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Scaling up embodied sensemaking in strategic decision-making episodes.

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Abstract: Within micro-foundations of strategic management, sensemaking remains constrained by a focus on cognition as thinking and talking. Little is known about how embodied storytelling in agents' social interaction allows people make sense. This study sheds light on how individual sensemaking scales up to collective sensemaking by analysing video data. This study distils significant moments from observing three international groups of executives of a Fortune listed firm working on the same decision-making problem. Analysis yields insights, which were organized in relation to process, individuals and artefacts, and groups as 'collective bodies' and different drivers of scaling up. This study contributes to the literature on collective sensemaking by showing how participants' bodies and (sub)groups of participants play an important role through three motions; dynamic configuration, self-management and inclusion of materiality. Second contribution is to the literature on tools-in-use in strategy practice; the study reveals the role of participant bodies as tools-in-use in strategic episodes. The paper concludes with opportunities for further research and applications of embodied engagement in collective sensemaking.

Keywords: Collective sensemaking; strategy tools; epistemic objects; sociomateriality; decision-making; cognitive perspectives; case-based research; video methods.

Word count: 9,777.

Introduction

In the literature on strategy-as-practice (e.g. Balogun et al., 2014; Gioia & Chittipeddi, 2007) and micro-foundations of strategic decision making (e.g. Rouleau, 2005; Westley, 1990; Tasselli, Kilduff & Menges, 2015), sensemaking is often used as a theoretical lens to refer to empirically observable strategizing activities (Cornelissen & Schildt, 2015). Preoccupation with sensemaking, mostly cognition as "thinking and talking", imposes a narrow focus and does not allow for broader cognitive frames (Cornelissen & Schildt, 2015 p. 356). Although strategy emerges through embodied storytelling through the social interaction of agents with socio-materiality (Gylfe, et al., 2016), consideration of the role of embodied sensemaking activity in scaling up remains scarce. Little is known of the "deep structures and micro-processes" (Sanderson & Galavan, 2016) of collective sensemaking.

Only few exceptions (e.g. Good, 2014; Stigliani & Ravasi, 2012) highlight the opportunity to further our understanding of how people make sense in teams through an embodied activity. Materiality and actors' bodies can provide 'sensemaking resources' (Gephart, 1993) and an embodied 'lived experience' (Cunliffe & Coupland, 2012) to scale up cognition from the individual to the collective level. This study includes gestures and physical social interaction (Cornelissen, Mantere & Vaara, 2014; Maitlis & Sonenshein, 2010; Stigliani & Ravasi, 2012) among the material and embodied processes, which precede, accompany and follow thinking and talking and can play important roles in scaling up individual sensemaking.

Recent advances in research on processes in management, temporality and timing in particular, are encouraging (e.g. Bluedorn & Denhardt, 1988; Ancona, Okhuysen & Perlow, 2001; Bakken, Holt & Zundel, 2013; Granqvist & Gustafsson 2016; Reinecke & Ansari 2017), yet work on strategic decision making episodes is still limited (Huy, 2001; Kaplan and Orlikowski, 2013). How actors' embodied sensemaking while discussing and choosing strategic options amplifies beyond the sensemaking of individuals could help better describe micro changes that scale up to influence macro level changes. Understanding of how actors' physicality and physical extensions with artefacts and the processes through which they scale up sensemaking is necessary to develop theory and suggestions for practitioners.

This paper responds to the call by Cornelissen and Schildt (2015) to expand sensemaking research from cognition and discourse to embodied narrative sensemaking as a social construction or a joint group accomplishment (Cornelissen, Mantere & Vaara, 2014; Stigliani & Ravasi, 2012; Cunliffe & Coupland, 2011). We formulate research question: *How do embodiment and physical interaction with material artifacts scale up individual level sensemaking and influence actors engaging in strategic decision problems?*

Analysis of video data of three senior executive groups and their making sense in deciding on an important course of action examines collective decision-making processes. The groups were given a teaching case study of a strategic problem and they were tasked to make a decision with the aid of a causal map. This study draws on analyzing video recordings of groups' decision-making processes. Research focuses on significant events for detailed analysis of embodied cognition, significant forms of embodiment and movement of bodies to surface patterns within and across the cases. We find that the groups reached a decision through three patterns of embodied configurations that consisted of postures, gestures, gazes as the group members interacted among themselves and with the causal maps and other material 'sensemaking resources.'

From observations a grounded model is developed that advances our understanding of this less investigated and undertheorized form of sensemaking by unpacking material practices and cognitive processes that underpin collective sensemaking transitioning from individual generation of early ideas (Hill & Levenhagen, 1995) with collective engagement in the negotiation of emerging interpretations (Gioia & Chittipeddi, 1991). The conceprual model describes embodied sensemaking as based on three interrelated embodied motions occurring as group members dynamically configure as group over time as the go back and forth processing information needed for making a strategic decision, self-manage interactions of taking initiatives and assuming roles, resourcefully include the materiality around and

within them. By doing so the model offers a way to reconcile the material nature of collective sensemaking and the cognitive processes of individuals in groups.

The study's insights also reveal how the embodiment of collective sensemaking which occurs as individuals and groups engage in material practices, facilitates the construction of new shared understandings. In so doing, we point to group members' bodies, their configurations and motions in the group as "sensemaking resources" (Gephart, 1993) that are an important part of materiality that a group can work with to transition from individual to collective sensemaking.

Theoretical background

Sensemaking (Weick, 1995) is one of the dominant theoretical approaches to understand attribution and meaning in organization studies (Cornelissen & Schildt, 2016). It is commonly seen as a process through which individuals or groups attempt to understand issues that are novel, confusing, or ambiguous (Maitlis & Christianson, 2014; Stigliani & Ravasi, 2012). Group sensemaking takes place when individuals begin to exchange provisional understandings and try to reach a consensual collective interpretation and a course of action (Weick, Sutcliffe & Obstfeld, 2005). According to Orlikowski and Scott (2008) our understanding of organizational life, including group sensemaking, will remain limited as long as management literature continues to overlook the ways in which organizing is intrinsically bound up with material forms and spaces.

Research on materiality informs the interaction between situated, socially constructed epistemic objects and human agents in the context of collective decision-making (Whittington, 2007; Kaplan, 2011). Some scholars even argue that there are no inherent differences between the social and the material (Leonardi, 2013). Orlikowski (2007, p. 1437) states about sociomateriality: "the social and material are considered to be inextricably related – there is no social that is not also material, and no material that is not social." However, critical realists argue that social context and the materiality that exist are different, but the social and the material become sociomaterial as people imbricate social and material agencies through practice (Leonardi, 2013). Similarly, Barley (1986) perceives social and material as distinct but mutually dependent aspects of the social world.

