Organizing distributed knowledge for collaborative action: Structure, functioning, and emergence of organizational transactive memory systems

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4 TMS DEVELOPMENT FOR HYBRID ENACTMENT

4.1 Abstract

In this chapter the third research question is being addressed, i.e. how can functionally structured organizations develop their ability to engage in networked operations, in addition to their functional mode of organizing? Hybrid enactment is introduced to conceptualize the ability of an organization to switch between functional and networked enactment. The latter is mandated in situations in which diverse specialized units are interdependent in heading challenges that exceed their specialization. These collaborations may be infrequent and brief, yet they are very common in e.g. law enforcement, crisis response, and the military. Contemporary research tends to frame functional and networked enactment as mutually excluding, rather than considering the transitioning processes between these modes. The purpose of this study is to understand how the two modes of enactment are interrelated and accomplished, and to identify opportunities to strengthen hybrid enactment. To this end we draw on the Resource and knowledge based theory of the firm to develop a multilevel distributed systems perspective, and use transactive memory systems (TMS) theory to conceptualize mechanisms for achieving coherence. Using an interpretive case study approach, we studied hybrid enactment at a national police organization. We took a failed case of networked enactment as a starting point for examining networked enactment of specialized departments as well as their functional background. Networked enactment in our case study concerned a routine operation aimed at eavesdropping a conversation between two criminals. Flexibility and resilience of the network was out-stretched when one of the two suspects was murdered by an unexpected third party. Analysis of

5 This research has been conducted in close collaboration with Paul C. van Fenema. During all phases of the research project Jan-Kees Schakel functioned as lead-researcher. A shortened version of this chapter has been submitted for publication.
the departments’ TMS revealed (underdeveloped) TMS components and relations among these components for hybrid enactment. This chapter concludes with implications for research, including cues for strengthening hybrid enactment.

4.2 Introduction

Complex tasks, such as dealing with large natural or man-made crises, require diverse (public) organizations to form temporary ad hoc collaborations (Provan and Kenis 2008). The underlying principles and structures that guide these collaborative activities differ from those guiding organizations' regular activities (Nissen 2006). For example, (public) organizations responsible for particular sets of services are often structured by function, product or region, or combinations thereof (Daft 2012). The resulting organizational structures are predominant vertical in nature, meaning that similar tasks and functions are grouped in specialized units, decision-making is centralized, and communication and reporting follow hierarchical lines (Andrews et al. 2007). Temporary ad hoc collaborations, on the other hand, are predominantly horizontal in nature, meaning that responsibilities for tasks are shared, decision making is decentralized, and communication and information exchange are based on (informal) contacts (Andrews et al. 2007). In this chapter we associate vertical modes of organizing with functional enactment, and horizontal modes of organizing with networked enactment. We introduce the concept of hybrid enactment to describe the ability of an organization to switch forth and back between its regular functional mode, and a temporary network mode of organizing.

While commonly performing successfully in a functional mode, organizations fail to marry this mode with networked enactment (Congress 2006). Since failure may lead to severe consequences, professionals and academics in organization science, information management, and disaster studies have invested in knowledge and capabilities for improving network robustness and resilience (Kleindorfer and Wind 2009; Miles and Snow 1992). These approaches build on the assumption that functional and networked modes of organizing are
mutually exclusive (e.g. Miles and Snow 1992). Yet, in many cases stakeholders expect organizations to be successful in both modes. Research relevant to our understanding of hybrid enactment remains limited to first, theorizing on structural properties of organizations (matrix organizations, ambidexterity, platforms) (e.g Bartlett and Ghoshal 1993; Ciborrra 1996; Jansen et al. 2009). This structural approach ignores the dynamic processes involved with networked enactment, and the ongoing transitioning between functional and networked enactment. Second, research on repertoires to alter routines (organizational flexibility, metaroutines, and dynamic capabilities) focuses on changing routines but not on the challenge of switching between routines related to different modes of organizing (Adler et al. 1999; Prieto and Easterby-Smith 2006). The objective of this chapter is therefore to analyze how organizations can organize for hybrid enactment, that is, how can functionally structured organizations develop their ability to engage in networked operations in addition to their functional mode of organizing (cf. Agranoff 2006). While networked enactment could involve both intra-organizational units and inter-organizational relationships, we focus on the former. This allows us at this stage to ignore the complexities of combining intra- and inter-organizational processes (cf. Gittell and Weiss 2004). In order to conceptualize hybrid enactment a theoretical framework was needed that could cater for functional, networked and hybrid enactment. To this end three steps were taken. First, we build on theory on knowledgeable resources and distributed systems. Second, we conceptualize the process of organizing distributed systems by using levels of agency (strategic, tactical and operational). And third, we insert transactive memory systems theory to frame how organizations engage in functional and networked enactment.

Empirically, hybrid enactment concerns the relatedness of functional and networked enactment. It represents a derivative construct that cannot be studied directly: data comes from organizational enactment in a functional or networked mode. We studied hybrid enactment at a Dutch police organization (Korps Landelijke Politiediensten, KLPD, in English National Policing Services Agency). In this type of organization,
which can be found in most nations, our starting point was a case in which units planned a networked operation and encountered disruptive events that could not be handled effectively. Our study then relates this networked enactment to the units’ functional mode of organizing, i.e. their ‘daily business’. We structure our results and analysis following the distinction between functional, networked, and hybrid enactment. We conclude this chapter with specifying our contributions and outlining implications for research.

4.3 Conceptual Framing: Distributed Systems and Levels of Agency

4.3.1 Knowledgeable resources and distributed systems

First, studying organizations which units are expected to engage in both functional and networked modes of organizing raises the question which conceptual starting point to choose. It should cater to the analysis of both modes of organizing and the transitioning between them. Building on the resource based theory of the firm (KBT) (Barney et al. 2001; Penrose 1959) and its spin-off, the knowledge based theory of the firm (KBT) (Grant 1996). We took the idea of knowledgeable resources yielding services as our starting point. KBT acknowledges that the ‘distribution of knowledge in an organization […] reflects the social division of labor’ (Brown and Duguid 1998: 98). KBT emphasizes the knowledge-intense nature of organized activities and the inseparability of knowledge (‘knowing’) and organizational practice (Orlikowski 2002). Scholars in related streams of research refer to distributed cognition at the micro level (Hutchins 1991), and distributed knowledge systems at the organizational level (Orlikowski 2002).

We built on the notion of KBT that organizations can be considered a collection of resources capable of providing a range of services (Penrose 1959). Organizations combine these resources into processes that generate benefits at a certain cost (Sirmon et al. 2007). For coherent action, organizations develop routines for combining resources’ knowledge and services (Feldman and Pentland 2003).
Returning to hybrid enactment, we can now state that functional enactment refers to a particular mode of organizing in which knowledge of resources and services is patterned in accordance with a specialized and rather homogeneous and predictable task goal (cf. Nissen 2006). Networked enactment, on the other hand, would require the same resources to (partially) activate their actionable knowledge and services for a combined task goal that is less homogeneous and predictable, and which transcends goals defined for functional enactment. Networked enactment and the transitioning between functional and networked enactment increases complexity as new connections between resources emerge (cf. Kogut and Zander 1992; Simon 1962) to form novel combinations (cf. Feldman 2004).

4.3.2 Levels of agency

Second, in accordance with Emirbayer and Mische we define agency as 'the temporary constructed engagement by actors of different structural environments … which, through the interplay of habit, imagination, and judgment, both reproduces and transforms those structures in interactive response to the problems posed by changing historical situations' (Emirbayer and Mische 1998: 970). Common perceptions of levels of agency describe these in the sense of granularity or aggregation, e.g. the well-known individuals – teams – organizations continuum. Others use the distinction between strategic, tactical and operational levels, referring to the vertical division of work in hierarchical organizations in relation to value creation. In the latter tradition, granularity relates to differences in scope, level of abstraction of goals, and time horizon, and are subsequently associated with operational, middle, and top management (e.g. Tarafdar and Qrunfleh 2009).

Hybrid enactment is an example of organizations becoming more complex than this hierarchical distinction in management levels can capture. Hence, following Mantere (2008) and others (e.g. Simon 1962), we dissociate strategic, tactical, and operational levels of agency from the vertical division of work in hierarchical organizations. Instead, we revert to the substantive content of levels of agency, associating them with
orders of governance. We link strategic level agency with third order governance (Sorensen and Torfing 2009). Accordingly, strategic level agency is focused on defining the 'rules of the game' (governing principles): workers negotiate, influence, or adopt shared norms, values, and principles (Kooiman and Jentoft 2009); and they develop shared intent and ambition in the sense of strategically positioning the system in its environment (Mantere 2008). We associate tactical level agency with second order governance. Relating to the strategic principles, tactical level agency is focused on establishing, shaping and deploying organizational structures for facilitating operational level action (Bigley and Roberts 2001). Operational level agency refers to first-order governance (Kooiman 2008) as well as to primary value creation processes that yield benefits for the system's stakeholders (Sirmon et al. 2007). Hence, operational agency encompasses personal knowledge and interactions related to primary tasks.

4.3.3 Synthesis: Towards a research approach

In addition to the introduction of TMS theory in Chapter 1, two perspectives have been introduced for studying hybrid enactment of organizations: distributed systems (based on the KBT and KBT), and levels of agency (dissociated from organizational hierarchy). From a distributed system perspective, we note that most theorizing focuses on resource interactions at the operational level (Hutchins 1991; Weick 1993). Bringing in the levels of agency suggests that the nature of interactions differs per level and are connected across levels (Perlow et al. 2004). This provides conceptual flexibility when theorizing on hybrid enactment: contributions associated with levels of agency are not necessarily associated with particular resources or formal hierarchical levels. Focusing on hybrid enactment, we assert that agency at and across the levels takes on different patterns. With functional enactment, strategic, tactical and operational agency become oriented towards specialized value creation. Networked enactment, on the other hand, involves resources offering diverse services for ad hoc, complex value creation. Such combinations of resources (and their services) tend to be innovative and
fragile (Brown and Duguid 2001). Transitioning between functional and networked enactment thus poses a challenge to sustain organizational coherence. To answer the question how distributed resources become organized and are able to contribute to both functional and networked enactment, we incorporated TMS as theoretic lens.

