

INTEGRATING KNOWLEDGE THROUGH COMMUNICATION - THE CASE OF EXPERTS AND DECISION MAKERS

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ABSTRACT:

This paper 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 present a communication framework that outlines the dimensions of the evolving communicative context on which experts and decision makers refer when attempting to integrate knowledge. The framework is used as a conceptual lens for the analysis of the knowledge communication process 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: implicit misunderstandings because of differences in language use, lacking common ground, lacking big picture, and relational tensions in view of the knowledge gap. 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.

Keywords: Knowledge Integration, Knowledge Communication, Boundary Objects

1 INTRODUCTION

The ever more accentuated distribution of expertise has profound implications for the coordination and *integration* mechanisms across knowledge boundaries (Brusoni, Prencipe, & Pavitt, 2001; Carlile, 2004; Grant, 1996a). One area, where the specialization of expertise and the concurrent need for *knowledge integration* have progressed is *decision making*. Decision makers often find themselves in an ‘authority-expertise chasm’ (Eppler, 2004), a situation in which they have the functional decisional power, but lack the sufficient expertise to take a reliable decision. *Decision makers* gather *experts* 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, Lascoumes, & Barthe, 2001; Weick, 1995) they perceive in fast changing market environments (Eisenhardt, 1989b).

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In this situation, the knowledge integration process mainly takes place through communication. Decision makers talk with experts and engage in other forms of knowledge-intensive communications. They try to integrate or ‘fuse’ the experts’ specialized knowledge in the decision making process in order to make sense of the ambiguous environment and to gain direction.

On the basis of a comparative analysis of three case studies, this paper focuses on how experts communicate their domain-specific knowledge to decision makers and how the latter integrate it in their decision making. After arguing for the importance of knowledge integration in the decision making context, we discuss the communicative challenges with which decision makers are confronted when struggling to integrate experts’ knowledge in their decision making. We then outline recurrent communicative practices with which experts and decision makers attempt to overcome the challenges present in their communication and particularly outline the role of boundary objects (Carlile, 2002).

We thereby aim to contribute to the development of a communicative approach to the study of social knowledge processes such as knowledge integration. It is based on the premise that knowledge processes take place in social interactions and communication (Berger & Luckman, 1966; Nonaka & Takeuchi, 1995), that talk and collocated conversations are central to sense-making (Weick, Sutcliffe, & Obstfeld, 2005) and that there is thus a necessity to fuse studies on communication and knowledge management. Fusion is thus both topic and approach of this paper. Studying the communication between experts and decision makers helps to understand how sensemaking takes place not only in retrospect to an action (resilience), but also in its prospect (anticipation) (Weick et al., 2005).

2 THEORETICAL BACKGROUND

2.1 Knowledge Integration in Decision Making

Knowledge integration in decision making is understood as the process of incorporating different domain specific knowledge of various decision makers and experts into some form of systemic group knowledge and of applying it in action and decision making (Alavi & Tiwana, 2002; Grant, 1996a; Huang & Newell, 2003; Okhuysen & Eisenhardt, 2002). As such, knowledge integration differs from the process of knowledge transfer in so far as 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 (Eisenhardt & Santos, 2000). While in the expert-novice interaction, the objective is to raise the novice’s knowledge to the level of the expert (a situation of knowledge transfer or sharing), for the expert - decision maker interaction, the specialization is functional and the aim is at no time to dissolve it (thus a situation of knowledge integration).

Carlile et al. specify that situations of knowledge integration are characterized, first, by the fact that the knowledge of the various entities (i.e. different functional divisions) *differs* not only in degree (i.e. novice – expert), but in kind (i.e. experts in different domains) (Carlile, 2002). Experts and decision makers 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). Second, these specialized entities strongly *depend* on each other in order to carry out their work and there is a need

for cooperation (i.e. develop a new product). Third, situations of knowledge integration are defined by a rapidly changing environment, in which the amount of *novelty* is considerable (Carlile, 2004; Carlile & Reberntisch, 2003).

In such situations, knowledge cannot simply be transferred, but has to be *translated* and *transformed* (Bechky, 2003; Carlile et al., 2003). In fact, the experts' and decision makers' areas of expertise and their practices are so distinct that their communication is challenged by idiosyncratic meanings, and by differences in language use, perspectives, and priorities. Such '*knowledge boundaries*' are difficult to overcome because they often do not only include differences in meaning (and the translation of local meanings from one context to another) (Bechky, 2003), but also pragmatic boundaries, which require the transformation of differences in interests and priorities (Carlile, 2004). Pragmatic boundaries arise because of the 'path-dependent' nature of knowledge for that it is costly to give up the hardly-won knowledge and people have interests not to do so (Carlile et al., 2003). In this way, if we understand knowledge as a part of action, an activity of knowing, that is intrinsically bound to practice (Brown & Duguid, 2001), knowledge integration involves “overcoming barriers to the flow and transfer of knowledge arising from pre-existing divisions of practice among team members” (Scarborough et al., 2004: 1582).