The sociomaterial perspective in practice research considers managerial engagement with materiality as "organized, open-ended human activities transpiring within material arrangement, unfolding in time, carried out by skilful agents" (Tsoukas, 2010, p. 49.) Yet, not all strategy-work may be intentional or deliberate even if focal actors may articulate it as such retrospectively. When organizational actors act non-deliberately, they respond spontaneously to the changing environment to get on with things on hand. They may not pay explicit attention to what they do but they do what is needed at that point in time with the material available to them. Or as Chia and MacKay (2007, p. 235) put it, "agents act purposefully without having a purpose in mind." Therefore, the challenge for practice-based researcher is not only to observe what actors 'do' when they engage in sensemaking in strategy work, but also what is left unsaid and observe the behaviours that may manifest themselves as a result of social and cultural conditioning (Chia & MacKay, 2007). This includes human body as a tool-in-use in embodied sensemaking activity.

Recent studies suggest that individuals and groups use material artifacts as epistemic objects to support the construction of new understandings as they engage in sensemaking (Stigliani & Ravasi, 2012). Epistemic objects or 'knowledge objects' are defined as open-ended objects that act as a source of interest and motivation by the virtue of their opacity and material transcendence (Werle & Seidel 2015; Knorr-Cetina 1997, 1999). These artifacts enable actors to do old things in new ways or they can be used to do new things (Leonardi & Barley, 2008).

Taking materiality into account when groups engage in strategy making invites adopting the embodied collective sensemaking lens, which provides a view of sociomateriality that incorporates actors' bodily and interpretive practices. Although the focus often is on tangible and concrete 'things' with physical properties, this embodied collective sensemaking approach emphasizes that material should not be

studied in isolation but include the way the material interacts with interpretive processes to drive behavior (Le & Spee, 2015).

In contrast to other objects, epistemic objects are not definite things whose properties can be captured and described, but they emerge and evolve during the activity that they are used (Ewenstein & Whyte 2009; Knorr-Cetina 1997, 1999, 2001, 2011; Miettinen & Virkkunen 2005; Rheinberger 1997, 2005). Epistemic objects and material artefacts increasingly mediate learning and knowing and human activity (Miettinen & Virkkunen 2005; Knorr-Cetina 1997). Organizational actors work with epistemic objects and material artifacts in their daily practices, be they problems they have to solve, models they create, projects they write, or information systems they use (Knorr-Cetina 1997). The use of epistemic objects and material artifacts, such as flipcharts, post-it notes, or symbolic artifacts such as a 'cube', 'pledge walls' or Lego-based models is not predetermined (Whittington et al. 2006). Symbols and artifacts only gain strategic meaning through the interpretations strategy practitioners assign to them within the everyday enactment of their strategizing (Schein 2004). Since strategy work is knowledge work (Whittington 2003, 2006; Jarzabkowski, Spee & Smets 2012), strategy practitioners imbue the artifacts with knowledge properties that are situated within the context of their work to make sense of a given situation. Therefore, artifacts do not have innate properties, but they become meaningful artifacts, or 'tools-in-use' (Jarzabkowski & Kaplan 2014), within the context of the strategy work within which they are used by agents (Whittington et al. 2006). As such they are epistemic objects, that change continuously and acquire new properties during their use (Knorr-Cetina, 2001). However, epistemic objects as 'tools-in-use' come with affordances that enable and constrain their use (Jarzabowski & Kaplan 2014). The materiality of the object favours, shapes, or invites agents to use the object in creative ways, but it at the same time constrains a set of specific uses by the objects. Therefore, the use of these objects depends not only on the material properties or the intended design of the tool, but also on the context and the interpretations of agents who may use them in creative and unpredictable ways within their overall material limitations (Jarzabowski and Kaplan 2014).

PowerPoint presentations (Kaplan, 2011) and textual artifacts (Denis, Langley & Rouleau, 2006) have been used as epistemic objects by individuals and groups to collectively make sense and define new courses of action. A large variety of tools, documents, and instruments are used as epistemic objects to support also scientific inquiry and the collective production of new knowledge structures (Knorr-Cetina, 1997). Furthermore, early research on the social construction of technology highlights the role of visual artifacts including whiteboards, sketches, and drawings as interactive communication tools (Stigliani & Ravasi, 2012). More recently, strategy-as-practice research has addressed the role of sociomateriality in sensemaking (Ravasi, Rindova &Stigliani, 2016; Balogun et al., 2014; Stigliani & Ravasi, 2010). Embedded in specific material contexts such as strategy workshops (Jarzabkowski & Seidl, 2008), individuals employ context specific tools such as causal maps, post-it notes and other spatial material artifacts (Jarzabkowski & Kaplan, 2015) mediate sensemaking. As summarized in Table 1, few studies call for embodied narrative sensemaking as a social construction or a joint group accomplishment (e.g. Cornelissen, Mantere & Vaara, 2014; Stigliani & Ravasi, 2012), while the focus of previous research has been on cognition and discourse. It is notable that the presence of the role of human body in strategy work is underdeveloped in the literature, with exception of for example of Dameron, Le & LeBaron (2015). Human bodies' important role in strategy has been noted (Paroutis, Franco & Papadopoulos, 2015). Facial expressions and verbal cues in displaying emotions (Liu & Maitlis, 2014), leaders' presence, physical and locational dominance (Hodgkinson & Wright, 2002) in strategy workshops, or the way bodies are oriented towards another reflects sensegiving and sensemaking (LeBaron & Whittington, 2011) influence strategy meetings. How bodies change their orientation reflects a change in focus of attention (Scheflen, 1976), facing formations (Kendon, 1990), and conversations' verbal and material interactions (Jarzabkowski, Burke & Spee, 2015), or participation framework, in various kinds of work teams. While embodied emotions (Liu & Maitlis, 2014) as well as the human body play an important role in the cognitive construction of strategy (Heracleous & Jacobs, 2008) and in the discursive framing of strategic decisions (Kupers et al., 2013), how things, body and brain come together when strategies emerge remains understudied. The body as 'organ of discourse' (Dameron et al., 2015) can influence others' attention and represent ideas in ways that can develop over time (e.g. Kaplan, 2011; Whittington, et al., 2006). An "account of strategy activities and practices must include the human body" (Dameron et al., 2015: S5). To better understand strategy work, the

role of bodies of actors, their materiality (Barad, 2003) and how they interact with artifacts that they enact, build, or surround themselves with (Stigliani & Ravasi, 2012) needs further investigation.