As far as we know, TMS literature focuses predominantly on operational level agency. For instance, scholars have studied dyads answering concrete questions, or small groups performing a collective task (e.g. Littlepage et al. 2008). Our earlier inclusion of tactical and strategic agency, however, implies that TMS can be analyzed at and across levels of agency. Elaborating on task-expertise-person (TEP) combinations (Brandon and Hollingshead 2004), first, tasks at the strategic level are of a more abstract nature than e.g. a team assignment at the tactical level, or the execution of a task by a particular person at a particular time and place (operational level). Second, the TEP ‘expertise’ construct is at the strategic level associated with organizational capabilities, at the tactical level it refers to a more specific combination of knowledgeable individuals, and at the operational level expertise concerns personal knowledge and information associated with (physically) situated and evolving agency (Orlikowski 2002). Finally, at the strategic level the TEP 'person'-construct represents abstract organizational entities and partners. At the tactical level, 'person' stands for the tactical combinations of persons or groups. And at the operational level person refers to actual individuals engaging in one or more levels of agency. In the methods’ data analysis section we further explain our operationalization.

4.4 Methods: Studying Hybrid Enactment Empirically

4.4.1 Design: interpretive case study research

The objective of this study is to learn how functionally structured organizations engage in networked operations. This required us to gain insight in 1) the operations of functionally structured teams, 2) organizational development efforts enabling these units to engage in networked operations, and 3) the sequencing and operational context of
networked operations. Empirical studies that allow for the collection of such data are broadly defined as interpretive case studies (cf. Walsham 1995). The opportunity for this study occurred while we were working on the theoretical foundations of this research. A recent networked operation of the KLPD, involving stealthy eavesdropping on a conversation between two high level criminals, took a dramatic turn when one of the suspects was murdered while being observed. The new situation out-stretched the networked capabilities of the involved police teams. The operation -called operation Frisau-, which was thoroughly evaluated and documented, formed a complex (in terms of dynamics) yet manageable (in terms of number of people involved) exemplar for the study we were conducting. Hence, permission was requested and received to conduct an in-depth case study.

Being employed as a senior advisor at the KLPD and a university-associated researcher, the role of the first author may be described as an involved researcher, while the second author functioned as outside observer (cf. Coghian 2001). Measures to ensure the quality of the interpretive case study are being described in the research quality section below (Section 4.4.4). Although the work of Yin (2009) is highly associated with positivist case studies, his work on the design of case studies is unsurpassed and very useful for the design of interpretive case studies as well. Using his terminology, we developed an embedded single case study design, including two supportive units of analysis driving the data collection (functional enactment and networked enactment), and one analytical unit of analysis (hybrid enactment). Yin (2009) provides five arguments for justifying the use of a single-case design. Three of them (revelatory, representative, and extreme) apply to this study. First, this case is revelatory as networked police operations like the one being studied are aimed at high-level criminals; consequently, they are highly confidential. Studying them in a contemporary real-life setting is difficult as researchers need to have high-level access and, as a consequence, case studies like these are very rare. Second, this case is representative as functional teams of public institutions such as the police frequently
engage in networked operations. And finally, this case is extreme as the challenges faced in this operation are very rare.

4.4.2 Research setting and data collection

The Dutch police are organized in 25 regional and one national police force (KLPD). Amongst other tasks the KLPD is responsible for dealing with serious and organized crime. It includes nine semi-autonomous operational departments specialized by functional domain. Next to delivering their functional services (i.e. functional enactment), many of these departments now and then participate in networked operations (i.e. networked enactment). In our results section we further explain the departments involved in Operation Frisau. Table 4.1 provides an overview of the empirical data collected during this study. We provide additional details on some of the data sources.

Ad (1) The police reports of the participating officers have been individually drafted the afternoon after the operation. Three have been supplemented afterwards to include additional details about the event. As police reports have a legal status in court, observations and actions are written down as factually as possible.

Ad (2) Due to legal constraints, video-recording operations is not standard practice. This time, however, it was decided to record the operation for training purposes. The video proved of great value for this study as it provides a highly reliable audio-visual record of the sequence of events.

Ad (5) In addition to the materials directly related to our case, one of the senior commanding officers invited the first author to observe a course on operational decision making for tactical commanders. This course provided additional insight in how functional teams engage in networked operations.

Ad (7) The selection of interviewees was based on their role and network position during the operation. Starting from key positions in the network we held interviews until the story was saturated cf. Strauss and Corbin 1990). Semi structured interviews lasting from ca. 1 hour to 3 hours were conducted with 5 officers who were operationally involved,
the 3 senior officers responsible for the three functional teams (who were involved in the preparations and on stand-by during the operation), and one interview with 2 commanding officers who became involved during the hot action phase.

<table>
<thead>
<tr>
<th>Data Sources</th>
<th>Quantity</th>
<th>Relevant Unit of Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Police reports KLPD</td>
<td>16, plus 3 supplements</td>
<td>Networked enactment</td>
</tr>
<tr>
<td>2. Video recordings KLPD</td>
<td>15 minutes</td>
<td>Networked enactment</td>
</tr>
<tr>
<td>3. Press communiqué KLPD</td>
<td>2 press communiqué items</td>
<td>Networked enactment</td>
</tr>
<tr>
<td>4. Documents KLPD</td>
<td>5 project plans</td>
<td>Networked enactment, hybrid enactment</td>
</tr>
<tr>
<td>5. One-day course operational</td>
<td>Powerpoint and personal notes</td>
<td>Networked enactment</td>
</tr>
<tr>
<td>decision making</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Research feedback session</td>
<td>Powerpoint and minutes of meeting</td>
<td>Functional, networked, and hybrid enactment</td>
</tr>
<tr>
<td>7. Semi-structured interviews</td>
<td>7 transcribed, 2 minuted</td>
<td>Functional, networked, and hybrid enactment</td>
</tr>
<tr>
<td>8. Personal notes and observations</td>
<td>135 pages of notes over a 8</td>
<td>Functional, networked, and hybrid</td>
</tr>
<tr>
<td>of first author</td>
<td>month period</td>
<td>enactment</td>
</tr>
<tr>
<td>related to his regular work at the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KLPD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Parliamentary questions and</td>
<td>24 questions, including answers</td>
<td>Networked enactment</td>
</tr>
<tr>
<td>answers from the Minister of Justice</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.1: Empirical data sources

The interview protocol was structured as follows. It started with questions directed at describing daily activities in the functional organization (functional enactment). Then, we asked the interviewee for a personal account of the networked operation, including personal observations, interactions, decisions, and actions (networked enactment). And finally, we were interested in the interviewee’s thoughts on
transitioning between functional and networked modes, including preparing functional units for future networked enactment (hybrid enactment). The translation from the interview questions to TMS-constructs is explained in the data analysis section below. We recorded 7 interviews on a voice recorder and transcribed these verbatim. During the other 2 interviews, the first author took extensive notes because the interviewee did not allow recording in one case, and because of problems with the dictaphone in the other case.

Ad (8) In his function as senior KLPD advisor, the first author was involved in several organizational development efforts related to hybrid enactment. Notes related to this work were used for triangulation purposes.

The data collection phase was terminated when regularities emerged and accounts of events of the researchers converged with those of the practitioners involved.

4.4.3 Data analysis

In accordance with the interpretive research tradition (cf. Walsham 1995), we refined our conceptual framework in interaction with our data analysis processes. The embedded design of our case study implies that we have three units of analysis: functional and networked enactment (used for empirical research), and hybrid enactment as a derivative unit of analysis (which cannot be studied directly in an empirical sense). Our analysis follows this structure. Functional teams are analyzed in terms of differences and commonalities between their TMS. For analyzing the networked operation we studied how the associated TMS evolved throughout the phases of the operation. And finally, for hybrid enactment, we analyzed the differences and commonalities between TMS for functional and networked enactment. To further explain our data analysis, we next explain how we analyzed (1) TMS and (2) relational effects among our units of analysis.
Analyzing TMS

Following Wegner et al. (1991) our analysis focuses on knowledge distribution within teams in terms of differentiation (more integrated versus more differentiated). Next, we identify Task-Expertise-Person (TEP) elements and combinations (Brandon and Hollingshead 2004) for each level of agency. Our preliminary empirical results indicated that TEP-combinations at the operational level may systematically be alternated (i.e. reciprocal or team task interdependence, Van de Ven et al. 1976). Hence, we are also interested in the state of TEP-combinations (stable versus dynamic). And finally, we included environmental conditions as well: police work is tightly linked with environmental conditions that serve as a context for sensemaking (cf. Whiteman and Cooper 2011) and action (cf. Peltokorpi 2008).

Analyzing effects across units of analysis

Our interests in transitioning between functional and networked modes of organizing implies that we want to study types of effects between units of analysis. Kozlowski and Klein (2000) distinguish three effects: global, direct, and moderating. Global effects only impact the unit of analysis from which they originate (in our case functional or networked enactment, since our empirical data originates here). Direct effects are effect originating from one unit of analysis (i.e. functional, networked, or hybrid) that conditions other units of analysis. And moderating effects stem from one unit of analysis and affect the relationship between two other units of analysis.

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As elaborated in our conceptual framing section, it should be noted that Kozlowski and Klein (2000) refer to levels and units of analysis in terms of aggregation, i.e. individual (representing lower level), team, organization, etc. (higher levels). In contrast, we make a qualitative distinction between different levels of agency (strategic, tactical, and operational); moreover, we use three units of analysis: functional, networked, and hybrid enactment.
Our data analysis resulted in three sections that are combined with case description. First, pertaining to functional enactment, we describe the three teams involved in the networked operation. At this point we are interested in their default mode of operating in accordance with their specialization. We analyze their respective TMS along the three levels of agency (strategic, tactical, and operational). Second, we describe the operational phases of Operation Frisau and analyze these along the levels of agency to analyze networked enactment. We build on these two analyses to examine hybrid enactment and develop a TMS model at organization level, which facilitates hybrid enactment.