2.2 A Communication Perspective on Knowledge Integration

Viewing knowledge integration (and knowledge management more in general) from a *communication perspective* (Baecker, 1999; Eppler, 2004; Heaton & Taylor, 2002; Reinhardt & Eppler, 2004; Reinmann & Mandl, 2004; Stacey, 2001) becomes 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). Such a conceptualization of knowledge emphasizes that knowledge is created, shared, and integrated in social interactions and communication (Berger & Luckmann, 1966; Nonaka et al., 1995; Shotter, 1994). Stacey, for example, outlines how communicative action develops communicative patterns through the very act of talking itself (e.g. through mutual expectations of associative response or negotiations of turn taking rights and obligations). In this way, communication accounts both for coherence and novelty in our constructions of knowledge (Stacey, 2001). Knowing and communicating are intertwined also because of the interpersonal, relational aspects that develop in our interactions and that are central to the co-construction of knowledge. Shotter, for example, says that “it is within the dynamically sustained context of these actively constructed relations that what is talked about gets its meaning” (Shotter, 1993: 2).

2.3 A Communication Framework for Knowledge Integration

The evolving communication between people – in our case between experts and decision makers - constitutes the context within which they make sense of each other and the context around them. This developing context, in which they integrate their knowledge, is multi-faceted. Watzlawick et al. (1967) refer to the two fundamental aspects of content and of relation, which are present in all communicative behaviour. In the following, we will refer to six dimensions that are part of this developing communicative context within which knowledge integration takes place: message, communicative process, communicative intent, mental models, group dynamics, outer context (see: Figure 1). We argue that it is on these dimensions on which communication partners continuously refer when attempting to integrate knowledge in their interactions. We will present the six dimensions as distinct, yet stressing their interdependencies. There are close interdependencies between the

communication process and the group dynamics: if there are strong formal or informal leaders (group dynamics), the turn-taking (communication process) is most likely to be dominated by these leaders. While this representation of communication is a rough simplification of the multitude of elements and dynamics intervening in the communication process, it serves as an analytic lens for structuring the subsequent discussion on the challenges and practices of the expert-decision maker interactions, which we observed in the case studies.

In the brief discussion of these six dimensions of our framework of communication, we refer to receiver- or meaning-centered models of communication (Gerbner, 1956; Herrmann & Kienle, 2004; Krauss & Fussell, 1998; Merten, 1999; Sonesson, 1997). In contrast to sender-based models (e.g. Shannon & Weaver, 1949), meaning-centered models are based on the assumption that the meaning of the communication is not part of the message itself. Instead, meaning is actively constructed by communication partners through activities of selecting, contextualizing, interrelating, and appropriating. Thus, the ‘inner context’ of the communication (e.g. knowledge, attitude, previous experiences of communication partners, image of their vis-à-vis,) as well as its ‘outer context’ (e.g. situation, environment, cultural values) (Herrmann et al., 2004; Merten, 1999) are central elements of the communication. Our framework takes these elements into account and refers to *mental models* and *communicative intent* regarding the ‘inner’ context of a communication and equally presents ‘outer context’ as an own dimension. In the discussion of these dimensions, we further refer to the literature in the domain of organizational learning or knowledge management (i.e. Argyris, 1996; Isaacs, 1993; Schein, 1993; Senge, Kleiner, Roberts, Ross, & Smith, 1994) that has commented on the various dimensions of the communication.

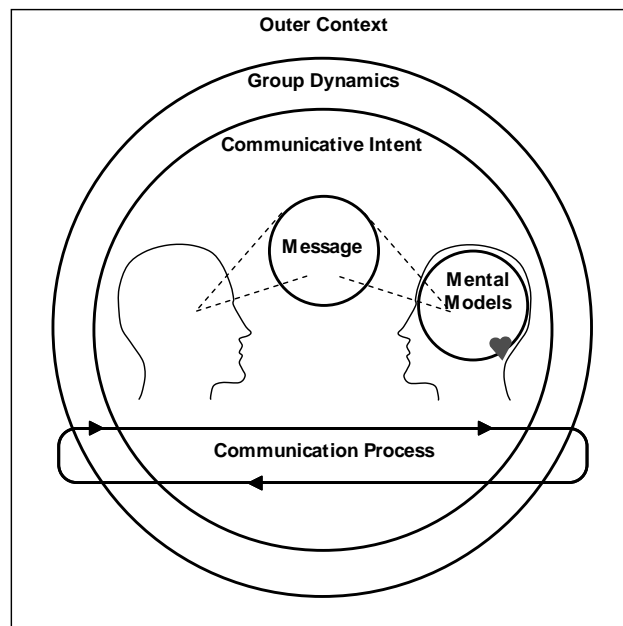


Figure1: Communication Framework for Knowledge Integration

A first central area or dimension in communication models regards the *message*. The message includes all signs that are shared by communication partners (i.e. Berlo, 1960; i.e. Gerbner, 1956; Jakobson, 1960). Argyris (1996) states that the more a message is rooted in

actual facts, the more one can be confident that the inference processes are not subject to severe misinterpretations. 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) (Krauss & Fussell, 1991; Watzlawick et al., 1967).