	Strategy tools	**Strategy objects and artifacts**	**Strategy technologies**	**Built spaces**	**Human bodies**
Category description	Strategy tools allow for a formalized way to approach strategic analysis and decision-making (Jarratt and Stiles, 2010). Strategy tools are prevalent in strategy work that may be considered institutionalized (Suddaby, Seidl &Le, 2013).	Objects and artifacts are tangible, visible or audible residue of past acts of meaning, distinct from tools that are overtly instrumental and technologies that are more mediational (Dameron, Le & LeBaron, 2015).	Technologies in organizations extend beyond the traditional machinery or device developed from scientific knowledge (Oxford Dictionary).	Strategy work that takes place within the confines of a physical space (Cornellisen, Mantere &Vaara, 2014).	The human body is an abiding and versatile presence in all strategy work (Dameron, Le & LeBaron, 2015).
Examples	Scenario planning, SWOT, BCG Matrix (Jarzabowski et al., 2013; Wright, Paroutis & Blettner, 2013; Dyson, 2004; Schoemaker, 1995); Porter's Five Forces (Paroutis, Franco & Papadopoulos, 2015)	Concrete and/or discursive (Higgins & Mcallester 2004); textual and/or visual (Jarzabowski, Spee & Smets, 2013); physical and/ or digital (Leonardi, Nardi & Kallinikos, 2012); "stuff of strategy" (Whittington, 2006, 2007); epistemic objects (Werle & Seidl, 2015; Knorr Cetina, 1997); cardboard cube (Whittington et al., 2006); Lego bricks (Heracleous & Jacobs, 2008); planning documents (Spee & Jarzabowski 2011; Vaara, Sorsa & Palli, 2010).	Computer software, PowerPoint (Kaplan, 2011); technologies intertwined with textual devices (Caliskan & Callon, 2010) and human knowledge (Orlikowski, 1992; Paroutis, Franco & Papadopoulos, 2015).	'Strategic spaces' (Jarzabowski & Kaplan, 2014; Jarzabowski, Burke & Spee, 2015) Physical locations such as boardrooms, offices, meeting rooms, and hallways.	CEO physical dominance in strategy workshops particularly controlling the whiteboard and pen (Hodgkinson and Wright, 2012); multimodal orchestration of discourse, artifacts, and bodies in strategy workshops (LeBaron & Whittington, 2011); emotional displays in strategy meetings (Liu &Maitlis, 2014); the role of body in constructing strategic spaces for strategy work (Jarzabowski, Burke &Spee, 2015).

Table 1: Categories of materiality

Method

A demarcation between the social and the material, or the lack thereof, has implications on how to research the interaction between socially constructed epistemic objects and human agents. This study adopts a critical realist perspective of sociomateriality (Werle & Seidl, 2015) because this lens enables

us to identify the ways in which the social interacts with the material although they may be perceived as distinct 'entities.'

While field-based research offers one approach for observing complex phenomena (Verona & Ravasi, 2003), naturalistic observation is not often feasible, as confidentiality and access can be problematic. In order to conduct practice-based research on strategy work, methods used should be able to capture the rich qualitative data on how strategy work is socially organized (Alby & Zucchermaglio, 2006) and how its process unfolds. Current work is dominated by observational field studies (Kaplan & Orlikowski, 2013), yet their limitations such as the required presence of the researcher at the right place at the right time (Bechky, 2008) ask for alternatives, including controlled experiments. This study proposes a possible solution by widening the use of experimental techniques to integrate observation and case studies in controlled settings of group engagement.

Video-based research was selected as a well-suited means for dealing with and capturing dynamic, particular, micro-behaviours and interactions that are part of strategic practice (Balogun, et al., 2014). Video recordings provide a powerful alternative to data capture for in-depth qualitative research into socially constructed phenomena rather than material realities (Peteraf, Di Stefano & Verona, 2013). In strategy research the use of video evidence is a relatively novel method (LeBaron et al., 2017; Gylfe et al., 2016) which is used in this study to elucidate the process of causal map enactment to gain an insight into how groups make sense of a strategic problem. Video can be used to capture the unfolding of strategic activity and record observable human behavior in relation to and in interaction with others, artifacts or tools (Werle & Seidl, 2015).

Empirical practice-focused studies based on visual data include research on embodied cognition (Gylfe, et al., 2016), the production of strategic knowledge in workshops (Paroutis et al., 2015), materiality of strategizing (Werle & Seidl, 2015), embodied emotions in strategy work (Liu & Maitlis, 2014), and material artifacts in the practices of doing strategy (Jarzabowski, Spee & Smets, 2013). The focus of this research places the human body at the centre of social interaction and we analyse visible behaviours or "so-called "nonverbal" communication as a form of emotional leakage that provides a window into the mind" (LeBaron et al., 2017 pp. 8).

Our interpretative approach (Gephart, 2004) is "highly descriptive [and] emphasizes the social construction of reality and focuses on revealing how extant theory operates in particular examples" (Eisenhardt & Graebner, 2007: 28). This required us to use multiple approaches to interpret our subject matter and "addresses questions about how social experience is created and given meaning" (Gephart, 2004: 454-455). This research followed the suggestion for qualitative research to extend theory (Siggelkow, 2007) and reviewed the extensive literature on strategizing and materiality – as seen above. The conspicuous lack of systematic research on how bodies of actors interact with their environment asks for an in-depth exploration of appropriate settings. We study three cases and progress in an iterative fashion from within case to cross case analysis (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). Our analysis evolves from being purely exploratory to gaining successively more structure over several rounds of analysis and a comparison between the emerging evidence and the literature (Miles, Huberman & Saldaña, 2014).

This study is based on three decision-making groups Telco 1, Telco 2, and Telco 3. Each group addressed the same decision-making problem. All participants were managers and executives with rich experiences mainly in the telecom industry. These executives were nationals of European countries working for a telco multinational and they lead departments, business units or company subsidiaries in roles as diverse as Head of Business Intelligence, Director of Sales, Chief Financial Officer, or Chief Operating Officer. Each group discussed the strategic decision-making problem over the course of one hour. Our analysis is based on video recordings of the material, bodily, and dynamic aspects of each group discussion. We investigate how executive decision-making groups make sense and reach a decision when they face an ambiguous strategic problem and enacting a causal map. In this study, we mean with enactment the co-development and use of epistemic objects.

We applied a "toolkit for analysing and presenting video data" developed by Gylfe, et al. (2016) p. 136. The toolkit consists of three interconnected techniques of 'detailing,' 'sequencing,' and 'patterning.' 'Detailing' captures embodied cognition in a single frame to amplify strategically significant forms of embodiment. 'Sequencing' is a technique that captures the movement of bodies and the analysis of embodied performance in interaction. 'Patterning' involves the identification and examination of embodied behaviours and interactions across strategic episodes that allows findings to be generalised across cases in socio-material settings (Gylfe, et al., 2016).

