram or metaphor.

Comments

The users of the let's focus Positioner have the possibility to deposit comments. They can use the comments to document why they have positioned a certain aspect or issue at a certain level of the diagram or metaphor, what are the facts behind a specific evaluation, or what are the caveats behind a certain consensus. In that comment field, users can also add a specific URL or a link to a document (e.g. an Excell sheet) for further information or facts.

While the main interface of the Positioner aims to show the major (discussion) points and decisions made on an all-integrating visual, the comments give the groups or individuals the possibility to provide more detailed and background information. The user can show or print all the comments that appear as pop-up boxes and which outline the more detailed information (e.g.

facts, reasons why). If the person is interested merely in a summary, he/she can also hide the comments so that only the high level information is visible. The producers believe it to be important to make it possible to "scale" information, i.e. to document and retrieve information at various levels of detail and to easily link the summary view to the more detailed information.

Print

At any stage of the conversation, users can print out the Positioner interface and view intermediate or final results on paper. Producers believe that the print-out functionality comprises various important functions. First, the change in the output media allows for subtle changes in fluidity and flexibility as they are perceived by the conversation partners. While the electronic media suggests that the documentation of the conversation is highly flexible and can be very easily changed, the cold print on paper implies more stability and participants can 'freeze' the intermediary results of a conversation and sense a feeling of security and progress. The printed media suggests that official decisions have been taken (Mengis & Eppler, 2005). Second, with the printouts at hand, conversers can conduct comparisons more easily since screen sizes have tight limits in juxtaposing various Positioner interfaces simultaneously. In the case of a client assessment meeting, for example, conversers can use the Positioner to structure the assessment of each client. The print-out function makes it then possible to compare the various client assessments. Finally, the media change from the electronic to the physical media is also important to include haptic and tactile senses that foster innovation and knowledge creation (Hatwell *et al.*, 2003).

Save

Users can save the Positioner document.

Make a Screenshot

Users can make a screenshot of (preliminary) results or of the current state of their discussion/thinking. The function of the Screenshot is necessary to include the let's focus Positioner document in textfiles, presentations, etc. In addition, similar to the print-out function, it serves to "freeze" a (preliminary) result of a conversation and to create a sense of stability and accountability.

Compare two Screenshots

Users have the possibility to make comparisons with a previously made screenshot. They can, for example, use one template to assess a past situation, make a screenshot, then make an assessment of the current situation, and then load the previously made screenshot. The screenshot will appear semi-transparently so that the image of the assessment of the present is overlapping the

one of the past. In this way, comparisons between two time periods or between two clients, objects, etc. are possible.

Change Size of Objects and Fonts

With the size ruler, users can change the size of objects, icons, and fonts.

Change Color of Objects and Fonts

With the color palette, users can change the color of text fields, objects, and arrows.

Clear

Users can clear all objects, text fields, icons, arrows, etc., which are placed on the Positioner so that only the initial background image remains.

Sign

Users can document the author and the day of the file and give a brief description of its content.

Undo

Users can undo any action they have done (placing objects, selecting backgrounds, etc.).

Languages

User can switch between a German, English, Italian, and a French version of the software.

Replay Function / Pause / Fast Forward / Stop

The replay function permits users to review the process, through which the final image, e.g. the result of a discussion, has been created. One can envision the whole process (from the initial template/background to the final image) through which the group went through. Objects and textboxes will pop-up one after the other. The idea behind this functionality is that often, people forget or have never known (since they have not been present) how or why a certain conclusion or agreement has come about. This feature permits persistence i.e. traceability (Bregman & Haythornthwaite, 2001) in the process of the conversation. One can see, for example, that a certain concept was renamed or first positioned at another level of the diagram. As in a video or audio recorder, the replay of the development process of a Positioner image can be paused or stopped and users have the possibility to do a fast forward.

Delete Replay Function

The recording of the process through which the image got developed can be deleted. This functionality is interesting for example when one creates a template and isn't interested in the process that lead to the creation of the template, but rather on the processes of the following interactions.

Import

Users can import Excell-sheets or another positioner document.

Export

The software provides the functionality to export a Positioner document as excell-file (to further use the text within the various categories) or as .jpg picture.

Help

let's focus Positioner has a small help function, which includes also a guided tour and that explains how to use the software.