Early on, communication models were criticized for being static and not taking into account the dynamic nature of communication (i.e.: Merten, 1999). The *process* dimension responds to this critique and signalizes that messages succeed each other, that the interlocutors change their roles from speaker to receiver and back to speaker, that initial intentions might change with the ongoing of the interaction, as can also group dynamics and even mental models. The process of communication is recursive (therefore the circular representation in Figure 1): it 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 dimension of the ‘*communicative intent*’ reflects the idea of intentionalist models of communication (see: Krauss et al., 1998) for which the messages do not carry meaning, but are only the vehicles of the communicative intentions of the speakers. According to Giddens (1984), the supposed or explicitly shared communicative intent is not the only, but an important element on which people draw when making sense of an interaction. Differences between presumed and actual intentions of speaker and receiver can lead to misunderstandings. In addition, the various participants often do not have the same or even compatible goals. Frequently, individual intentions often remain obscure to other interlocutors (Ross, 1994).

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; Senge, 1992). We use a whole network of values, convictions, assumptions, and psychological dispositions for our sense-making and move in a nanosecond from the original message to our interpretation of it. Communication partners are said to be often quite unaware of the active role of their mental models. This can lead to implicit misunderstandings, unsound inferences, and to discussions that are purely oriented on advocacy (Argyris, 1996; Bohm, 1996; Isaacs, 1993; Schein, 1993). We do not conceive mental models to be entirely cognitive, but conceive emotional aspects as being equally important in the selection and elaboration processes of the message (in Figure 1, we express this visually by including a heart icon in the circle around mental models).

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 their communications, group dynamics play a central part in the collaborative sense-making process. 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 (Watzlawick et al., 1967). Group dynamics are also the cause of “political” communication and mistrust, which are apparent when only certain people speak, particular issues remain taboo, participants try to save face, or do not dare to

contribute dissenting views (Janis & Mann, 1977; Schein, 1995; von Krogh, 1998). Here, 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 (‘outer context’).

Finally, the last dimension of the framework is the *outer context*. It represents the larger setting in which the communication between experts and decision makers takes place and includes formally defined communicative procedures (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). The single interactions are embedded in this larger context and experts and decision makers use this context to make the communicated messages meaningful (Herrmann et al., 2004). At the same time, the single communications shape and structure the larger organizational context (Giddens, 1984). Ford et al. call this outer context the “background conversations” and define it as the “unspoken ‘back drop’” that is manifest and presupposed in the single interpersonal interaction (Ford, Ford, & McNamara, 2001: 108).

Together, the message, the communication process, the communicative intent, the group dynamics evolving between communication partners, their mental models, and the outer context of the communication, represent the communicative context on which experts and decision makers refer when attempting to integrate knowledge in decision making.

3 METHODOLOGY

The research design of the here presented study sets up qualitative analysis of three explorative cases of knowledge integration. The unit of analysis is the knowledge integration process. The approach includes both within-case and cross-case analysis and aims at sharpening our analytic generalizations (Yin, 2003) and at understanding whether there are communicative challenges or practices that are recurrent even if the organizational and institutional context of knowledge communication differ considerably.

We analyzed the knowledge integration process between: 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; and 3. the IT specialists of InSure[†] (a European leader in the insurance market) and the managers of InSure’s business line.

Sampling: For the theoretical sampling (Glaser, 1998) of the case studies, we chose to introduce both similarities and differences between the contexts of the three cases. We varied the contexts across the cases quite considerably in order to see whether the communicative challenges and practices are not related, in the first place, to a certain type of knowledge (e.g. financial vs. process expertise), to a certain type of organizational setting (e.g. inter-departmental vs. inter-organizational), or to a type of expert (e.g. engineer, financial analyst), but are more intrinsically related to the process of knowledge integration in decision making. However, all three cases have in common that the duplet

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

experts and decision makers can be easily identified, that there is a clear functional difference between the two roles (experts’ role is limited to counseling) and that decision contexts are complex, that is they are characterized by ambiguity, extensive dynamism, and inconsistencies.

Data Collection: For each case study, we worked with multiple data collection methods (Eisenhardt, 1989) and relied both on semi-structured interviews mainly with experts, but also with some decision makers and on communication documents. In total, we conducted 32 face-to-face-interviews (10 for pom+, 14 for InSure, and 8 for Brookings), each of which lasting on average 45 minutes. The interviews were structured in three main parts: a first introductory part (i.e. asking about the educational background of the interviewee, the types of decisions part of his/her responsibility, the organizational context of his/her work), a second part on the process of interaction between experts and decision makers (organization in time, form of interaction for what type of content or phase of interaction) and finally a third part on the challenges and practices characteristic for the knowledge-intensive interaction between the experts and decision makers. All interviews were audio-taped and transcribed word-by-word. To complement the data, we analyzed qualitatively communication documents circulating between experts and decision makers (which ranged from newsletters, presentations, brochures, articles, working reports, websites, and the like).

Data Analysis: We coded the transcripts of the interviews first openly by adding tags with comments or categories to the single quotes of the interviewees and to the collected communication material. We then used tables (Miles & Huberman, 1984) to further structure coding categories. In a next step we coded more theoretically (Glaser, 1998) by attributing the ensued challenges and practices along a framework for knowledge communication presented above (Mengis & Eppler, 2005). Working with this framework helped us to more consequently analyze the process of knowledge integration from a communicative perspective. 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.