4.4.4 Research quality

To ensure research and data quality we followed the principles for conducting and evaluating interpretive studies of Klein and Myers (1999). The principle of the hermeneutic circle was followed by iteratively examining the parts and the whole they form, until the accounts of the researchers of the analyzed events converged with those of the practitioners involved. The principle of contextualization is inherent to an interpretive case study like ours and the multilevel character of the phenomenon being studied. The principle of interaction between the researchers and the practitioners involves ex-ante and informal interactions and a presentation of, and subsequent discussion about our findings. We applied the principle of abstraction and generalization and the principle of dialogical reasoning to data collection and data analysis. We kept in mind that participants involved in the same operation may (and did) have different interpretations of the events (principle of multiple interpretations). During the interviews we were sensitive to possible biases and systematic distortions in the narratives collected from the practitioners (principle of suspicion). Finally, we applied the usual measures recommended by Yin (2009) for thorough case study research, i.e. measures to assure construct validity, internal validity, external validity, and the reliability of our data (protocols and the setup of a case study database), complemented with the principles of analyzing multilevel phenomena (as described earlier). Upfront, a Researcher-Client
Agreement between the researchers and KLPD was drafted, providing the contractual, ethical, and procedural basis for this study.

4.5 Results (1): Functional Enactment

4.5.1 Functional enactment: description of teams

The networked operation analyzed in this study involved 25 members of 3 teams of the following specialized departments of the KLPD:
- an observation team (OT) of the Department of National Criminal Investigations (DNR);
- a tactics team (TT) of the Department of Special Technical Investigations’ Methods (DSRT); and
- a helicopter crew (HC) of the Department of Operational Support Services (DOS).

In this section we focus on their functional (default) mode of operating.

Department of National Criminal Investigations (DNR)

DNR is responsible for fighting serious and organized crime. To this end the department has criminal investigations teams (CI) that work on a case-by-case basis, and observation teams (OT). An OT is a team specialized in shadowing suspects and gathering information about geographic-behavioral patterns, meetings, and conversations. OTs provide services for several CIs at the time. An OT may execute two to three operations in one daily shift. To follow and observe suspects OTs have developed a wide range of standardized routines. These routines are used by all national OTs, including the OTs of regional police forces. This enables individual OT members to join other OTs without further training, while multiple OTs can be merged to cater for larger or more complex operations. During an operation the position of an OT member in relation to a suspect constantly changes, and so does his role in the team. With respect to information sharing OTs utilize two principles. The need-to-share principle is used among all involved in the criminal investigation case, because well-informed teams perform better. The need-to-know
principle (i.e. selective, more restricted information sharing) is applied to all those not directly involved in the investigation. Information sharing in this case has a serious connotation with leaking, which compromises action against criminals. OTs provide two types of services: those that OTs deliver on their own (functional enactment), and services that require cooperation with other teams (networked enactment). Networked enactment occurs infrequently.

**Department of Special Technical Investigations’ Methods (DSRT)**

The second participating team is of the DSRT. This department is specialized in collecting data from risky, challenging locations. We focus here on the tactics team (TT) that was involved in our case study. For security reasons the description of the team has to remain limited. A TT provides two types of services, which may both be delivered in functional or networked mode. In ‘singular assignments’ a client asks for a specific type of evidence, such as the recording of an event, or the placement of eavesdropping equipment. In such assignments DSRT asks no questions since its services are limited to technical contributions. For the second type of service, ‘comprehensive assignments’, TT takes responsibility for collecting all evidence and takes on a coordinating role. In general, TTs are assembled in accordance with the requirements of the assignment, so their composition varies. With respect to information sharing TTs only utilize the principle of need-to-know. The reason is that leaking not only compromises action against criminals, but directly affects personal safety of TT members as well, which is an employer responsibility. Most of the time TTs operate on their own (functional mode).

**Department of Operational Support Services (DOS)**

The third participating team is of DOS, responsible for supportive services such as the provision of police horses, drug-dogs, command and control services, and aerial support. The latter can be provided by planes or helicopters, supporting static (monitoring a single location) or dynamic (following suspects wherever they go) operations. Given their contribution to Operation Frisau, we focus on helicopter support. A
helicopter crew (HC) consists of a pilot and an observer. The division of labor between the pilot and observer is strict, yet their roles are tightly dependent. For instance, based on the evolving situation on the ground, the pilot may request the observer to adjust the flight-plan and clear these plans with air traffic authorities. In case of observing a criminal suspect, a member of an OT or TT often joins the HC to bring in (implicit) knowledge about the suspect (e.g. the way he tends to walk or places he commonly visits). With respect to information sharing HCs emphasize the principle of need-to-share. The more information is available on a subject, the easier it is to recognize and observe him. While the HC can perform some tasks independently without external coordination (e.g. making aerial photos of crime scenes), a substantial part of their work involves aerial support for teams operating on the ground.

4.5.2 TMS for functional enactment: first analysis

In this section we analyze the TMS of the involved departmental functional teams. Our analysis of TMS is structured per level of agency. We interpret departmental TMS in terms of strategic level principles, tactical level structures, and operational level personal knowledge and interactions related to primary tasks (cf. Table 4.2).

Differences between TMS elements are described in terms of TMS integration versus differentiation, Task-Expertise-Person (TEP) state (stable or dynamic), and TEP-combinations. Of these combinations, task and expertise are indicated per level of agency, while persons are represented in the form of departmental teams (columns, Table 4.2). For each level, a short description is given of the physical and social environment in which the teams operate. Finally, the right hand column of Table 4.2 shows commonalities of TMS across the functional teams’ departments.
<table>
<thead>
<tr>
<th></th>
<th>Department DNR</th>
<th>Department DSRT</th>
<th>Department DOC</th>
<th>Functional enactment and TMS: commonalities across departments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation Teams (OT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tactical Teams (TT)</td>
<td></td>
<td></td>
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<tr>
<td>Helicopter Crew (HC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

### Strategic level: emerging and conditioning governing principles

<table>
<thead>
<tr>
<th>TMS differentiation</th>
<th>Integrated</th>
<th>Integrated</th>
<th>Integrated</th>
<th>• Police Law</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEP-state</td>
<td>Stable</td>
<td>Stable</td>
<td>Stable</td>
<td>• Fighting serious and organized crime</td>
</tr>
<tr>
<td>Task (T)</td>
<td>Subject observation</td>
<td>Technical observation</td>
<td>Aerial observation</td>
<td>• High quality observation skills</td>
</tr>
<tr>
<td>Expertise (E)</td>
<td>Stealth following skills</td>
<td>Stealth placement skills</td>
<td>Flying skills</td>
<td>• Safety principle</td>
</tr>
<tr>
<td>Environment / Context</td>
<td>Mandate to operate in public access spaces Need-to-know and need-to-share</td>
<td>Mandate to enter private spaces Need-to-know</td>
<td>Mandate to operate in the national airspace Need-to-share</td>
<td>• Learning through debriefing principle</td>
</tr>
</tbody>
</table>

### Tactical level: emerging and conditioning organizational structures

<table>
<thead>
<tr>
<th>TMS differentiation</th>
<th>Integrated</th>
<th>Differentiated</th>
<th>Differentiate</th>
<th>• Hierarchical structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEP-state</td>
<td>Stable</td>
<td>Stable</td>
<td>Stable</td>
<td>• Police</td>
</tr>
</tbody>
</table>

7 C2000 is a shared technical communication infrastructure used by police and other crisis response forces in The Netherlands. In addition, regular GSM phones are used as well.
<table>
<thead>
<tr>
<th>Task</th>
<th>Department DNR Observation Teams (OT)</th>
<th>Department DSRT Tactical Teams (TT)</th>
<th>Department DOC Helicopter Crew (HC)</th>
<th>Functional enactment and TMS: commonalities across departments</th>
</tr>
</thead>
<tbody>
<tr>
<td>All team roles</td>
<td>Placement and protection</td>
<td>Visual observation</td>
<td></td>
<td>education C2000?</td>
</tr>
<tr>
<td>Expertise</td>
<td>Shared routines</td>
<td>Technology and arrest squad skills</td>
<td>Distance observations</td>
<td></td>
</tr>
<tr>
<td>Environment / Context</td>
<td>Public space-type related repertoires</td>
<td>Private space-type related repertoires</td>
<td>Air space-zone related repertoires</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4.2: Functional enactment: TMS analysis**

**Operational level: personal knowledge and interactions related to primary tasks**

<table>
<thead>
<tr>
<th>TMS differentiation</th>
<th>Differentiated</th>
<th>Differentiated</th>
<th>Differentiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEP-state</td>
<td>Dynamic</td>
<td>Stable</td>
<td>Stable</td>
</tr>
<tr>
<td>Task</td>
<td>All team roles alternate</td>
<td>Placement and protection</td>
<td>Visual observation</td>
</tr>
<tr>
<td>Expertise</td>
<td>Unique OT expertise</td>
<td>Unique TT expertise</td>
<td>Unique HC expertise</td>
</tr>
<tr>
<td>Environment / Context</td>
<td>Event related place-time conditions</td>
<td>Event related place-time conditions</td>
<td>Event related place-time conditions</td>
</tr>
</tbody>
</table>

- Policing skills
- Knowledge of evolving situation

**Strategic level agency and TMS**

At the strategic level we found each functional department featuring an integrated TMS and a stable TEP state. When analyzing task
(T) and expertise (E), we found differences between the teams (P), which is reflected in their image and attitude. OTs are known as “the ones with the fast cars”, TTs as stealthy “can do’s”, and HCs as punctuate and reliable. With respect to attitude, OTs have an urge to never let go and improvise when needed to keep a suspect under control. A dominant value of TTs is to never get seen, and to improvise when required to maintain their stealthy operational presence. The adagio of HCs is to strictly follow aerial (safety) regulations and instructions, while watching the suspect ‘like an eagle’. Approaches to information sharing differ: TTs stress the importance of need-to-know (share only information for a given purpose); OTs utilizes the principle of need-to-share for all involved in the criminal investigation case, and the principle of need-to-know for all those who are not; and HCs stress the importance of need-to-share.