Appendix 12

Distribution of Items - Tests of Normality

Factor	Item	Mean	Standard Deviation	Skewness (St.Error)	Kurtosis (St.Error)	Kolmogorov-Smirnov (sig.)	Shapiro-Wilk (sig.)
EP	1.	.6875	.73193	1.822 (.299)	6.470 (.590)	.288 (.000)	.678 (.000)
	2.	2.3214	.86297	-.330 (.441)	-.939 (.858)	.284 (.000)	.831 (.000)
	3.	.7656	.92139	1.245 (.299)	.895 (.590)	.266 (.000)	.744 (.000)
BP	1.	1.2813	.89918	1.433 (.299)	2.510 (.590)	.373 (.000)	.748 (.000)
	2.	1.6094	1.09279	.464 (.299)	-.352 (.590)	.272 (.000)	.899 (.000)
	3.	1.5000	.85449	.394 (.299)	-.561 (.590)	.299 (.000)	.841 (.000)
	4.	1.2295	.58860	.418 (.306)	.637 (.604)	.373 (.000)	.751 (.000)
	5.	.8594	.75313	.700 (.299)	.488 (.590)	.341 (.000)	.698 (.000)
	6.	.8906	.66945	1.439 (.299)	6.456 (.590)	.270 (.000)	.809 (.000)
CG	1.	.9531	.57541	.511 (.299)	2.241 (.590)	.361 (.000)	.714 (.000)
	2.	.9531	.69988	.638 (.299)	1.006 (.590)	.317 (.000)	.791 (.000)
CC	1.	1.4688	.61641	.122 (.299)	-.236 (.590)	.308 (.000)	.780 (.000)
	2.	1.3750	.70147	-.392 (.299)	-.484 (.590)	.282 (.000)	.807 (.000)
	3.	1.3906	.76878	.272 (.299)	-.168 (.590)	.288 (.000)	.847 (.000)
RC	1.	.3015	.63842	5.488 (.302)	2.331 (.595)	.459 (.000)	.536 (.000)
	2.	.4688	.90797	2.197 (.299)	4.513 (.595)	.416 (.000)	.584 (.000)
	3.	.3750	.65465	1.883 (.299)	3.656 (.595)	.420 (.000)	.616 (.000)
DC	1.	.9219	.62500	.456 (.299)	1.225 (.595)	.331 (.000)	.762 (.000)
SGP	1.	.7969	.73850	1.565 (.299)	5.283 (.595)	.314 (.000)	.714 (.000)
	2.	.8906	.73716	1.404 (.299)	4.630 (.595)	.332 (.000)	.734 (.000)

Notes: The tests of *normality of distribution illustrate that* several variables show considerable skewness and/or kurtosis. In most cases, many of the skewness values are even more than twice the value of the standard error. By a frequent standard error of 0.299 of the skewness, the skewness itself ranges from 0.122 ("How many disagreements regarding different ideas were there during the one hour discussion?") up to 5.49 ("How much anger was there among the members of the group?"). In the non-tool condition, skewness is even more positive. In addition, some of the variables have quite kurtose distributions (which ranges from -0.037 for "I shared with my group members all the relevant insights, information, experiences that I deemed relevant for the task" to 6.456 for "At every point in time I knew why the group was discussing a specific issue."). Kolmogorov-Smirnov and Shapiro-Wilk tests of normality confirm the fact that variables show a non-normal distribution. Unfortunately, treating the variables with a logarithm did not improve the situation significantly. As a general tendency, respondents reported quite positively (or uncritically) on their or the groups behavior. One possible explanation for the non-normality of our distributions is our small sample size (Yourstone & Zimmer, 1992). An additional explanation for the non-normality could also be that students were only poorly motivated to reflect critically on the questions of the questionnaire after having participated in the relatively long experiment of one hour. Furthermore, biases of social desirability (Edwards, 1990) or of acquiescence (Hurd, 1999; Paulhaus, 1991) might also be reasons for the non-normal distributions we found. The subjective impressions of the researchers, who attended the experiments as observers and who organized the correct

filling out of the questionnaires, found that for constructs, that are quite easily observable like balanced participations, the turn taking was not as balanced as respondents reported and that there was a difference between the respondents' exposed theories (written or oral self-descriptions of one's/an organization's behavior, values, beliefs) and the ones in use (those more implicit values, beliefs, and assumptions manifested in personal/organizational practice) (Argyris & Schön, 1978).