Analysis begins with the writing of a detailed account of the causal map enactment process from the viewpoint of the informants for each case. The enactment process encompasses individual and group activities of the informants as they engage with socio-material from individual note taking on paper to a generation of a collective map construction and their individual and group interaction with the emerging map and other 'sensemaking resources.' We attempt to place ourselves in the position of the informants as they begin enacting the map. Atlas.ti software allows for the cataloging and arranging the within-case data (Mantere et al., 2012) and the construction of a history of significant events during the map enactment process from the informant groups' perspective for each case. These significant events include the informants' progression from independent reading and note making to collective map enactment, the intensification of debate, the iterative process of reflection and further map construction, and the emergence of the final decision and its final justification. We apply process coding and use video stills to capture the "ongoing action/interaction/emotion taken in response to situations, or problems, often with the purpose of reaching a goal or handling a problem" (Corbin and Strauss, 2008, pp. 96-7). Detailing events of embodiment in a single frame helps to amplify strategically significant forms of using the body (Gylfe, et al., 2016). Such focusing the analysis on single frames helps to reach the depth of analysis while ensuring that the key events are covered. By way of 'sequencing' we capture the movement of bodies and analyze the embodied performance in interaction. Directing attention to the dynamic interactions across and between frames helps understand collective embodiment. Identifying and examining embodied behaviors and interactions across strategic episodes ('patterning') allows generalizing findings across the different socio-material settings of across cases.

Findings

Coding was distilled to significant events from the groups' initial problem defining to making the final decision. The significant events are highlighted in the summaries of the case narratives for the three groups that are included in Appendix I. The map enactment process across all cases can be broken down to five steps. The groups were instructed to read the decision-making case study first independently, note down thoughts independently, and then enact a causal map as a group. The groups had been instructed the causal mapping techniques prior to the exercise. The five steps of the map construction process are depicted in the Figure 1 and an example of a fully developed map by Telco 1 is depicted in Exhibit 1 below.

Problem identification	Individual idea generation	Planning the mapping mechanics	Map enactment	Final decision
While sitting down the group discussion focused on identifying the decision problem. In all groups, one informant stood up initially to post the perceived problem on the whiteboard.	Long periods of up to five minutes of individual idea generation on at the beginning of the exercise. In Telco 1 individuals returned back to individual note writing throughout the map enactment process as the map evolved.	Some general debate how to start the mapping on the whiteboard. The mapping mechanics evolved during the map enactment stage through trial and error with the exception of Telco 2 where one informant solely controlled the map enactment.	One individual started in all groups; others then joined in with their notes/ comments. In Telco 2 this was dominated by one. Map enactment was interrupted by collective reflection in all groups. In Telco 1 all informants crowded in front of the map. New notes were posted or written on whiteboard individually or collectively. They were moved the existing notes around on the board.	Once the addition of new notes and movement of existing notes on the board stopped, the decision seemed to emerge without a conscious effort of "let's make a decision" type discussion. All groups circled back to the decision problem to confirm the initial problem framing. In Telco 2 this was directed by one informant. Decision was justified individually and collectively by reference to the map in Telco 1 and Telco 3.

Figure 1: The map enactment process

Exhibit 1: A causal map

After detailing and sequencing the single frame video stills of the significant events we identified significant forms of embodiment and of embodied performance in interaction. Examples of significant events during map enactment, conflict, and deciding are included as Appendix II. Patterning allowed us to analyse the embodied behaviours across the cases to generalize across the cases. We identified significant moments from the groups' initial problem defining to making the final decision.

Analysis yielded several insights which we tentatively organized in relation to process, individuals and artefacts, artefacts and groups, individual bodies, individual bodies in groups, groups as 'collective bodies' and different ways of scaling up sensemaking. We found different ways in which embodiment

played a role. Although the room settings were different, Telco 1 in a large seminar room and Telco 3 in a small break out room, the two groups that stood up from the table and engaged with causal map enactment, the members participated in lively group discussions. Group members interacted with each other and the maps became the focal point of attention and imbued with collective understanding. We also find that in Telco 1 where all members were involved in map enactment showed the highest degree of engagement and each member used the map to summarize and justify the final decision taken by pointing at the map to summarize the decision the was taken by the group. In Telco 1 we also find that the collective orientation towards the whiteboard was interspersed with moments of participants facing each other. However, in the semicircle configuration of standing bodies with each member facing the whiteboard as a material artefact, the map emerged over time as fruit of joint elaboration and became imbued with knowledge and insight. The whiteboard and the semicircle of participants became complementary parts of a whole; embodied and collective sensemaking.

In contrast, in Telco 2, the map enactment and discussion were quite different with lower participation and engagement by the members. The discussion was dominated by one participant who stood close to the whiteboard holding on to the marker pen. The other members of the group remained seated at the table throughout the decision-making exercise. This group also demonstrated the highest degree of conflict as the dominant member attempted to bring the discussion to his way of thinking by using the pen to point at the map he had drawn with the marker pen. His view was challenged by only one group member but as the group did not join the dominant group member in collective map enactment, the final decision became accepted as presented by the dominant group member. In this group we found the members to remain seated around the table facing the dominant member standing opposite close to the whiteboard. Only occasionally did they direct their gaze to engage with the whiteboard, which appeared excluded from the semicircle opposite the dominant member. The configuration and development showed opposing parts of the group when members faced each other, engaged in conflict. The oppositional seating configuration, not fully including the whiteboard, embodies a more fractured process of collective sensemaking.

In Telco 3 we found again a different pattern of embodiment. The participants in their more limited room adopted a characteristic pattern. While initially facing each other, the members oriented quickly towards the flipchart and continued to alternate between facing each other and facing the flipchart while mostly staying seated. One member was charged with taking notes on the flipchart. Over time other individuals took initiative to engage more actively by standing up and walking to the flipchart to post, write and draw. Such conspicuous activity by individuals (e.g. getting up, standing, elaborate) relied on tacit consent of other participants because simultaneity of such activity was severely restricted by civility and space. Where at points in time, individuals contributed more, over time multiple individuals allowed for several others' contributions by returning to the table. The temporal and complementary motions and interactions with materiality were accompanied by a highly engaged process of collective sensemaking.

Taken together, we found patterns of embodied sensemaking that differ in how participants relate to each other and to the artefacts. At key moments we discerned different configurations of bodies relative to each other and artefacts; sedentary arrangements limiting contact with artefacts and semi-circular arrangements completed by artefacts in which individuals stand up and engage with artefacts each other. Our data shows in each group relative consistent patterns of how cognition was embodied over time. Members who moved in the standing semicircle that was completed by the whiteboard and the emerging map in one group stand in contrast to members of another who opposed domination more than engage in accomplishing the task. Besides the rather static configuration with fractured collective sensemaking, we found two dynamic configurations with distinct patterns of embodied sensemaking that share some commonality. In both groups individuals take turns in engaging with artefacts in complementary motions – epistemic motions – that enhance collective sensemaking.