4 OVERVIEW ON THE THREE CASE STUDIES

In the first case, we analyzed the knowledge integration process between the scholars of *The Brookings Institutions* and the policy makers at the U.S. Congress. Brookings is one of the oldest and for its thorough scholarship most respected think tanks in the United States. While most of the scholars of Brookings have a PhD from a well-known U.S. university in Economics or Political Science and have important prior experience in government, the policy makers, formed by the 435 representatives of the house and the 100 senators, represent quite a fragmented group and decide on the initiation of revenue bills, the impeachment of officials or the election of the President. To a large part, Brookings pushes its research 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. Apart from testimonies, major communication formats are events, luncheons, and meetings organized

on Capitol Hill, public briefings, but also more traditional written communication formats like policy briefs, papers, reports, which are all distributed over Brookings’ website and can be commented by the community.

The second case deals with the knowledge integration process between consultants specialized in construction -, facility-, and portfolio management of a small advisory service company in Switzerland, *pom+*, and their clients. The clients are formed mostly by state organizations, but also larger private companies from industries such as the insurance, the telecommunication, or the retail industry. These clients ask for advice with regard to decisions such as what strategy to pursue in the development of a real estate portfolio, what type of facility management software to implement, or what business model to adopt for a specific construction project. Communication between *pom+*’s consultants and their clients takes place, in the beginning of an advisory project, mainly in the form of workshops, meetings, and interviews, and – later on – in the form of project presentations and reports.

In the third case, we examined the knowledge integration process between the IT-specialists of a large insurance company, *InSure*[‡], and its middle managers from the business line (from team and project managers up to the executive board of specific market units). The knowledge communication deals with the communication around decisions that concern the remodeling of the company 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, calculating risks, or verifying customer claims. The communication between the IT-specialists and the managers from the business line takes place most essentially in formal and informal co-located meetings, workshops, reports such as the business concept or the technical requirements.

5 COMMUNICATIVE CHALLENGES IN THE KNOWLEDGE INTEGRATION PROCESS

Across the three case studies, we could observe a variety of recurrent communicative challenges and practices, which appear to be characteristic for the knowledge integration process. Some of them are *specific to a particular phase* in the interaction between experts and decision makers. In the beginning of their interaction, for example, when decision makers aim to convey their need to the experts, a recurrent challenge we found is what has been called in the context of information retrieval the “anomalous state of knowledge”-hypothesis or *ASK-problem* (Belkin, Oddy, & Brooks, 1982). The decision makers, acknowledging that they do 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) and that they need to call in an expert on the decision to take, yet lack the sufficient knowledge to specify precisely what is needed in order to solve the anomaly. In the cases of both *pom+* and *InSure*, experts and decision makers address this challenge by installing an interactive process of continuous refinement and alignment that is characterized by informal, face-to-face communication, analysis and the more formal marking down of binding agreements. This process comes close to how Weick describes the cycling behaviour between talk, action, and reflection, which is necessary for making

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sense of a problem (Weick, 1995; Weick *et al.*, 2005) (for a detailed discussion of the ASK-challenge in the expert-decision maker interaction, see: Mengis, 2007).

Other challenges and practices of the knowledge-intensive communication between experts and decision makers cannot be attributed to a specific phase of their interaction, but are valid *throughout the process and 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 discussion, we will focus on these more general challenges and practices characteristic for the expert-decision maker communication.