Appendix 13

Original Scales with Factor Loadings and Cronbach Alphas Prior to Scale Adjustments

Factor	Item	Factor Loading	Eigen-value	% of variance explained	Cronbach alpha
Balanced participation (EP)	1 There were not one or two people who dominated the discussion	0.874			
	2. There was an adequate participation from all members of the group.	0.814	1.77	0.59	0.65
	3. The other members of my group paid attention to the comments I made.	0.586			
Big Picture (BP)	1. The conversation process was very clear	0.806			
	2. We never lost time on discussing irrelevant issues	0.724			
	3. We never lost time on too detailed discussions	0.602			
	4. I always knew how a specific contribution related to the more general topic of the discussion.	0.603	2.90	0.48	0.78
	5. At every point in time I knew why the group was discussing a specific issue.	0.774			
	6. I knew at every point in time where we where in the discussion	0.632			
Common Ground (CG)	1. During the discussion the group created a shared and deep understanding of the topic.	0.829			
	2. During the conversation, the group developed and shared a common language to deal with the task	0.854	1.66	0.55	0.55
	3. I could now better adjust my communication style to the other members of the group.	0.492			
Task Conflict (TC)	1. How many disagreements regarding different ideas were there during the one hour discussion?	0.838			
	2. How many differences about the content of decisions did the group have to work through?	0.749	1.96	0.65	0.73
	3. How many differences of opinion were there within the group?	0.837			
Relationship Conflict (RC)	1. How much anger was there among the members of the group?	0.854			
	2. How much tension was there in the group during the exercise?	0.898	2.35	0.78	0.85
	3. How much personal friction was there in the group during decisions?	0.901			
Decision Commitment(DC)	1. I feel confident that our group made the right decisions	0.709			
	2. The group was better at making the decision than I could have done by myself.	0.674			
	3. The decisions were unanimous (that is, all four of us agreed) before the two managers of my group took a decision.	0.424	1.669	41.7	0.48
	4. There was a lot of agreement in the group.	0.730			
Satisfaction with Group Performance (SGP)	1. I am satisfied with my group's set of solutions	0.881			
	2. I am satisfied with my group's performance	0.735	1.74	0.58	0.63
	3. I am satisfied with my performance on this assignment.	0.650			

Notes: Items reported in grey are the ones we had to drop

Appendix 14

Group Comparison of Means between Tool and Non-Tool Condition

Construct	Non-Tool Condition Mean (S.D.)	Tool Condition Mean (S.D)	d	t^2	p
Balanced participation	0.89 (0.73)	1.19 (0.94)	-.30	-1.41	.165 n.s.
Big Picture	0.99 (0.30)	1.46 (0.67)	-.47	-3.53	.001**
Common Ground	0.84 (0.50)	1.06 (0.61)	-.22	-1.58	.120 n.s.
Task Conflict	2.55 (0.57)	2.63 (0.57)	-.07	-.52	.608 n.s.
Relationship Conflict	3.52 (0.76)	3.71 (0.53)	-.19	-1.16	.250 n.s.
Decision Commitment	0.90 (0.64)	0.94 (0.62)	-.03	-.20	.843 n.s.

Group Comparison of Means between Tool- and Non-Tool-Condition
Notes: SD = standard deviation, d = effect size, t^2 = t-test, p = p-value
** Significance at .01 level, * Significance at .05 level