The conceptual model describes embodied sensemaking as based on three interrelated embodied motions; 'dynamic group configurations', 'dynamic and embodied self-organization', and 'dynamic inclusion of complementary materiality'. These partly overlapping and complementary motions occur as group members dynamically configure as groups over time. The way group members take seats and

position themselves vis-a-vis each other and how they change this arrangement is an embodied motion that changes over time; we label 'dynamic group configuration'. Data shows that dynamic and open configurations of the group members' bodies that are inclusive of material practices, such as refining a map on a white board, are associated with more robust discussions. Our evidence shows a second dynamic motion that occurs as the group member go back and forth processing information to make a strategic decision. The ways they self-manage their interactions by taking initiative, assuming roles and relinquishing control are embodied in the motions reflecting such 'dynamic self-organization'. As opposed to monologues, taking turns, the seizing opportunities to contribute to the discussion and providing such opportunities to other members is made possible through embodied moves indicating how a group structures and regulates freewheeling discussions. Dynamically including artefacts, such as directing attention to documents, flips charts and walls, illustrates the resourcefulness of groups as they complemented their dynamic configurations of embodied collective sensemaking. Seeing and using artefacts as complementary resources – as if they were another group member – by groups was in our data indicative of more intensive discussion. Taken together, 'dynamic group configurations', 'dynamic and embodied self-organization', and 'dynamic inclusion of complementary materiality' provide a better understanding of how the material nature of group members' bodies and their dynamic configurations enables collective sensemaking.

Discussion

This paper proposes that groups of experienced practitioners making strategic decisions, which involve much uncertainty and complexity, can do so by organizing collective sensemaking in a way that differs, yet complements, from the most commonly studied ways of sensemaking that is associated strongly with talking and thinking. We refer to it as embodied collective sensemaking. We have used the analysis of three groups of senior executives' strategic decision making to deepen our understanding of this type of sensemaking and to begin to unpack the ways embodied collective sensemaking enhances group members' capacity to consider risks and opportunities collectively when making strategic decisions.

From our observations, we develop a grounded model that advances understanding of this less investigated and undertheorized form of sensemaking by unpacking the role of the body, physical and material practices as complementary to cognitive processes that underpin collective sensemaking (Hill & Levenhagen, 1995) with collective engagement in the negotiation of emerging interpretations (Gioia & Chittipeddi, 1991). Our model describes embodied sensemaking as based on three interrelated embodied motions, 'dynamic group configurations', 'dynamic and embodied self-organization', and 'dynamic inclusion of complementary materiality', occurring as group members dynamically configure as groups over time as the go back and forth processing information needed for making a strategic decision, self-manage interactions of taking initiatives and assuming roles, and resourcefully include the materiality around and within them. By doing so our model offers a way to reconcile the material nature of collective sensemaking and the cognitive processes of individuals in groups. Our insights also shed light on how the embodiment of collective sensemaking which occurs as individuals and groups engage in material practices, is constitutive of the construction of new shared understandings. In so doing, we point to group members' bodies, their configurations and motions in the group as "sensemaking resources" (Gephart, 1993) that are an important part of materiality that a group can work with to transition from individual to collective sensemaking.

Our analysis is mainly based on video recordings of the material, bodily, and dynamic aspects of group discussions. We investigate how executive decision-making groups make sense and reach a decision when they face an ambiguous strategic problem and how sensemaking of individuals influences sensemaking in teams. The analysis of inter-coder reliability helped to increase the confidence in our approach. A possible limitation to our research is that it does not take into account national, cultural, and social influences. Although demographic data is available for a possible extension of our research to consider embodied sensemaking in relation to different national and cultural contexts, the international nature of the groups and the level of seniority of the participants in conjunction with the observations made did not suggest further benefits for conceptualizing embodied cognition.

In this section, we first expand on the theoretical underpinnings of the observations which we presented in the previous section and discuss these insights' transferability (Lincoln & Guba, 1985). We show how our observations differ from current assumptions regarding collective sensemaking to underscore the novelty of our findings based on the study of cases of strategic decision making in groups of executives. To substantiate their transferability to other forms of sensemaking we draw attention to similarities with research on sensemaking of individuals and groups deciding on strategy in a business context and in crises situations. Next, we discuss the implications of our findings for our theoretical understanding of embodied collective sensemaking and decision making.

A grounded model of embodied collective sensemaking

Sensemaking conceptualizes mainly how individuals seek and gain understanding, which in the search for solutions to important strategic problems but also business opportunities, is not equally distributed among actors (Dew, Velamuri & Venkataraman, 2004; Hayek, 1945). Because of the specific knowledge, information or cognitive skills they possess – these theories argue – some individuals are better able to recognize and interpret information necessary to solve a decision-making problem. This uneven distribution poses questions regarding a groups' ability to collectively make sense.

Previous studies, however, suggest that for decision making in groups is not only important include people with high levels of skills, but also ensure sufficient diversity among team members because different perspectives are likely to enhance the quality of the discussion. Enhancing group members' systematic capacity to access and make use of valuable complementary knowledge, resources, and skills possessed by other members – our findings suggest – is how embodiment supports these members' own search for better understanding and joint decision.

In the previous section, we illustrated three interrelated embodied motions that helped group members discuss the decision-making problem and highlighted how these motions enhanced the engagement and information exchange through changing group configurations, dynamic alterations and embodied self-organization, and patterns inclusion of complementary materiality. We now articulate a theoretical explanation for how these motions influence the shared cognitive and behavioral micro-foundations of members' sensemaking.

Preparing common ground and fostering engagement

Research on decision making in groups has highlighted the importance of hierarchical organization and of carefully selecting members for expertise deemed necessary to achieve a timely collective decision-making output or some rules for effective discussions such as 'devil's advocate'. In contrast, interrelated embodied motions can facilitate decision making where there are limited possibilities to identify expertise and potential complementarities in advance and where members interact in an autonomous way. To accomplish that, embodied collective sensemaking specified the motions groups need to approximate to safeguard a degree of openness, equality and engagement among all group members to ensure the robust discussion of different views, while at the same time encouraging the willingness to support and sharing information confidently with other members in order to explore the positive and negative consequences of the numerous possible decisions. To this end, our study suggests, it is important that decision making groups promote motions of embodied collective sensemaking as opposed to a common focus on thinking and talking.