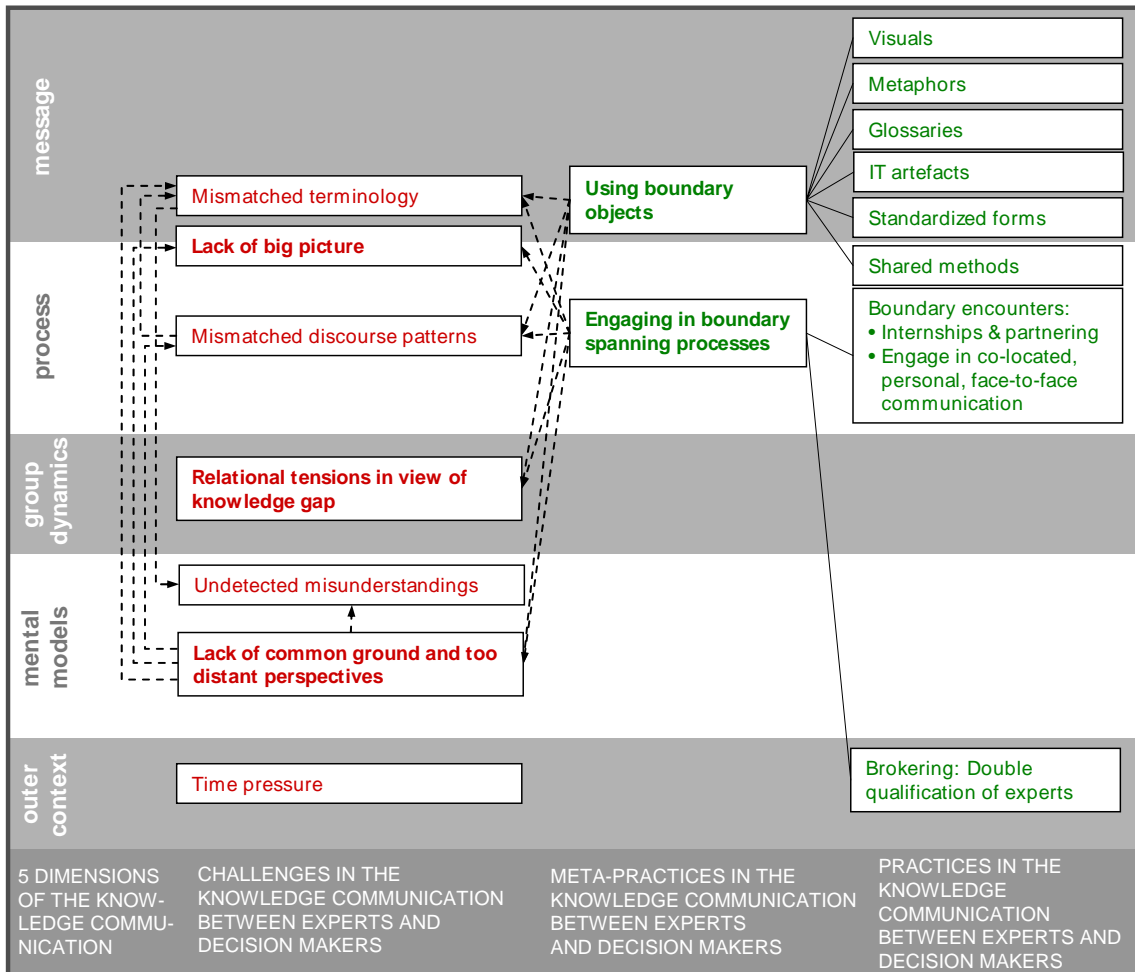


Figure 2: Major Challenges and Practices in the Knowledge Communication between Experts and Decision Makers across the Three Case-Studies[§]

Figure 2 gives an overview on these general, phase-unspecific challenges as we have elaborated them inductively from the three case studies. It further shows two meta-practices

[§] We have drawn arrows between the various challenges and across the challenges and the practices, when they were mentioned by interviewees in relationship to each other. They do not indicate causalities, yet argue for the interconnectedness between the various dimensions as we have proposed them in the paragraph on the theoretical background.

(using boundary objects, engaging in boundary spanning practices), which we have drawn from the literature (i.e. Carlile, 2002; Wenger, 1998), which reflect concepts stemming from the literature, but which we will summarize the inductively elaborated practices from the three case studies. In the following, we will discuss these challenges and practices in detail.

Mismatched Terminology and Discourse Lead to Undetected Misunderstandings

Different language use has emerged as a recurrent problem in the communication between experts and decision makers across the three case studies^{**}. On the message level, the problem is about a *different use of terminologies* (Bechky, 2003). We found that while expert jargon and the use of technical terms can be resolved relatively easy by experts de-emphasizing technical terms, the more difficult problem is the use of apparently simple terms, of which experts and decision makers are unaware to understand differently. The problem is either that the same term is used to designate different things or, on the contrary, that different terms are used to designate the same thing. Such differences in terminology use often remain uncovered, which leads to costly implicit misunderstandings. The following example of a consultant of pom+ exemplifies this communicative challenge:

“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. (...)”

The language difference cannot be grasped fully by a difference in semantics. A Brookings’ scholar mentions that language differences are expressions of deeper differences in knowledge, experiences, and perspectives, which shows an interrelationship between the message and the mental model dimension of the framework (see: Figure 2, lack of common ground):

“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.”

In this way, different modes of reasoning or ‘thought worlds’ (Dougherty, 1992) are expressed in language. In the previous quote it is shown that economists of Brookings 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:

^{**} We attribute the differences in terminology to the message dimension and the differences in discourse patterns to the process dimension of the proposed framework.

“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^{††}. 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.

Lack of Big Picture

In all the three case studies mentioned we found repeatedly that a major difficulty of the expert-decision maker interactions is to *gain and sustain the big picture of an issue*. At *InSure*, an IT-manager formulated 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?”

The quote shows that because of the complexity and the ambiguity of the issue and because the experts’ and decision makers’ views are very limited, experts and decision makers have difficulties to understand when systemic group knowledge is sufficiently developed and the big picture of the issue can be seen. Because of the distribution of knowledge, experts and decision makers cannot start by envisioning ‘the big picture’ and then working out the details at a later stage. Ringach (2003: 7) argued similarly that such “a top-down (or coarse-to-fine) method“ is inadequate and the big picture can only be formed by small details. The challenge is not simply to understand the big threads of an issue, but also the small details of which they are made (Sull, Ghoshal, & Monteiro, 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.

The ‘big picture’ is thus gradually elaborated, which is why Karl Weick states 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). In this way, the big picture challenge is related not only to the issue that is an object of communication (its complexity), but also to the process of interaction^{‡‡}. It turned out in the interviews that experts and decision makers not only have difficulties in gaining the big picture along the process of interaction, they might see it in the beginning, but then lose it underway and digress into (technical) details.

One key aspect in the capacity of gaining and sustaining the big picture is to make relationships explicit and to show the interconnections between the concrete details and the more general, abstract notions. An IT-manager of *InSure* illustrates why this is a challenging undertaking:

^{††} Following Foucaults’ (1972) deliberations on the multiple definitions of ‘discourse’, we use the term 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.