Strategic aspects of the physical environment in which the teams operate refer to their respective mandates. OTs are mandated to operate in public access spaces; TTs are mandated to enter private spaces; and HCs are mandated to operate above areas ranging from sea to land and from densely populated to rural areas.

Finally, strategic level TMS elements held in common between the teams include the Police Law and their shared task of fighting serious and organized crime. Moreover, all of their tasks demand high quality observation skills and all three use the same order of priority in relation to safety: safety of own people first, followed by the safety of possible victims, the safety of the criminal(s), and the need to catch them. As a general rule all operations are being debriefed to support learning and organizational development.

*Tactical level agency and TMS*

Tactical level TEP-elements and combinations among the teams differ in terms of their level of differentiation, while all of them appear stable. Because OT members need to be able to perform all team roles, at a tactical level its TMS is highly integrated. To enable swift allocation and execution of operational tasks a wide range of standards and routines are used. A TT has a more differentiated task-expertise structure: educational
backgrounds of team members responsible for operating technological
differ from those responsible for placement or protection. Tasks and
expertise in helicopter crews are highly differentiated. Hence, their TMS
are differentiated as well.

With respect to the environment in which the teams operate
various types may be distinguished, each requiring different expertise to
cope with the specific characteristics and dynamics of these environments.

Finally, structural elements which the three teams hold in
common include the hierarchical ranking system and their educational
background in policing (except for the pilot). This shared background
provides the teams with a common elementary knowledge base
(expertise), which covers law, mandates, and authority relations. Another
common structure is the C2000 communication system. Moreover,
members of all the three teams gain knowledge of their colleagues
through perceptions based on personal experience and self-disclosure and
through knowledge of actors’ access to information (cf. Wegner et al.
1991). This knowledge supports geographically distributed cooperation at
the tactical level, which all three teams are familiar with.

Operational level agency and TMS

TMS differentiation and TEP-state of OTs at operational level
differ from the tactical level. When an OT is involved in a dynamic
pursuit of a subject, tasks related to the pursuit are almost constantly
handed over to team members that are in a better position to perform the
task, while few to no members are idling. This reciprocal task
interdependence (Van de Ven et al. 1976) requires the team not only to
constantly update and access each other’s knowledge. To remain coherent
with the evolving operation, the allocation of responsibilities for
information storage has to be brought in accord with the division of labor
of that particular moment. Operational level TMS differentiation and
TEP-state of TTs and HCs, on the other hand, resemble tactical level TMS
differentiation and TEP-states.
The operational environment refers to the actual conditions at a particular space and time. These are inherently idiosyncratic for police work.

Finally, operational TMS elements that the teams hold in common are their policing skills. They all know, for example, how and when to use arms, how to make an arrest, what details are important to register, and how to draft a Police Report.

4.6 Results (2): Networked Enactment

4.6.1 Description of phases of 'Operation Frisau'

Operation Frisau, in which the OT, TT, and HC collaborated, moved through the following common phases: initiation, positioning, hot action, and debriefing. These are described next.

Operational phase - initiation

Operation Frisau was part of a larger project of a criminal investigations team of the DNR for which the TT of the DSRT had accepted responsibility (a ’comprehensive assignment’). Two days before the operation it was learned that the two suspects under surveillance would have a meeting next Monday at noon. Since the intended meeting place was quite difficult to secure, the head of the TT-unit contacted the head of the OT-unit for assistance. The concept they agreed on for assembling the network was straightforward (see Figure 1): the TT would take care of the technology to eavesdrop the conversation and form an inner-ring to protect the 'hotspot', i.e. the place from where the technology was operated in the assumed vicinity of the suspects; the OT would form an outer-ring to signal the arrival of the suspects; and to coordinate activities everyone would communicate on C2000 communication channel 2. Thus instructed, the team leader of the TT contacted and briefed the team leader of the OT (by phone), who in turn briefed and prepared her team (also by phone).

Four hours before the operation the question arose within the TT whether the two suspects could be identified beyond legal doubt before
the recording would be started. This is required by law. To eliminate doubt it was decided that the inner-ring would seek additional identification, and that a helicopter would be hired to provide the hotspot with streaming video images of the surroundings. It was decided that one of the TT members would join the helicopter to help identifying the suspects. The HC was strictly instructed that the operation could not be compromised to protect strategic interests of the investigation project. For this reason the helicopter had to operate out of sight and beyond the hearing range of the hotspot. Since for technical reasons the HC could not use C2000 channel 2 it was decided that channel 1 would be used instead. The TT team leader would communicate this change of configuration with the OT. Yet, due to time pressure he failed to inform the OT about the helicopter all together. As a result, communication in the network was organized in two channels (cf. Figure 4.1). Most interviewees, including OT members, were only mildly bothered by this omission because the intended role of the helicopter was to provide additional support for the hotspot; it would not interfere with the role of the OT.

![Network configuration of Operation Frisau](image)

**Figure 4.1: Network configuration of Operation Frisau**

*Operational phase - positioning*

While everyone was taking positions, the OT team leader did hear a helicopter. She contacted the TT team leader to verify whether an HC had joined the operation. After his confirmation she helped him guide the helicopter to a spot where it could not be heard or seen. The helicopter
ended up at a suboptimal location because its space to maneuver was restricted due to weather conditions and proximity of a major airport. The OT and TT team leaders discussed alternative communication channels to be used. Because they could not find a secure communication channel to which all three teams had access, it was decided that communication between the helicopter and the OT would be mediated by the TT team leader and his driver (cf. Figure 4.1). The boundary-spanning role of the TT team leader and his driver, however, proved ambiguous, as they held different opinions on who would communicate with whom. Shortly after the helicopter was positioned, one of the OT members announced the arrival of the first suspect.

Operational phase - hot action

Within a minute after the suspect had parked his car, an unknown man approached him from behind and emptied his gun. Except for the helicopter no one could see what happened. The officers in the hotspot only heard popping sounds and ticking against the protective layer of the hotspot. They concluded that the ticking was caused by shells and communicated their conclusion over channel 1 (cf. Figure 4.1). Combining the sensory input with the message of the hotspot, the co-observer in the helicopter concluded that an assassination had occurred. This conclusion, however, was not communicated. Hence, TT members only knew that there had been a shooting, and the OT, operating on channel 2, was still unaware of the event. They were supposed to be updated by the TT team leader, but he had spotted the van of the shooter and started a pursuit. By following the suspect himself, the TT team leader had become submerged in the operation. This is against one of the governing rules for team leaders, who, according to the functional unit heads of the TT and OT, are responsible for maintaining oversight and preserving team calmness. Shortly after starting the pursuit, the TT team leader realized his responsibilities. He attempted to quickly hand over the pursuit of the shooter to the helicopter, not realizing that the OT was still not informed. As soon as the HC co-observer confirmed he did see a van similar to the one involved in the shooting, the TT team leader assumed
the pursuit was handed-over. He returned, informing the OT team leader that he was returning to the hotspot because – to her surprise – there had been a shooting. By that time the van had passed the outer-ring. At that time the HC realized that the van they followed was not the one involved in the shooting. It had escaped.

*Operational phase - debriefing*

As soon as responsibility for the crime scene had been handed over to the regional police, the functional teams retreated to their individual units for a debriefing. Such debriefings are standard. Due to the murder, however, the heads of the functional units requested all team members to put their experience in a personal Police Report. This was done because, one of the unit heads explained, 'shared briefings would lead to synchronization of individual memories'. After the Police Reports were written, debriefing sessions were held per functional team. In these sessions it was quickly established that the murder could not have been prevented. All were frustrated, however, by the fact that the murderer had escaped and wondered how this had happened.

Although during the debriefing people agreed that everyone should have been on the same communication channel, during the interviews opinions differed. While some members argued that all network members should share the same channels, others argued that multiple channels were required to ensure silence and the opportunity to speak when needed. Moreover, while being in the heat of the action, they did not want to be distracted by communications taking place in other parts of the network. They did all agree that channel numbers and GSM-numbers should be known by all members of the network. The result of the debriefing was that a thorough evaluation would be organized to learn from what had happened in order to remain in control the next time. In addition, a shared debriefing session was organized to enable the three teams to reestablish trust by explaining their individual situation and discussing their cross-team frustrations.
4.6.2  *TMS for networked enactment: second analysis*

The first analysis (functional enactment) provided insight in cross-departmental differences and commonalities. Here we focus on networked enactment. For each level of agency a summary is given of our analysis of the evolving network TMS. In addition to the functional commonalities discussed above (not repeated here, *cf*: Table 4.3, first row) we describe TEP-elements and combinations and environmental factors pertaining to networked enactment. Comparison across levels is discussed when relevant for the analysis.