Building common ground is important because it helps diffuse assumptions of equality and together with the apparent absence of hierarchy feelings of trust between peers arises. Dynamic configurations of bodies during the discussions can do so to the extent that a majority of group members exhibits social behavior and views the group as sharing a purpose with the other group members, rather than, as in more common group settings, a mere opportunity to meet personal goals. Assumptions of equality and mutual trust, in turn, motivate group members to lower relational barriers, engage in discussions and share knowledge, information and divergent views with others more freely, which is essential for effective decision making. Equally important for building common group were the dynamic ways in which groups embodied self-organization. The organization of group activities was embodied through the groups' changing arrangement of bodies facing each other and material artefacts. The changing nature of the ways the groups (re)constituted physically during the discussion reflected and fostered

made the emergent order evident in the motions of bodies. The embodied self-organizing process through its dynamics and transparency contributed to the common awareness of sharing common ground.

In the previous section, we showed how some groups managed to do so by assuming or agreeing on a group configuration influencing the participation of all group members. The changing configurations frame interactions between members as co-operative rather than top-down, and through distribution of activities, transparency and equal share in activities a sense of communal understanding and trust facilitated deep discussions. These findings resonate with research on other forms of organizing that highlight the importance of creating common ground among members of groups and communities. For instance, research on activities in open source communities has shown that trust and transparency are important conditions for cooperative work. Avoiding hierarchical relationships in groups to stimulate the development of new ideas is well known in the literature on creative problem solving, yet the importance of embodied self-organization and changing of configurations of bodies in preparing a common ground remained underdeveloped, rather than optimizing brainstorming and refining cognitive activities.

Open confrontation and reflection of materialized thought through dis-embodiment

Research on decision making groups shows that defining and coordinating roles and responsibilities in groups is important to improve the consideration of the problem at hand and the decision-making outcomes. In contrast, embodied collective sensemaking reveals another logic of how to influence a group process in order to preserve openness for sharing views freely. While preparing a common ground and enhancing engagement in the discussion are important correlates of dynamic configurations and self-management, the other complementary process helps members take advantage of material artefacts (e.g., white boards) for their interaction and participation by externalizing views and divergent opinions is a transparent way that can be confrontational yet triggers group reflection rather than personal acrimony. Paradoxically, materializing divergent views by means of artefacts and thus dis-embodying it helps to depersonalize what may be offensive to some and direct reflections of such views an activity that is less likely to trigger personal attacks. Directed to the artefact that represents formerly personal reviews, reflection and confrontation with divergent views is more constructive and heightens the group's understanding of their own views. Openness to materialized thoughts of group members is complementary to and reflected in the dynamic configurations and self-organization of the group and it augments members' capacity to consider alternative perspectives. Such materiality of members' thoughts facilitates introspection and engagement in discussions with other members as peers in seeing and reflecting on thoughts that materialized within the group. This provides participants the opportunity to reflect critically on "who they are, what they know, and whom they know" (Sarasvathy, 2001: 250). A heightened understanding of one's purpose, resources (Helfat et al., 2007) and a process of self-conscious inquiry (Danneels, 2011) are important for effective search of better decision-making options (see also Schreyögg & Kliesch-Eberl, 2007).

Other studies have described similar occasions for critical reflection to challenge and revise assumptions regarding one's resources and motivation in order to re-direct opportunity search (Jones, Macpherson & Thorpe, 2010). Where in some studies, external trusted advisors can support self-reflection by structuring the process and questioning one's beliefs (Strike & Rerup, 2016), our data shows that materialized thought can support group members' reflection and to make sense of the problem at hand. Two of the groups we observed, used this dis-embodied, materialized thought to effectively encourage and facilitate discussion between members so that they could benefit from mutual exposure and knowledge exchanges. They did so by organizing the group activities in a way that exposed members to materialized thought, or epistemic objects, by including the material resources (e.g., white boards, flip charts) in the dynamic group configurations. Being confronted by divergent thought given prominent presence through artefacts encouraged group members to consider these thoughts calmly.

Other types of decision-making groups have been shown to rely on similar supporting activities. Consultants are frequently called in to provide material evidence for more radical views than those that could be voiced by insiders in an acceptable way. In doing so, consultants' reports materialize

confrontational thought that then can be discussed and enhance decision making of a group. Similarly, external expert opinion and artefacts produced by the expert may be required to embody perspectives that cannot easily be presented by an insider. In a practice, recently adopted by more groups responsible for developing and making decisions on new products, prototypes play an important role. The material artefact not only shows progress and provides evidence for opportunity or risks it also facilitates group discussions beyond presenting facts. The presence of an artefact directs the discussion of groups to reflecting on the divergent perspective it represents rather than doubting someone holding such a divergent view.

Implications for Research on Embodied Collective Sensemaking

Our findings suggest that current theories of sensemaking are not sufficient to explain how decision making in groups occurs and how it can be facilitated. Whereas collective sensemaking relies on mainly on thinking and talking of participants, our analysis indicates that embodied collective sensemaking allows building a culture of collaboration between team members, rather than defining and enforcing roles and responsibilities. Its dynamic processes explain how the emerging contextual conditions influence the ways how knowledge is shared and how the discussion of divergent views occurs more spontaneously rather than in more scripted knowledge exchanges in common meetings. Interpreting collective sensemaking only in terms of thinking and talking therefore – our observations suggest – would underappreciate the important function that bodies and material resources perform by carefully reflecting and influencing the views and attitudes in the social context within which emergent interaction among group members occurs.

This different function of bodies – our findings reveal – creates a paradoxical tension (Smith & Lewis, 2011) between the benefits of talking and the benefits of non-verbal aspects needed to ensure a context conducive to free and trustful interaction among group members. The three processes that we described help embodied collective sensemaking to attend to these paradoxical tensions by shaping the cognitive and language-based interactions through the embodied and material foundations of how members attend to each other. As a result of these processes, the groups that we observed differed in their ability to maintain their focus on the task and at the same time to foster an inclusive and collaborative culture that allowed the group to accomplish this task.

More effective groups were able of holding and reflecting the diversity of views and alternative perspectives, arising from the same information on the situation at hand, in thought, speech, and conduct. Critically, as opposed to more common views of collective sensemaking, conduct included the physical and the material. The physical way in which they dynamically changed the configuration of how members were situated towards each other and how they self-organized the roles they temporarily adopted and relinquished allowed for creating a common ground for trustful and open interactions. The material way in which artefacts were generated and treated as 'group members' allowed the transparent reflection and discussion of confrontational views, which increased the engagement in discussions and their depth.