^{‡‡} For this reason we locate the concept at the process level of the communication framework.

“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 difficult to explain something without going very far afield”.

In this way, the big picture challenge is about 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. Senge (1990) therefore argued that the capacity of creating the big picture is tightly related to the capacity of systemic thinking (relation to mental model dimension in Figure 2).

Relational Tensions Emerging of Knowledge Gap

On the level of the group dynamics that evolve between experts and decision makers, we can observe in all the three case studies that relational tensions (Szulanski, 2000) often grow from the knowledge gap between experts and decision makers and represent a major challenge in their communication.

A first issue raised by interviewees is that decision makers themselves feel knowledgeable about a certain issue. They thus question the knowledge gap, which is perceived by the experts as an attack to their status of expert. A doubt or critique of this type does not refer to a specific argument an expert puts forward, but acts more on a personal level and leads to a feeling of hurt pride and relational tensions.

We further found that the knowledge gap threatens also the self-perceived value and position of the decision maker. In other contexts, it has been argued that ‘new’ knowledge can put “at stake” (Carlile, 2004) the engrained practices and hardly won knowledge so that ‘politics of meaning’ emerge (Swan & Scarbrough, 2005). Because the knowledge communication menaces existing knowledge (Baecker, 1999), because it is perceived as a threat also to the function and value a person has (within an organization), and because it thus destabilizes the balance in the relationship between experts and decision makers, decision makers might discard the insights provided by the experts. These implications of the knowledge gap on a relational level represent a challenge to the integration of knowledge, as illustrates this quote of a consultant of *pom+*:

“The ignorance of a client sometimes inhibits knowledge transfer. Once I had to deal with an older, experienced manager who then realized that I (..) knew a little more in this specific field than he did. And then, his ignorance really blocked the knowledge transfer. 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.’”

The knowledge integration process is challenged also by the *formally defined hierarchy* (especially if part of the same organization) and its repercussions on the informal dynamics between experts and decision makers. One quote of an IT-manager of InSure illustrates this aspect:

“Often, there is an inhibition threshold ,from down to top’ in the communication between IT technicians and the management 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 very 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 and constitute a rather difficult context for the integration of knowledge:

“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”.

Distance in Perspectives and Lack of Common Ground

One recurrent finding of the three case studies particularly stands in line with previous research on knowledge integration and that we attribute on the level of the mental models. We found that the lack of common ground and the rather accentuated differences between mental orientations represent a central challenge in the knowledge communication between experts and decision makers. Previously, Alavi and Tiwana outlined that mutual understanding and knowledge “that lies at the intersection of the specialized knowledge sets” represents one of the key challenges of knowledge integration (Alavi et al., 2002: 1033). Similarly, Carlile (2004) and also Bechky (2003) refer to the importance of ‘common knowledge’ or ‘common ground’ for managing the knowledge integration process. In the context of decision making, Fahey and Prusak argue that “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).

For the expert-decision maker interaction, the elements on which common ground is developed are rather sparse: experts and decision makers do not belong to the same professional community (lack of shared community membership), they often have only limited interactions with each other (limited linguistic co-presence), and they often rely on written formats in their interactions (limited physical co-presence) (Clark & Marshall, 1981). As a consequence, their common ground is often thin and their mental orientations or “thought worlds” vary in such a way that they do not only know different things, but also that they know things differently (Dougherty, 2001):

One such recurrent difference in mental orientations is that decision makers tend to be oriented on finding *yes-or-no* or *go versus no-go* solutions, yet experts are trained to think: “it depends”, as outlined by one senior scholar at *Brookings*.

“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.”

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 needs to make a decision and therefore, by necessity, looks for clear-cutting answers even where there are not any. While the distinct perspectives of experts and decision makers potentially are beneficial for both experts and decision makers, the experts perceive it as a difficult challenge to communicate their messages somewhere within this spectrum of ‘go-no go’ and ‘it depends’ and to coin it on the appropriate level of ‘in-between complexity’.

This difference in mental orientation can also be observed by the experts’ tendency to reflect on issues on a more *theoretical, methodological, and procedural level* and develop solutions from there while decision makers are much more *practically oriented*. The clients of pom+ often are skeptical about this theoretical approach of the consultants 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 time, I am responsive to the client’s wish 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.”

Another difference in orientation, which has been reported repeatedly, is that the experts tend to strive for *comprehensive, integrated solutions*, while decision makers often are interested in *finding quick fixes and ready-made solutions*.

Such differences in perspectives stand at the very core of the expert-decision maker constellation and, as such, are to be maintained as the knowledge differences and specific perspectives are functional and desired. However, a minimal common ground is necessary in order for experts and decision makers to allow with their communications to translate meanings and transform interests from one context to the other (Carlile, 2004) and make knowledge integration possible. To underline this central point, two interviewees drew the same two ovals with a small intersection area, which one of them commented as follows:

“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”.

The quote illustrates that a major challenge in the expert-decision maker interaction is to find and *adequate balance within the concomitant polar needs for specialization and common ground*.