<table>
<thead>
<tr>
<th>Strategic level agency and TMS: emerging and conditioning governing principles</th>
<th>Tactical level agency and TMS: emerging and conditioning organizational structures</th>
<th>Operational level agency and TMS: personal knowledge and interactions related to primary tasks</th>
<th>Comparison across levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional enactment and TMS: commonalities (from Table 4.2)</td>
<td>Functional enactment and TMS: commonalities (from Table 4.2)</td>
<td>Functional enactment and TMS: commonalities (from Table 4.2)</td>
<td>Functional enactment and TMS: commonalities (from Table 4.2)</td>
</tr>
<tr>
<td>Police Law; Fighting serious and organized crime; High quality observation skills; Safety principle; Learning through debriefing principle;</td>
<td>Hierarchical structure; Police education; C2000</td>
<td>Policing skills; Knowledge of evolving situation</td>
<td></td>
</tr>
<tr>
<td>Phase 1 Initiation</td>
<td>Personal identification needed (legal condition); Comprehensive assignment, DSRT in the lead;</td>
<td>TL briefing; Briefing of team members by three team</td>
<td></td>
</tr>
<tr>
<td>Phase 2 Positioning</td>
<td>Strategic level agency and TMS: emerging and conditioning governing principles</td>
<td>Tactical level agency and TMS: emerging and conditioning organizational structures</td>
<td>Operational level agency and TMS: personal knowledge and interactions related to primary tasks</td>
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<tr>
<td>Operation may not be compromised (compromise principle)</td>
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<td>Operation may not be compromised (compromise principle)</td>
<td>Operation may not be compromised (compromise principle)</td>
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<thead>
<tr>
<th>Phase 3 Hot action</th>
<th>Principle 'Operation may not be compromised' not withdrawn</th>
<th>Network configuration; C2000 configuration</th>
<th>leaders (TT, OT, HC); Trust of members in colleagues involved in operation</th>
<th>Ambiguous division of responsibilities between team leader and his driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning helicopter; Adjustment of C2000 configuration; Proximity of major airport and wind direction</td>
<td>Positioning helicopter; Adjustment of C2000 configuration; Proximity of major airport and wind direction</td>
<td>Positioning helicopter; Adjustment of C2000 configuration; Proximity of major airport and wind direction</td>
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<th>Network configuration; C2000 configuration</th>
<th>leaders (TT, OT, HC); Trust of members in colleagues involved in operation</th>
<th>Ambiguous division of responsibilities between team leader and his driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tactical team leader role largely absent</td>
<td>Tactical team leader role largely absent</td>
<td>Tactical team leader role largely absent</td>
<td>Tactical team leader role largely absent</td>
<td>Tactical team leader role largely absent</td>
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<thead>
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<th>Principle 'Operation may not be compromised' not withdrawn</th>
<th>Network configuration; C2000 configuration</th>
<th>leaders (TT, OT, HC); Trust of members in colleagues involved in operation</th>
<th>Ambiguous division of responsibilities between team leader and his driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team leader starts acting at operation level; Sharing of various individual observations and conclusions; HC attempts to establish contact with team leader and OT</td>
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<tr>
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<th>Principle 'Operation may not be compromised' not withdrawn</th>
<th>Network configuration; C2000 configuration</th>
<th>leaders (TT, OT, HC); Trust of members in colleagues involved in operation</th>
<th>Ambiguous division of responsibilities between team leader and his driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissonance between strategic level (do not compromise) and operational level (follow suspect)</td>
<td>Dissonance between strategic level (do not compromise) and operational level (follow suspect)</td>
<td>Dissonance between strategic level (do not compromise) and operational level (follow suspect)</td>
<td>Dissonance between strategic level (do not compromise) and operational level (follow suspect)</td>
<td>Dissonance between strategic level (do not compromise) and operational level (follow suspect)</td>
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</tbody>
</table>
In addition to existing common principles, two conditioning social environmental factors were added during Initiation specifically aimed at Operation Frisau: the legal condition of identifying the subject before switching on the eavesdropping equipment, and the strategic importance of the overall criminal investigation: the investigation was not to be compromised by this operation. During positioning no additional principles were required. Even though the compromise principle became irrelevant after the subject was murdered during the hot action phase, the principle was never explicitly withdrawn. This caused dissonance between strategic level agency (do not come close) and – as will be explained – operational level agency (come closer). Dissonance induces people to change their behavior, change the importance of cognition, or add new cognition (Cooper 2007). In Operation Frisau the co-observer at the HC tried to change the crew’s behavior by suggesting the pilot to follow the subject. She could not, however, because she was bounded by aerial regulations and the compromise principle. As a consequence, ambiguity continued. With very limited time available during the operation,
synchronizing tactical and operational agency with strategic principles failed.

During the debriefings it became manifest that the ambiguous situation had led to frustration and trust decay among the teams. Hence, a second, but now shared briefing was organized to learn to understand what had happened, and to reestablish trust. In TMS literature two forms of trust have been studied. First, trust in the form of task credibility (Moreland and Myaskovsky 2000), also known as cognitive-based trust (Kanawattanachai and Yoo 2007). Given the response during interviews, this form of trust had not faltered. The second form of trust is defined as “expectations, assumptions, or beliefs about the likelihood that another’s future actions will be beneficial, favorable, or at least not detrimental to one’s interests” (Robinson 1996: 576). As the following two quotes illustrate, it was this form of trust that needed to be restored after Operation Frisau:

We all have an A-status which ensures that we can handle sensitive information … I only do not know up to what extent people have internalized this principle … even when dealing with criminal investigation teams I do not know this, because they too are checked only superficially. And you see what happens when you share information, how much of it leaks … how we work is exposed to the outside world, everyone now knows it. That hotspot was a fantastic means … But now it is gone, tactic lost” (TT member).

What kind of secrets do I have? We are all in for the same game: catching criminals. And what they (TT) do technically, I do not have to know. But this was crucial … And then I think, why do we agree to work on one channel, while your own team works on another channel? That information (about the shooting) did not come through. And last week this happened again. That piece of trust has to grow again” (OT member).
Restoring trust for future collaboration is important, as research has identified the lack of trust as one of the main barriers of distributed team success (Rosen et al. 2007).

*Tactical level agency and TMS*

For this operation, the TT received a 'comprehensive assignment' (task) for which they sought assistance of the OT and HC. Individuals required for the operation were selected and the network communication infrastructure was configured accordingly (initiation phase). While the functional teams’ TMS is based on face-to-face interaction and well-developed (i.e. in a functional sense), cross-team transactions are based on roles, rather than names, and depend on technology mediated communications (C2000 and GSM). During the positioning phase, the configuration of the network and C2000 were adjusted to incorporate the tactical requirements of the helicopter. Its location was dictated by tactical conditions related to aerial control (nearby a major airport) and specific weather conditions (eastern wind). The positioning of the helicopter illustrates Whiteman and Cooper's (2011) notion of ecological sensemaking. Individuals need expertise to cope with local natural and artificial conditions. In this case, natural conditions were complemented with local aerial regulations. These proved inhibiting during the hot action phase. So far, during the positioning phase, the operation was tactically understood as a routine operation in which it was the task of the OT to announce the arrival of the suspects, the HC to provide overview, and the TT to seek additional identification, make the recording, and protect the hotspot. In a predictable environment (external dynamics) with predictable interaction between the various team roles (internal dynamics), this setup had worked -as one of the interviewees said- '99 out of 100 times'. Other interviewees, however, contested that in more dynamic environments, operations had failed before. In this case, the external dynamics were caused by an unexpected event, the assassination. This disrupted the hot action phase and challenged the teams to adapt their networked enactment at all three levels of agency. Immediately after the shooting, the TT team leader became involved at the operational level.
Consequently, he discontinued tactical leadership. Since he was responsible for integrating contributions from OT and the rest of the network, the two parts of the network were deprived of their tactical level resource to synchronize action. This was aggravated by the fact that there were no alternative options for the HC and the OT to communicate with one another. From a TMS perspective, the various teams within the network were minimally coupled and only at tactical level. Failure of the exclusive link that held the teams together (Figure 1) led to disintegration of the network. The disintegration (from a network perspective) continued during the debriefing, which was initially organized per functional team. Preceding the debriefing, all individual officers were asked to put their experience formally on paper in a Police Report. This was aimed at preventing synchronization of memories. During the debriefings, however, it became manifest that a shared briefing was needed to better understand what had happened.

Operational level agency and TMS

Network initiation. During network initiation, the team leader of the TT was briefed (face-to-face) by the head of his unit. The team leader, in turn, briefed the team leaders of the OT and HC about Operation Frisau. He did not know these team leaders in person, but was aware of their intended role in the operation. Due to time pressure and physical distances he briefed them by phone. Subsequent communication, too, was by GSM and C2000. This procedure seems to contradict extant TMS research which holds that technology mediated communication is detrimental to TMS development, if not supplemented by face-to-face communication (cf. Lewis 2004). In this case, however, people acted based on task familiarity, rather than team familiarity. Espinosa et al. (2007) asserts that these two types of familiarity are substitutive, not complementary, in their effect on team performance. We can nuance this statement. Task familiarity sufficed as long as tasks were predictable. Team familiarity could have limited the extent to which the assassination disrupted the TMS.
Positioning phase. After the briefing each member went to the location from which he/she would operate and communicate personal observations relevant for the task at hand. Until that moment the agreed TMS functioned as designed. Once the OT noted the presence of the helicopter, however, the TMS became ambiguous. Besides the fact that role allocation between the TT team leader and his driver was unclear, the configuration of communication channels (required for updating, accessing, and allocating) became ambivalent. This went well as long as the operation proceeded as predicted. Thus, until the shooting.

Hot action phase. This phase was dominated by two intertwined developments: the shifting role of the TT team leader, and unclarity about the abilities of the helicopter.

First, within the established tactical structure the TT team leader played a pivotal role. By pursuing the shooter, rather than delivering his tactical level services he had shifted to an operational role. The OT and TT/HC teams were connected through one tactical level link only (i.e. the TT team leader). When this link became submerged in the operation, the various parts of the network were incapable of organizing concerted action. In an attempt to fill this tactical level void, the HC tried to establish alternative communication channels with the OT, yet failed. Becoming aware of his role-shift, the TT team leader handed-over the pursuit of the shooter to the helicopter, and returned to the hotspot where he reassumed his tactical role. This time, however, his focus had narrowed down from the entire network to his functional team only. The helicopter resumed its operational role, trying to pursue the shooter.