Considering groups holistically, groups as bodies, we found that movement and dynamics varied between the groups and mattered in the decision making process because rather than the spoken word alone, it is the embodied action that punctuates group discussion and contributes to scaling sensemaking up through acting out, visualization and – possibly – articulation. We found action by individuals an important way to influence group sensemaking. While words matter in groups' making strategic decisions, we found that in terms of influencing group processes through acting with epistemic motions convey often hidden meaning. When seizing the moment – as our findings show – by standing up group members engage and can exert strong influence on collective understanding. We also found such scaling up of sensemaking and timing of actions to often help the group focus or shift its collective sensemaking.

Our findings also draw attention to the important role that embodied collective sensemaking may play in helping group members explore consequences of decisions, their opportunities and risks. Collective sensemaking requires the participants to engage in articulating and exchanging views to help deepening understanding of a problem. In contrast, due to the essentially embodied cognition of people's

sensemaking – our findings suggest – embodied collective sensemaking play a more subtle role by helping group members clarify their understanding of own views and distinctive insights in relation to other members by shaping the social context. In order to improve group members' capacity to discern yet unknown similarities and differences with other members, embodied collective sensemaking then, encompasses bodies and context to capture emotions and cognitions even before they are articulated. Embodied collective sensemaking thus provides a perspective that allows tapping into knowledge from sources that may still be inaccessible for articulation in discussions.

Implications for future research

We expect replication of our analysis in a wider range of settings to increase understanding of how different material resources (e.g. whiteboards) may lead to different patterns of physical interaction and use of artifacts. In our setting, for instance, it is possible that the apparent absence of diverging interests within a group may have influenced the relative prominence of motions and patterns of engagement. Also, our analysis focuses on how group members in a collective make sense, rather than on ways individual participants seek to exert intragroup influence. Future research could explore in more depth how individuals' sensegiving is supported by their bodies and their conduct within their groups. All groups prepared by absorbing the same problem-solving case and discussed the given situation in an industry not familiar to most to the participants. Future research may vary the settings and purposefully select settings characterized by intrinsic divergence of interests among group members to investigate in more depth the interplay between personal affinity, embodied collective sensemaking, material practices but also political processes.

In our study the artifacts available were limited to those available in a standard classroom setting. Besides chairs, tables and flip charts also pens and post-its were available, yet future studies may also build on our insights and investigate more systematically the extent to which engaging in embodied collective sensemaking and/or the types of artifacts used affect the quality of the process. In recent years, other tools such as Lego bricks or power points have become widely used and may present for researchers interested in microlevel processes an opportunity to explore embodied cognition in relation to other tools. Alternatively, in more experimental settings different conditions could be tested. Other researchers may be more interested in the influence of embodied collective sensemaking on outcome variables. Here especially the boundary conditions that delineate when and how embodied collective sensemaking can lead to better decision-making outcomes. In our study, all groups were given the same time to complete their tasks; variations of the tasks and the time given could help elucidate the limits of embodied cognition.

Conclusions

Our study examined sensemaking common to a broad range of situations in which people seek better understanding in groups with the aim to eventually arrive at a decision and action. Our observation extends our theoretical understanding of sensemaking by explaining how embodied cognition in groups influences collective sensemaking. We suggest that embodied collective sensemaking operates at levels that are overlooked with the focus on articulation and verbal discussions in groups. Embodied collection sensemaking and material practices explain how the bodies of participants constitute a context in motion that greatly influences cognitions and discussions. Focusing in group settings on the embodied and material practices can help to reflect on groups' sensemaking and sensegiving and to exert influence on how groups can engage more in discussions that will yield better outcomes.

Therefore, embodied collective sensemaking suggests investing in the creation of an interactional context that enhances group members' reflection and contribution to the group's attempts to grapple with a problem. This view shifts much of the responsibility to run effective group discussions to the group's members and their ability – our findings indicate – to engage with other members through motions that range from the physical presence in the occupied space, the ability of the group to manage itself without relying on hierarchy or other fixed structures and use materiality to enhance the groups' ability to create reflexivity.

References

Anderson, S. J. & Galavan, R. J. (2016) The "how" of multiple leaver sensegiving and strategic change. In Sund, K. J., Galavan, R. J. Huff, A. S. (Eds.) Uncertainty and Strategic Decision Making, Emerald Group Publishig Limited, Bingley, UK.

Balogun, J. and Johnson, G. (2004) Organizational restructuring and middle manager sensemaking, Academy of Management Journal, August 1, 2004 vol. 47 no. 4; 523-549.

Balogun, J., et al. (2014) Placing strategy discourse in context: Sociomateriality, sensemaking, and power, Journal of Management Studies, 51/2: 175-201.

Corbin, J., & Strauss, A. (2008) Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory, Sage Publishing, Thousand Oaks, CA.

Cornelissen, J. and Schildt, H. (2015) Sensemaking in strategy as practice: a phenomenon or a perspective? in Golsorkhi et al. (Eds) Cambridge Handbook of Strategy as Practice, 2nd Ed.: 345-364.

Cornelissen, J., Mantere, S., and Vaara, E. (2014) The contraction of meaning: the combined effect of communication, emotions, and materiality on sensemaking in the Stockwell shooting, Journal of Management Studies, 51/5: 699-736.

Cunliffe, A. and Coupland, C. (2012) From hero to villain to hero: making experience sensible through embodied narrative sensemaking, Human Relations, 65/1: 63-88.

Di Stefano, G., Peteraf, M., and Verona, G. (2010) Dynamic capabilities deconstructed: a bibliographic investigation into the origins, development, and future directions of the research domain, Industrial and Corporate Change, 19/4: 1187-1204.

Denis, J. L., Langley, A., and Rouleau, L. (2006) The power of numbers in strategizing, Strategic Organization 4/4: 349-377.

Eisenhardt, K. M. and Graebner, M. E. (2007). Theory building from cases: opportunities and challenges. Academy of Management Journal, 50/1: 25-32

Gephart, R. P. (2004) Qualitative research and the Academy of Management Journal, Academy of Management Journal 47/4): 454-462.

Gylfe, P., et al. (2016) Video methods in strategy research: focusing on embodied cognition, Strategic Management Journal, 37: 133-148.

Gioia, D. and Chittipeddi, K. (2007) Sensemaking and sensegiving in strategic change initiation, in Johnson, et al. (Eds) Strategy as Practice: Research Directions and Resources, Cambridge University Press, 137-151.

Good, J. (2014) Sensemaking at Sea: Organizing with Natural Materiality in an Alaskan Commercial Fishery, Academy of Management Proceedings.
http://proceedings.aom.org/content/2014/1/16871.short.

Heracleous, L. and Jacobs, C. D. (2008) Crafting strategy: the role of embodied metaphors, Long Range Planning 41/3: 309-325.

Jarzabkowski, P. and Seidl, D. (2008). The role of meetings in the social practice of strategy. Organization Studies, 29/11, 1391-1426.