Time Pressure

A final challenge of the expert-decision maker interaction we have found – on the level of the outer context - is the ever *growing time pressure*. A core reason why decision makers build on experts’ knowledge is their shortage of time for doing an in-depth analysis themselves. Yet, experts have to provide insights and conduct analyses in ever shorter time cycles and communication formats.

With the lack of time, decision makers hardly are able to describe the context of a certain decision situation and experts, on their side, have very limited possibilities in conveying the context of a specific insight or advice and are urged to find ever more synthetic modes of communication that yet still are able to represent the complexity of the issue of decision in an adequate manner.

6 PRACTICES FOR KNOWLEDGE INTEGRATION IN DECISION MAKING

In view of the manifold communicative challenges to the knowledge integration process, experts and decision makers across the three case studies have developed a set of practices for their knowledge intensive communication. Without striving to confirm a specific set of constructs discussed in the literature, we found, however, that the recurrent practices of our case studies can be best subsumed under what has been proposed as the practices of *boundary objects* (Arias & Fischer, 2000; Bechky, 2003; Boland & Tenkasi, 1995; Carlile, 2002, 2004; Koskinen, 2005; Levina & Vaast, 2005; Pawlowski & Robey, 2004; Star & Griesemer, 1989; Wenger, 1998) *boundary-spanning* (Carlile et al., 2003; Grant, 1996b; Levina et al., 2005; Wenger, 1998). Boundary objects are defined as tangible artefacts or object-like forms of communication that “inhabit several intersecting social worlds and satisfy the information requirements of each of them” (Star et al., 1989). We will discuss in what way boundary objects facilitate the knowledge integration between experts and decision makers and particularly focus on the complementary relation of the use of boundary objects and one form of boundary spanning practice – collocated face-to-face conversations. We will show that only by engaging intensively in collocated conversations that structure around the boundary objects is it possible to integrate knowledge between experts and decision makers.

Experts and decision makers use a variety of boundary objects (visuals, metaphors, glossaries, IT artefacts, standardized forms, shared methods) to overcome the communicative challenges discussed above and surmount the knowledge boundaries between them. In alignment with prior research findings, we find that boundary objects have mainly three important characteristics why they can facilitate the knowledge integration between experts and decision makers:

1. Boundary objects provide a shared language that allows for representing the domain specific knowledge in a structure and format that are known on the other side of the knowledge boundary (Carlile, 2002). This structure is abstract and loose in common use (allows for interpretive flexibility) and becomes concrete and highly structured in its specific instantiations (Star et al., 1989). In the case of the communication between the consultants of pom+ and their clients, for example, shared, rather abstract methods (such as approaches for quality or facility management) permit pom+ to systematically elicit the knowledge of the client that is embedded in practice:

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

Thanks to the method, the consultants of pom+ can embed the client’s knowledge in a more general structure and combine it with the more abstract and theoretical knowledge of the consultant. From the perspective of the client, the abstract method becomes meaningful

because it is contextualized in his/her everyday context and provides a structure into which he/she can model his/her problems. In addition, with the use of the method, the overall goal and big picture of an issue can be maintained.

Metaphors have a similar function than methods. In the case of *Brookings*, for example, their written communication products often have metaphoric titles such as “Sisyphus Revisited” (Closa, 2005) or “A Guns and Caviar Approach” (Gale & Orszag, 2002). With this latter title, the Brookings’ experts describe President Bush’s politics of simultaneous war spending and 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. In this way, metaphors can take over the function of boundary objects as they allow interaction partners to build on a loose structure that is meaningful 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).