Second, lack of awareness of TT members (including the co-observer that had joined the HC) of the environmental factors that conditioned the functioning of the helicopter resulted in misperceptions of its operational capabilities. That is, potential services of this resource for the network were constrained by the environment (cf. Whiteman and Cooper 2011). Contributing to network collapse was the fact that TT members assumed (but never verified) that the helicopter would switch from a static mode of operating (providing sight to hotspot) to a dynamic one (pursuing the escaping shooter). Yet the helicopter could not
materialize this switch due to tactical level environmental conditions and 
strategic level instructions and regulations. Due to the extreme situation 
and unfamiliarity with the functioning of the helicopter, the TMS of the 
network was no longer backed by task familiarity. In absence of team 
familiarity and alternatives to coordinate action (communicate), 
networked enactment had broken down in three functional teams working 
in isolation.

Debriefing phase. In the aftermath of the operation officers made 
individual Police Reports and participated in the two briefing sessions, 
contributing their personal perspectives and reflecting on the lessons 
learned. From these sessions insights emerged that fueled tactical and 
strategic level agency.

4.7 Results (3): Hybrid Enactment

4.7.1 TMS for hybrid enactment: third analysis

In this section we revisit our analysis of functional (F) and 
networked (N) enactment to obtain insight in hybrid enactment. To this 
end we take an analytical step (this section) and a theory development step 
(next section). Our previous two analyses resulted in constructs associated 
with functional and networked enactment: principles at the strategic level, 
structures at the tactical level, and personal knowledge and interactions at 
the operational level. As explained in our data analysis, we use Kozlowski 
and Klein’s (2000) distinction of global, direct and moderating effects to 
relate the results of our three units of analysis –functional, networked, and 
hybrid enactment (cf. Table 4.4). Global effects concern only functional or 
networked enactment since our data collection concerned these units of 
analysis. Direct effects occurred between all three units of analysis. 
Following this step we construct a model of hybrid enactment based on 
these relations and effects, and thus address our main research objective.
### Strategic level: emerging and conditioning governing principles

**TMS for functional enactment of diverse departments (ex Table 4.2):**

<table>
<thead>
<tr>
<th>Global effects</th>
<th>Direct effects</th>
<th>Moderating effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject, technical, aerial observation</td>
<td>Complementary effect (F→N)</td>
<td></td>
</tr>
<tr>
<td>Skills, attitude related to following, placement, flying</td>
<td>Complementary effect (F→N)</td>
<td></td>
</tr>
<tr>
<td>Legal mandates for specialized tasks</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Information sharing principles</td>
<td>Conflicting effect (F→N)</td>
<td></td>
</tr>
</tbody>
</table>

**TMS commonalities across departments for functional enactment (ex Table 4.2):**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Police Law</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Fighting serious and organized crime</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>High quality observation skills</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Safety</td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

**TMS for networked enactment (ex Table 4.3):**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Identification</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Compromise</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Learning through shared debriefing</td>
<td>Learning effect (N→H)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Global effects</td>
<td>Direct effects</td>
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</tbody>
</table>

**Tactical level: emerging and conditioning organizational structures**

*TMS for functional enactment of diverse departments (ex Table 4.2):*

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Team roles</td>
<td>Complementary effect (F→N)</td>
<td></td>
</tr>
<tr>
<td>Routines</td>
<td>Complementary effect (F→N)</td>
<td></td>
</tr>
<tr>
<td>Environment related repertoires</td>
<td>Complementary effect (F→N)</td>
<td></td>
</tr>
</tbody>
</table>

*TMS commonalities across departments for functional enactment (ex Table 4.2):*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hierarchical structure</td>
<td>√</td>
</tr>
<tr>
<td>Police education</td>
<td>√</td>
</tr>
<tr>
<td>C2000</td>
<td>√</td>
</tr>
</tbody>
</table>

*TMS for networked enactment (ex Table 4.3):*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Initiating effect (F→N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive assignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network configuration</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>C2000 configuration</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Positioning HC</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Proximity airport and wind direction</td>
<td>√</td>
<td></td>
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<tr>
<td>Role of TL</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Reporting instructions</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Functional teams debriefings</td>
<td>Global effects</td>
<td>Direct effects</td>
</tr>
<tr>
<td>-----------------------------</td>
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<td>---------------</td>
</tr>
</tbody>
</table>

**Operational level: personal knowledge and interactions related to primary tasks**

*TMS for functional enactment of diverse departments (ex Table 4.2):*

<table>
<thead>
<tr>
<th>Unique OT, TT, and HC skills</th>
<th>Complementary effect (F→N)</th>
</tr>
</thead>
</table>

*TMS commonalities across departments for functional enactment (ex Table 4.2):*

<table>
<thead>
<tr>
<th>Policing skills</th>
<th>√</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of evolving situation</td>
<td>√</td>
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</tbody>
</table>

*TMS for networked enactment (ex Table 4.3):*

<table>
<thead>
<tr>
<th>TL briefing</th>
<th>√</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team briefings</td>
<td>√</td>
</tr>
<tr>
<td>Individual trust-levels</td>
<td>√</td>
</tr>
<tr>
<td>Individual position taking</td>
<td>√</td>
</tr>
<tr>
<td>TL goes operational</td>
<td>√</td>
</tr>
<tr>
<td>Sharing of observations (transactions)</td>
<td>√</td>
</tr>
<tr>
<td>HC attempt to contact OT</td>
<td>√</td>
</tr>
<tr>
<td>Shared debriefing</td>
<td>Learning effect (N→H)</td>
</tr>
</tbody>
</table>

**Table 4.4: Hybrid enactment: TMS analysis**
TMS for functional enactment of diverse departments. Specialized strategic tasks and expertise related to observation (i.e. subject, technological, and aerial observation) can potentially be combined in networked operations and, thus, have a direct, complementary effect: functional services can be compiled to create networked services. Legal mandates and regulations related to tasks are independent of the mode of enactment. Hence, these mandates have a moderating effect. Finally, the functional teams used different principles with respect to information sharing. This had a direct, conflicting effect on the networked operation. Expectations with respect to information sharing were not explicated and brought in line with one another before the operation commenced. The contributing functional teams did stick to their own principles. During the operation this resulted in ambiguity and decay of trust.

TMS commonalities across departments for functional enactment. These include the Police Law, principles of fighting serious and organized crime, delivering high-quality observation services, the safety principle, and the principle of learning through shared debriefings. These principles do not remain limited to functional enactment and hence, have a moderating effect. All organizational members know these principles, and know that other members know these principles. They thus serve as a common body of knowledge underpinning collaboration processes (cf. Cramton 2001).

TMS for networked enactment. First, the identification principle is related to the legal mandate to record conversations and, thus, applies to both functional and networked modes of enactment. During the networked operation it had two direct conditioning effects: at the tactical level it influenced the configuration of the network (inclusion of helicopter, and additional task for TT inner-ring), and at the operational level it inspired the OT to collect additional video evidence by parking one of its video equipped cars such that it offered an overview of the hotspot. Thus, by knowing what the network needed, the OT could boost its functional contribution. Second, the compromise principle applied only to the networked operation (global effect). And third, the principle of learning
through shared debriefings (i.e. involving multiple functional units) originated from the networked enactment. It had a direct effect on the knowledge base that the functional teams hold in common. In turn, this common knowledge has a moderating effect on future networked enactment.

**Tactical level agency and TMS**

TMS for functional enactment of diverse departments. The roles among the three teams showed little overlap and as such were complementary. The same holds for the routines of the teams and repertoires related to the environments in which they operate. For example, the HC complements the OT by providing aerial oversight. To provide this service they assume the role of observer. Routines are developed to handle specific aspects of tasks, such as static and dynamic operations, camera techniques (visual or infra-red), and transport modalities (plane or helicopter). In turn, sets of routines are combined in repertoires. The services the HC provides are complementing the capabilities of the OT, which is operating on the ground and has its own set of roles, routines, and repertoires.

TMS commonalities across departments for functional enactment. The constructs we found include the hierarchical structure, general police education, and C2000 communication infrastructure. These have a moderating effect: teams operating in both functional and networked modes benefit from these tactical level structures. Their common knowledge of these structures has a moderating effect in the sense of reducing communication needs and enriching the professional meaningfulness of collaboration processes (Rico et al. 2008).

TMS for networked enactment. The networked operation was initiated by the DSRT when it received a comprehensive assignment of the DNR to collect evidence. Seeking to combine capabilities of the OT, TT, and HC, the DSRT TT unit head initiated a networked operation. Most of the tactical structures that followed were global in effect; their relevance remained limited to Operation Frisau. For example, structuring the network (based on the experience of the unit heads in previous
collaborations) and the configuration the C2000 communication channels was idiosyncratic to this operation. Likewise, the proximity of airport and prevailing wind direction influenced the actual position of the HC in the network configuration. We found two tactical level constructs that influenced network enactment yet not uniquely related to either mode of enactment. These moderating constructs include the role of the team leader, and the instruction to all contributors to the operation to draft personal Police Reports. Finally, functional team debriefings after the networked operation remain limited to the team, and hence are global in effect.

**Operational level agency and TMS**

TMS for functional enactment of diverse departments. The operational skills of the various teams (OT, TT, and HC) cover diverse aspects of observation. Hence, they are complementary. Network operations rely on combinations of these operational capabilities that originate in the functional realm of the organization (Sirmon et al. 2007).

TMS commonalities across departments for functional enactment. In this category we found two constructs: common policing skills and knowledge of the evolving situation. Policing skills are applied in both modes of organizing. Hence, these skills have a moderating effect. Second, individual knowledge of the evolving situation in its physical context is of utmost importance for the meaningfulness of networked enactment (Whiteman and Cooper 2011), but is global in effect.

TMS for networked enactment. Team briefings are standard routines that are used for both modes of organizing. This construct thus moderates operational level agency. Enacting the routine at the operational level, however, implies a global effect: the briefing is geared at preparing for a specific networked operation. Trust influences the willingness to cooperate and share information (Mishra et al. 2010). Specifically, initial trust among network members is critical for performance (Rosen et al. 2007). Inter-team trust was a given at the beginning of the operation. It resulted from previous experiences, or perceptions of persons or (types of) teams, in previous collaborations.
Operational constructs associated with Operation Frisau and with a global effect included: position taking, the role shift of the TT team leader, the sharing of observations, and the attempt of the HC to contact the OT. Finally, due to the dramatic turning of events the networked operation a shared debriefing was organized. Shared debriefings have a direct effect on hybrid enactment, as lessons learned are used to inform future operations (in either mode of enactment).