Jarzabkowski, P. and Kaplan, S. (2015) Strategy tools-in-use: a framework for understanding "technologies of rationality" in practice, Strategic Management Journal 36/4: 537-558.

Jarzabkowski, P., Spee, A. P. and Smets, M. (2013). Material artifacts: Practices for doing strategy with 'stuff'. European management journal, 31(1), 41-54.

Kaplan, S. and Orlikowski, W. J. (2013) Temporal work in strategy making, Organization Science, 24/4: 965-995.

Kaplan, S. (2011) Strategy and PowerPoint: The epistemic culture and machinery of strategy making. Organization Science, 22/2: 320-346.

Knorr-Cetina, K. (1997) Sociality with objects. Social relations in post social knowledge societies. Theory, Culture and Society,14(4), 1.

Kupers, W., Mantere, S., and Statler, M. (2013) Strategy as storytelling: a phenomenologocal exploration of embodied narrative practice, Journal of Management Inquiry, 22/1: 83-100.

Le, J. and Spee, P. (2015) The role of materiality in the practice od strategy in Golsorkhi et al. (Eds.) Cambridge Handbook of Strategy as Practice, 2nd Ed.: 582-597.

LeBaron, C., Jarzabkowski, P., Pratt, M. G., and Fetzer G. (2017) An introduction to video methods in organizational research. Organizational Research Methods 1-22.

Liu, F. and Maitlis, S. (2014) Emotional dynamics and strategizing processes: a study of strategic conversations in top team meetings, Journal of Management Studies, 51/2, 202-234.

Mantere, S., Schildt, H. A. and Sillince, J. A. (2012). Reversal of strategic change. Academy of Management Journal, 55(1), 172-196.

Maitlis, S. and Christianson, M. (2014) Sensemaking in organizations: taking stock and moving forward, Academy of Management Annals, 8/1: 57-125.

Maitlis, S. and Sonenshein, S. (2010) Sensemaking in crisis and change: inspiration and insights from Weick (1988), Journal of Management Studies, 47/3: 551-580.

Paroutis, S., Franco, L. A. and Papadopoulos, T. (2015). Visual interactions with strategy tools: producing strategic knowledge in workshops. British Journal of Management, 26/1: 48-66.

Stigiliani, I. and Ravasi, D. (2012) Organizing thoughts and conencting brains: material practices and the transition from individual to group-level prospective sensamking, Academy of Management Journal, 55/5: 1232-1259.

Weick, K. E. (1995) Sensemaking in Organizations. Thousan Oaks, CA, Sage,

Weick, K. E., Sutcliffe, K. M., and Obstfeld, D. (2005) Organizing and the process of sensemaking, Organizstion Science, 16/4: 409-421.

Werle, F. and Seidl, D. (2015) The layered materiality of strategizing: epistemic objects and the interplay between material artefacts in the exploration of strategic topics, British Journal of Management, 26/1: 67-89.

Appendix I: Telecom industry cases in chronological order of video recording

Group	Profile	Composition	Location	Equipment	Significant events	Video Run Time
Telco 1	An international group of 5 Telco executives on an open programme. The informants were familiar with causal mapping; they received a short introduction into causal mapping and its application. All informants had considerable practical experience in the use of causal maps as a decision-making tool.	Age range 35 to 60. 3 men 2 women The informants had not met each other prior to the first day. All informants had spent the previous day as part of a larger group together. They had not previously worked together as a group.	A large seminar room at a European University. White bard at the end of the room.	Video camera. Selection of different color Post-it notes. Flip chart paper. A selection of marker pens. Note paper. Whiteboard. Teaching case study.	Arranged chairs in front of the whiteboard. The group spent most of the time **standing** at the whiteboard enacting a causal map. Issues were raised by group members and points made by addressing or **pointing at the map**. The group formed a tight knit group with a **close focu**s on the map. The group engaged in joint **map enactment**. The group moved in an iterative fashion **from map enactment to reflection and back to enactmen**t. The map was used by group members to clarify thinking and **justify the decision**. The decision was reached by articulating and pointing at the map. The map was complex with post-it notes posted by informants.	102 min
Telco 2	An international group of 5 Telco executives on an open programme. The informants were familiar with causal mapping; they received a short introduction into causal mapping and its application. All informants had considerable practical experience in the use of causal maps as a decision-making tool.	Age range from 38 to 45. 4 men 1 woman The informants had not met each other prior to the first day. All informants had spent the previous day as part of a larger group together. They had not previously worked together as a group.	Seminar room at a European University. White board next to a nest of tables.	Video camera. Selection of different color Post-it notes. Flip chart paper. A selection of marker pens. Note paper. Whiteboard. Teaching case study.	The group remained **seated** around the table most of the time. One informant took a lead in **controlling** the discussion and **enacting** the map. This informant led the discussion from the beginning to the end and was responsible for map enactment that was very sketchy and superficial. The other team members spent a considerable time in consulting their notes or writing things down resulting in a **divided focus**. The seated members made points to the dominant informant and **occasionally pointed at the map**. **Disagreement** arose when one of the **seated informants** challenged the dominant informant **standing** at the whiteboard. The disagreement did not result in a wider consideration of opposing views and exploration of options. The **final decision was not justified by the map**, rather by the dominant informant sitting down and presenting his work to the other team members. None of the other informants articulated or justified the controlling informants view at the end of the exercise. The map remained simple and underdeveloped.	106 min
Telco 3	An international group of 4 Telco executives on an open programme. The informants were familiar with causal mapping; they received a short introduction into causal mapping and its application. All informants had considerable practical experience in the use of causal	Age range 40-53. 3 men 1 woman The informants had not met each other prior to the first day. All informants had spent the previous day as part of a larger group together. They had not previously worked together as a group.	Small break out room at a European University. White board next to a nest of tables.	Video camera. Selection of different color Post-it notes. Flip chart paper. A selection of marker pens. Note paper. Teaching case study.	Initially the group sat at the table until one informant was tasked to start **map enactment** on a flip chart by the rest of the group. Another informant **stood up** through the narrow space in the room joined the **standing** informant to show how he would enact the map and went back to sit down. The group discussion became more animated when the female informant **stood up** and took the map from the flipchart and attached it to whiteboard effectively creating two maps. The female informant remained **standing** with the original standing informant. The discussion became more animated and the rest of the group became closely focused and **pointing**	104 min

Group	Profile	Composition	Location	Equipment	Significant events	Video Run Time
	maps as a decision-making tool.				looking at the two maps**. Decision** was made and **justified** by informants at making statements and pointing at the map.	

Appendix II: Significant event of map enactment

Map enactment - Telco 1


Disagreeing – Telco 2


Deciding - Telco 3