The means comparison between the tool and non-tool condition shows significant means differences only with regard to the "big picture" construct. The mean is significantly higher in the tool condition (mean: 1.46 (S.D.: 0.67) than in the unsupported condition (mean: 0.99 (S.D.: 0.30). The individuals in the non-tool groups struggled less to gain the big picture and they were more satisfied with their performance than the individuals interacting with the facilitation of the tool. Although we have not expected that the tool has a significant positive impact on the level of the means, the significant negative effect for the big picture construct can be explained by a low familiarity with the tool and the use of an inexperienced moderator (person using the tool). Both aspects led to breaks in the communication flow, an exaggerate time allocation for the documentation of details, and an unbalanced participation.
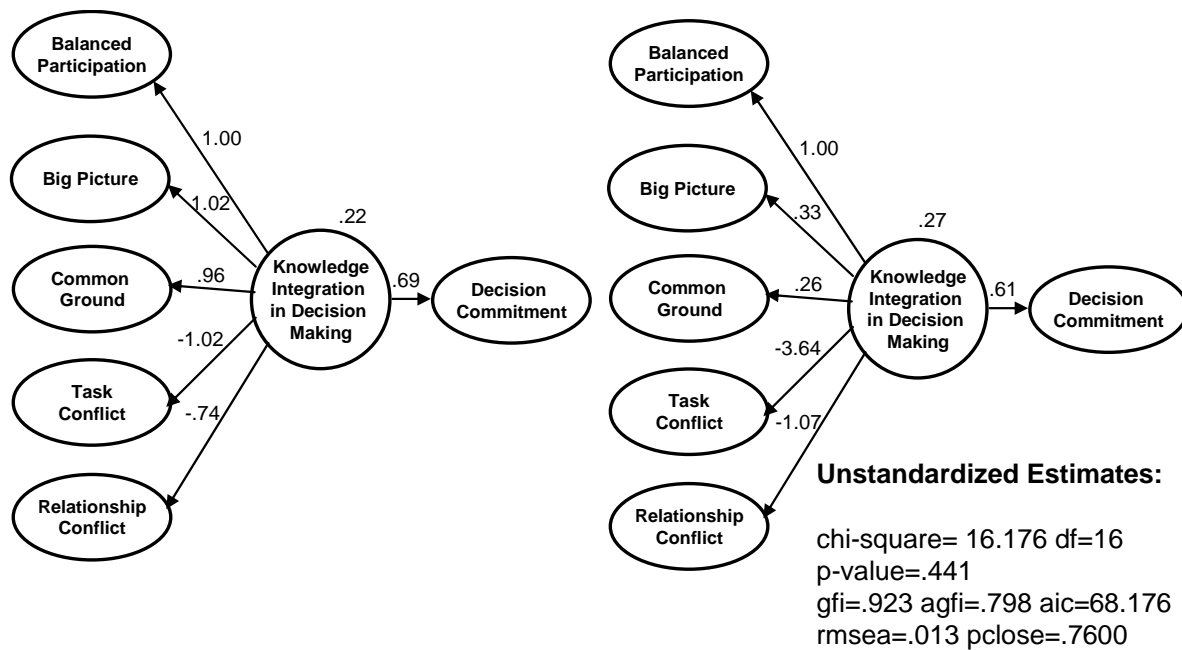
Appendix 15

Pearson's Inter-Construct Correlations Controlling for the Tool/Non-Tool Condition

	EP non-tool/ tool	BP non-tool/ tool	CG non-tool/ tool	TC non-tool/ tool	RC non-tool/ tool	DC non-tool/ tool
Balanced participation (EP)						
Big Picture (BP)	.37*/.49**					
Common Ground (CG)	.18/.35*	.20/.54**				
Task Conflict (TC)	-.57**/-.24	-.31/-.10	-.10/.24			
Relationship Conflict (RC)	-.55**/-.33	-.50**/-.47**	-.18/-.60**	.50**/.05		
Decision Commitment (DC)	.28/.27	.37*/.52**	-.10/.31	-.51**/-.22	-.35/-.26	

Notes: ** Significance at .01 level, * Significance at .05 level

Appendix 16

Multiple-Sample Analysis between Tool and Non-Tool Groups Showing Unstandardized Values

Balanced Participation

1.00

Big Picture

1.02

.22

Common Ground

.96

Knowledge Integration in Decision Making

.69

Decision Commitment

-1.02

Task Conflict

-.74

Relationship Conflict

Balanced Participation

1.00

Big Picture

.33

.27

Common Ground

.26

Knowledge Integration in Decision Making

.61

Decision Commitment

-3.64

Task Conflict

-1.07

Relationship Conflict

Unstandardized Estimates:

chi-square= 16.176 df=16
p-value=.441
gfi=.923 agfi=.798 aic=68.176
rmsea=.013 pclose=.7600

Unstandardized Estimates for Tool Group

Unstandardized Estimates for Non-Tool Group