4.7.2 Developing an Organizational TMS Model for Hybrid Enactment

We can now synthesize our results to construct a multilevel model for hybrid enactment (Figure 4.2). The model depicted in Figure 4.2 allows us to address our research objective by providing insight in the structure of TMS for hybrid enactment, its development, and in mechanisms for increasing organizational resilience. We distinguish four types of TMS involved in hybrid enactment, depicted as rectangles in Figure 4.2.

![Figure 4.2: Organizational TMS model of hybrid enactment](image)
First, functional units (including their heads and members) develop enduring TMS supporting their functional services. Depending on the requirements of each functional department, their TMS varies in terms of differentiation across strategic, tactical and operational levels. Departmental TMS are characterized by unique mandates, knowledge, routines, and repertoires underpinning functional enactment.

Second, based on common elements of functional and networked TMS, unit heads and members hold TMS elements in common. These include shared or overlapping legal frameworks and strategic intent, educational backgrounds and experience, and organizational and technical structures. We call this integrated TMS for hybrid enactment. The integrated TMS moderates functional and networked enactment as it provides the participating teams with a common basis for understanding (Wegner 1986).

Third, while each unit head is responsible for his specialized unit, he knows what the other unit heads could contribute and how these contributions can be activated (Kor and Mahoney 2004). This TMS thus consists of a group of unit heads enabling unit-crossing services and innovations (Kor and Mahoney 2004). It is differentiated since the unit heads bring in unique, non-overlapping expertise, while they depend on each other for delivering networked services. Hence, this TMS has a direct initiating effect on networked operations, in addition to a moderating effect on the relationship between functional and networked enactment.

And fourth, the organization develops a temporary TMS for networked enactment. It is initiated by the differentiated TMS for hybrid enactment (rectangle 3) and it is linked by direct effects originating from the TMS for functional enactment (rectangle 1). These include complementary and conflicting effects, originating at the strategic, tactical, or operational level of functional enactment. Differences between functional teams contribute to the potential of combinative capabilities during networked operations, but may also fuel conflicts if conflicting differences between contributing functional teams are not recognized and solved during network initiation. And finally, networked TMS contribute
to the integrated TMS for hybrid enactment (rectangle 2) through explicating lessons learned during shared debriefings (*cf.* Ron *et al.* 2006).

### 4.8 Contributions

The objective of this chapter was to analyze how organizations can organize for hybrid enactment. We framed organizations as collections of knowledge resources providing services (i.e. organizational agency) in a strategic, tactical, and operational sense. TMS play a role in the organization of resources (Wegner *et al.* 1991). Particularly, we assumed that organizations develop different TMS patterns to enable functional or networked enactment (*cf.* Gupta and Hollingshead 2010), and to transition between these modes. Conducting case study research at a national police organization, we were interested in how TMS patterns are interrelated, and how its resilience could be increased.

#### 4.8.1 TMS for hybrid enactment

Although Wegner stated that ‘the structuring of an organization is clearly an exercise in structuring transactive memory’ (Wegner 1986: 204), there are only two conceptual studies (Anand *et al.* 1998; Nevo and Wand 2005) and one empirical study (Jackson and Klobas 2008) exist at the organizational level (Ren and Argote 2011). These three studies depict organizational TMS as a patchwork of multiple group TMS. They illustrate that people may be member of multiple groups, and show how information systems can be used to share information with members outside their group. These three studies hold in common an aggregative perspective of organizational TMS. In contrast, we found that TMS for hybrid enactment consist of four different types of TMS with unique contributions (Figure 4.2). At the organization level, these four TMS are interrelated through direct and moderating effects.

First, specialized units have developed TMS for functional enactment, which in effect did not have bearing relevance to other units’ TMS, i.e. global effects (*cf.* Kozlowski and Klein 2000).

Second, heads of these specialized units regularly collaborate with each other to solve problems they cannot solve with their own units, thus
requiring networked enactment. Through experiences with networked enactment they develop a differentiated TMS, which plays a critical role in identifying partners for collaborative networked operations (*cf.* Jackson and Klobas 2008).

Third, following the initiative of functional unit heads, a networked operation is assembled for which a temporary TMS is being developed. We learned that multiple TMS for functional enactment are potentially not just complementary, but may be conflicting as well. Moreover, the need for harmonization of strategic principles at the organizational level may conflict with the functional orientation of the unit (Kogut and Zander 1992).

Finally, lessons learned during networked enactment can enrich the common knowledge base of the participating organizational units. Following Wegner (1986), we refer to this base as an integrated TMS for hybrid enactment, providing a basis for mutual understanding and minimizing the need for explicit coordination (*cf.* Cramton 2001).

### 4.8.2 Qualitative approach to multilevel theorizing

The aggregative perspective of organizational TMS falls short in properly explaining the composite structure of TMS at the organizational level, and how they emerge. We introduced the concept of agency (Emirbayer and Mische 1998) and explained how people (irrespective of hierarchical position) engage in three distinct levels of agency, i.e. strategic (creating or adjusting principles, norms, values), tactical (creating or adjusting supporting structures, routines, configuration of technology), and operational (execution of primary processes). Thus dissociating these levels of agency from the formal vertical division of work, we used the levels to structure our analysis of functional and networked enactment. This agency-based perspective to multilevel TMS provides insights that remain hidden when using an aggregative perspective by explaining how operational agency contributes to the emergence of tactical structures and strategic level principles, which in turn condition operational level agency.
4.8.3 Resilience, control and potentiality

In organizations capable of hybrid enactment, functional enactment represents their comfort zone with deeply engrained organizing architectures, control processes and expertise coordination (cf. Feldman and Pentland 2003; Faraj and Xiao 2006). Networked enactment, on the other hand, represents a 'zone of potentiality' in tactical-operational terms. It provides the organization with opportunities to deliver services exceeding functional teams’ capabilities (cf. Bosch et al. 1999). In this zone of potentiality the organization stretches its capabilities with the palpable risk of over-stretching and losing control (cf. Brown and Eisenhardt 1997). Combining unit services may change the strategic, tactical, and operational coherence of their stand-alone functional services since it disrupts established TMS patterns at and across these levels. For networked enactment, the TMS gains an ad hoc operational logic that gives new organizational meaning to unit services (cf. Maitlis and Lawrence 2007). This ad hoc logic is fragile as many studies on crisis response illustrate. Where these studies mainly focus on system breakdown (e.g. Weick 1993), our study considers networked operations as opportunities for creating new value through the combination of services of functional units. Moreover, our study indicates that dissonance within networked operations can be understood when analyzing TMS developed for networked enactment in relation to the TMS for functional and hybrid enactment (Figure 4.2). While the pool of functional capabilities provides opportunities to respond in exceptional situations, we showed how organizations may strengthen their TMS in support of hybrid enactment. In particular, our study sheds light on enablers of swift networked response, and switching between modalities (functional or networked) and network configurations (combinations made).

4.9 Implications for Research

4.9.1 Combinative capabilities

The KBT starts with the notion of Grant that 'if the strategically most important resource of the firm is knowledge ... then the essence of
organizational capability is the integration of individuals’ specialized knowledge' (Grant 1996: 375). Subsequent research (e.g. Bosch et al. 1999; Wang and Peng 2008) has emphasized internal organizational structures and processes that enable organizations to develop new capabilities for increasing competitive advantage. Heeding calls for building micro foundations of the capability perspective (Foss 2011), our research extends the literature on combinative capabilities. This may inspire further research in this area.

First, where literature on combinative capabilities emphasizes the adaptation of organizations to changing markets (e.g. Barney et al. 2001), we studied combinative capabilities as a special mode of networked enactment that complements an organization’s default functional mode of operating. As such, hybrid enactment enables an organization to develop highly specialized services and to combine these services into temporary configurations for delivering value beyond functional enactment.

Second, contemporary KBT research emphasizes the positive aspects of making new combinations, as heterogeneously specialized resources would add value through innovation (Busquets 2010). We nuance this view. Taking a multilevel TMS perspective brings to light complementary as well as conflicting knowledge patterns. Further research could examine how organizations committed to hybrid enactment identify and manage these contradictions in a sustainable manner (cf. Smith and Lewis 2011).

Third, from the perspective of our study, current literature on combinative capabilities is predominantly focused on organizational structures. For example, scholars study combinative capabilities in terms of platforms (Ciborra 1996), modularization of organizations (Sanchez and Mahoney 1996), and the configuration of networks and components (Busquets 2010). Our study encourages researchers to describe the emergence of these structures in terms of strategic, tactical, and operational levels of agency.

And finally, we have limited ourselves deliberately to intra-organizational hybrid enactment. Further research could examine hybrid enactment in inter-organizational relationships (e.g. alliances) and
networks (Kleindorfer and Wind 2009; Provan and Kenis 2008). Moreover, while inter-organizational cooperation is often framed in terms of mechanisms and phases, the TMS perspective highlights sharing of knowledge and resources. This appears relevant for creating value across organizational boundaries. Such value creation is characterized by scale, innovation and the politics of dealing with organization-specific interests (cf. Child and Rodrigues 2011). The types of TMS we distinguished in organizational TMS could transcend organizational boundaries. For instance, potential partners in crisis response could organize reconnaissance meetings for developing a differentiated TMS that supports hybrid enactment. Further research could examine how strategic and tactical level TMS constructs of potential partners interrelate, and which approaches could be developed to deal with potential conflicting differences and constraints.

4.9.2 Organizational TMS and learning

First, contemporary TMS research predominantly focuses on operational level agency and emphasizes TMS as systems that may vary in terms of convergence (Brandon and Hollingshead 2004). The compound and multi-level structure of TMS for hybrid enactment suggests that new methods are needed to measure its stage of development and the degree of complementarity and conflict between functional units’ TMS, and incorporate all three levels agency.