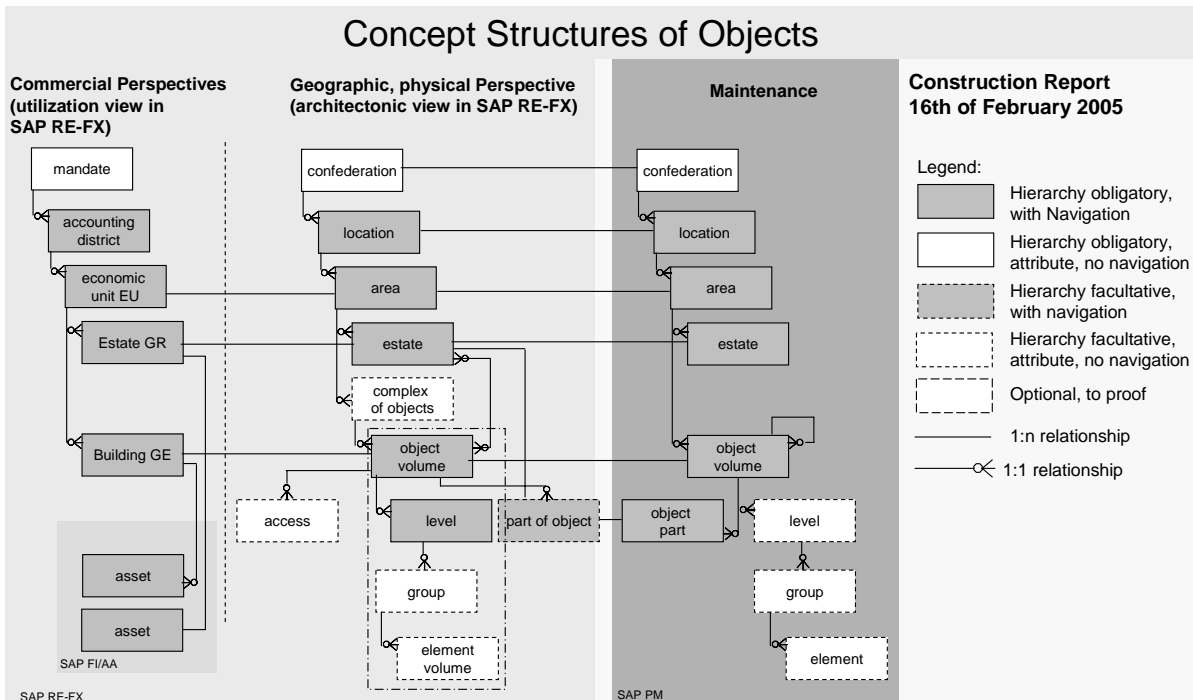


Figure 3: Visual boundary object used at pom+ to outline the differences and dependencies of construction objects between three perspectives (commercial, geographic, and maintenance perspective)

2. Boundary objects provide a concrete means to specify and learn about differences and dependencies across a boundary as rich representations of the own perspective invites to perspective taking (Boland et al., 1995; Carlile, 2002). The visual of Figure 3 is used in the interaction between pom+ and its clients. It shows objects of a construction report from three perspectives (commercial, geographic, maintenance) and further shows the relationships between the objects and between their different perspectives. A ‘building’, for example, is a different unit if viewed from a commercial rather than from a maintenance

perspective. These different perspectives then have their specific implications: the economic view sees the building as a utilization unit and as such implies criteria for how to rent and charge the building (which is very different from the maintenance perspective). In this way, boundary objects facilitate the discussion on the concrete implications of integrating knowledge in terms of changes in practices, costs, or power structures and thus help to anticipate, not only misunderstandings, but also the pragmatic consequences implied in the outcome of the knowledge integration process (Carlile, 2002).

3. Boundary objects provide a form of ‘reification’ around which the practices of the various actors and the co-constructions of an emergent, shared meaning can be coordinated (Wenger, 1998). Reification through tangible objects can enhance the development of common ground as physical co-presence is enhanced (Clark & Brennan, 1991) and people can refer to these physical objects to express what might otherwise be difficult to frame in verbal language. In addition, the tangibility of these objects makes the understanding of an abstract concept much more concrete (Bechky, 2003) so that the practical implications can be imagined. Yet, what we found in all three cases to be a key aspect of reification is that the holding down of tentative shared understandings further activates talk and collaboration around these objects. Knowledge integration thus gradually takes place in a cycling process of collaborative talk and holding down.

“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”.

The practice of combining very participative and collocated forms of communication with means of reification through objects is important not only in a micro-context of interaction as referred to in above quote. Also in InSure’s larger communication processes, for example, when the managers from the business line aim to convey their need to IT experts, they engage in a cyclical process where forms of collaborative talk (workshops, meetings, interviews) (i.e. participation) are iterated with holding down in writing (in the “business concept” and the “technical concept”) (i.e. reification through boundary objects) and also with phases of analysis. In this way, they gradually reach a shared understanding of an ever more specific request. The “business concept” and the “technical concept” thereby serve as boundary objects as these standard documents keep track of the differences in perspectives (Boland et al., 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. This process shows that in order to integrate knowledge in decision making, experts and decision makers enhance, on the one hand, the persistence (traceability and correctibility) (Bregman & Haythornthwaite, 2001) and tangibility of their communication through boundary objects and, on the other, the flexibility in the communication process through the extensive use of collocated, face-to-face communication.

In sum, our case study work suggests that only by combining boundary objects with boundary-spanning activities (such as collaborative, flexible forms of communication), knowledge integration across knowledge boundaries can gradually unfold (Wenger, 1998). The practice of combining flexibility and retention allows for both persistence, voicing differences and, on the other hand, a refined and aligned understanding between experts and decision makers.

7 CONCLUSION

Our analysis of the case studies has shown how experts and decision makers rely on the continuously evolving communicative context when attempting to integrate knowledge and to make sense within social interactions. The proposed model of communication that puts forward six dimensions on which communicators draw when making sense within their interactions, can serve as an analytic lens to discuss and structure challenges and practices present in the knowledge integration process between experts and decision makers. The major challenges we identified are: mismatched terminologies and discourse patterns which lead to undetected misunderstandings, the lack of big picture, relational tensions in view of the knowledge gap, and an insufficient of common ground. To overcome these challenges, experts and decision makers rely on a set of practices, which we summarized in terms of combining participation and reification (Wenger, 1998): knowledge integration relies on the combination of participative, flexible communication (i.e. collocated conversations), which structures around boundary objects. In particular, we showed that, in the context of the expert-decision maker interactions, visuals, methods, metaphors, standardized forms and other objects more, served as boundary objects as they took over three important roles for enabling the knowledge integration process: 1. providing flexible and common structures that allow for increasing the common ground and language between interlocutors; 2. providing modes for representing differences and dependencies of perspectives and thus developing an understanding of their implications; 3. providing forms of reification by holding down the meanings that emerge in the collaborative communication that structuring around these objects.

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