Second, in addition to current literature, which depicts TMS as emergent (Kozlowski and Klein 2000), we observed that knowledge patterns may be very dynamic, especially when the team is engaged in a particular task. Analyzing knowledge patterns of functional teams in terms of TMS differentiation and TEP-state (stable or dynamic) reveals that differentiation and state may differ for each level of agency. Future research may explore whether counter-balancing relationships occur across the levels.

Third, in addition to TEP-combinations, the environment in which organizational resources act represents an important additional parameter influencing the configuration of (temporary) combinations. This applies in
particular to networked operations which tend to be more complex than functional enactment. As shown in Operation Frisau, the environment conditioned the forming of TEP-combinations, requiring the network members to engage in ecological sense making (Whiteman and Cooper 2011).

Finally, Wegner et al. (1991) identify three progressively sophisticated learning methods through which distributed expertise becomes known: stereotyping, self-disclosure, and experience. One question that this study raises is whether these learning methods are necessarily sequential. Where in enduring functional teams this may be the case, because members move through for instance regular training programs, in operations such as Frisau, teams worked together based on role-perceptions. More research is needed to better understand how TMS for networked enactment can be strengthened in relation to functional enactment. This could support the allocation of organizations’ knowledge investments.

4.9.3 The psychology of hybrid enactment: stress and trust

With hybrid enactment central to our analysis, our results pointed at the interrelatedness of organizational phenomenon like principles and structures, and human agency. Stress and trust were not included in our initial model (cf. Lin et al. 2008), yet, as has been found in other studies, they had an important moderating effect on Operation Frisau (e.g. Ellis 2006; Ellis and Pearsall 2011; Pearsall et al. 2009; Rau 2005).

First, where Ellis (2006) found that stress reduces TMS related communication, we found that stress impacted the level of agency and reduced the network horizon (van Liere 2007) of its members (defined as awareness and perception of who is part of the team). It is well known that people under stress tend to redraw to their comfort zone, i.e. fall back on older learned routines (Staw et al. 1981). Likewise, after the shooting the TT team leader became operationally involved, disregarding the tactical level services he was providing for the network. As one of the functional unit heads explained, this is very common:
In stressful situations strategic leaders tend to interfere with tactical level leaders, while tactical leaders tend to interfere with the operational level. In general everyone tends to regress one level (Functional Unit Head OT).

Besides this level of agency descending effect, we noticed a narrowing network horizon effect. The moment the TT team leader reestablished his tactical role his horizon had reduced from the entire network to TT-members at the crime scene (his functional team), and from the entire operation to securing the crime scene and handing it over to the local police authorities. The consequence for the network TMS was that it ceased to exist (Figure 4.3, rectangle 4). As the network broke up, the three teams retreated to their functional mode. Future research may explore how team leaders can recognize narrowing network-horizon and descending level of agency (i.e. from tactical to operational), and how unit heads may dynamically alter or add strategic principles, or tactical level structures to increase resilience.

Second, trust has been studied within the context of TMS development in the form of cognitive-based trust and task credibility (Kanawattanachai and Yoo 2007; Moreland and Myaskovsky 2000; Rau 2005). In our study we found that although trust in each others’ capabilities was high, during Operation Frisau trust in each others’ willingness to collaborate was negatively affected. The latter category of trust sheds light on TMS validity, which is defined as the degree to which group members actually make use of each other during problem solving (Brandon and Hollingshead 2004). Because members originating from different functional teams maintained different values with respect to information sharing, trust among the members diminished. This affected the development of the temporary networked TMS and the integrated TMS for hybrid enactment. Lack of trust hinders open communication, asking questions, and explicitly verifying facts (Jarvenpaa and Leidner 1999). The DSRT unit head exercised strategic level agency to restore trust, enforcing the principle of shared briefings). The latter act could extend current work on semi-structures at the tactical and operational
level. Semi-structures are defined as ‘simple or minimalist rules that help members of a group organize their knowledge integration processes, yet remain flexible enough to adapt to an evolving situation’ (Jarvenpaa and Majchrzak 2008: 262). Examples include dialogic practices (conversation rules), clarity of knowledge ownership (ensuring the right and responsibility to act on that knowledge), and knowledge dissemination protocols (what to share). In relation to strategic level principles, these semi-structures at the tactical level may contribute to more transparent decisions making that sustains trust among the teams.

4.10 Implications for Practice

4.10.1 Developing TMS for hybrid enactment

TMS for hybrid enactment constitutes multiple group TMS. Each may have its own structure (more integrated or differentiated) and may differ in terms of convergence (cf. Brandon and Hollingshead 2004). Moreover, principles, organizational structures and processes), and personal knowledge and interactions that emerge in the various TMS may differ to suite the requirements of the respective tasks and task contexts (environment). From the perspective that specialist services are at the core of the organization and networked services form their derivative, these differences have to be managed. First, among functional teams these differences signify more specialization. Second, for additional value adding through networked operations these differences have to be bridged. Interventions aimed at developing TMS for hybrid enactment have to respect both values. Based on the model presented in Figure 4.2 this may be achieved by 1) intervening in differentiated TMS for hybrid enactment, e.g. through strengthening meta-knowledge of other functional units, 2) intervening in the integrated TMS for hybrid enactment, e.g. through developing shared principles, structures, or skills, 3) establishing mechanisms to ensure feedback of lessons learned during networked enactment to further strengthen the integrated TMS for hybrid enactment, and 4) by increasing awareness of potential conflicting direct effects, and developing strategic level principles, tactical level methods or semi-
structures (cf. Jarvenpaa and Majchrzak 2008), or operational level personal skills to deal with them.

4.10.2 Cross-unit cooperation and preparation

In the evaluation report, practitioners advice to organize frequent shared training sessions, and to approach preparations more systematically, i.e. to use check-lists, standard formats and schemas to help configuring the network, and shared (where possible face-to-face) briefings. To start with the first, training is known to help to increase team performance through developing a shared TMS (Liang et al. 1995; Moreland et al. 1996). This is due to the fact that members of groups with highly developed TMS declare domains of knowledge in earlier periods of interaction then groups with less developed TMS, while the frequency with which members evaluate other’s expertise and competence increases over time (Ren and Argote 2011; Rulke and Rau 2000). With regard to more systematic preparations, these are aimed at strengthening strategic and tactical level structures, while shared face to face briefings are known to strengthen TMS (Lewis 2004).

Making the recommendation more specific, we recommend to develop more integrated TMS (increasing redundancy), develop meta-routines (cf. Zollo and Winter 2002) to assemble multiple functional teams for networked operations, invest in interdepartmental trust, and develop semi-structures for knowledge sharing. The latter is of utmost importance to stimulate explicit communication, required to remain in control (Argote 1982; Larson and Schaumman 1993). Finally, we recommend to cross-check for potential vertical (among levels of agency) and horizontal (among teams) dissonance, make direct conflicting effects explicit, and make known to all participating members how these conflicts are solved for the duration of the networked operation.

4.10.3 Enablers and leadership

Like was the case in Operation Frisau, during some tasks absolute concentration and silence is required, while for other tasks events in the rest of the network may have to be monitored as well. Temporary
networked operations by default are used to conduct less predictable tasks. In such setting explicit communication is of utmost importance for shared sense making (Van De Ven et al. 1976; Kraut 1987). This need is aggravated by the fact that TMS for networked enactment is temporary too, which increases its reliance on explicit communication (cf. Littlepage et al. 2008). We therefore recommend to work -by default- on one channel and redraw to multiple channels only when and for as long as needed. In that case, at least one alternative connection should be maintained to prevent the creation of a (potentially vulnerable) exclusive link.

While enabling strategic and tactical constructs may be negotiated by the functional unit-heads, and briefed to team members just before the actual operation, during the hot action phase new strategic and tactical constructs may be needed (e.g. new strategic objective: pursuit shooter) and old ones may become redundant (e.g. compromise-principle). These changes require the team leaders to maintain oversight at all times. As some of the interviewees contested, however, 'team leaders are first and foremost police officers … action driven … and hate to stand by doing nothing'. Thus, the urge to jump into action (provide operational level services) may interfere with the task of providing tactical level services. Three types of measures could be used to make tactical level services more robust. First, organize redundancy. In Operation Frisau the team-leader functioned as an exclusive link between the participating teams, rendering the network susceptible for team collapse due to link failure. Second, make team-leaders aware of level of agency transcendence. And third, review whether team-leaders can participate virtually. Leading the team from a distance frees them of local stressors (Larsson 1989), forces them to remain overview, and prevents them from being drawn into action, thus providing a context in which full concentration can be paid to the networked operation. Moreover, such central position (e.g. in a command and coordination center) enables swift scaling of operations.

4.11 Conclusion

We formulated hybrid enactment as the capability of distributed functionally specialized units to engage in networked operations. Being
able to assemble networked operations increases the potential value of an organization's resources, as through the creation of new combinations the organization can engage in services that none of its functional units can deliver on its own (cf. Zammuto et al. 2007). We studied hybrid enactment empirically at a policing organization. To this end we developed a theoretic lens. Through this lens we analyze the organization as a collection of distributed (knowledgeable) resources that become organized through the development of a multilevel TMS. Contrary to social science practices, which usually use an aggregative perspective to multilevel theory, we adopted a multilevel agency perspective.

We found that TMS in combination with multiple levels of agency provides a micro-foundation for KBT, as it provides insight in how capabilities are being developed (Foss 2011). We found that, next to multiple TMS for functional enactment and temporary TMS for networked enactment, integrated TMS and differentiated TMS for hybrid enactment are being developed. Relations among these TMS are characterized by moderating and direct effects, which, if managed well, may constitute an organizational learning cycle. These moderating and direct effects provide pointers for interventions aimed at strengthening hybrid enactment, which increases operational resilience. Moreover, we found that environmental factors, as well as psychological factors (trust and stress) play an important conditioning role on TMS and team performance.