Understanding Knowledge Coordination Dynamics in Traditional and Fast-Response IT Organizations

Completed Research Paper

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Abstract

This research takes a dynamic view on the knowledge coordination process, aiming to explain how the process is affected by changes in the operating environment, from normal situations to emergencies in traditional and fast-response organizations, and why these changes occur. We first conceptualize the knowledge coordination process by distinguishing between four dimensions – what, when, how and who – that together capture the full scope of the knowledge coordination process. We use these dimensions to analyze knowledge coordination practices and the activities constituting these practices, in the IT functions of traditional and fast-response (military) organizations where we distinguish between “normal” and “emergency” operating conditions. Our findings indicate that (i) inter-relationships between knowledge coordination practices change under different operating conditions, and (ii) the patterns of change are different in traditional and fast-response organizations.

Keywords: knowledge coordination; traditional organization, fast-response organization; practices; emergency

Introduction

Knowledge coordination has been recognized as an important stream of Coordination Theory that focuses on “knowledge” as one of the objects of coordinative action (Okhuysen and Bechky 2009). Scholars have highlighted challenges associated with the coordination of specialized knowledge that is distributed between individuals in co-located or virtual teams (e.g., Faraj and Sproull 2000; Kanawattanachai and Yoo 2007, respectively), with particular attention given to non-traditional organizations that are fluid, emergent and ambiguous (Callon 1998; Faraj and Xiao 2006; Kellogg et al. 2006). The complexity involved in knowledge work has steered theories associated with knowledge coordination away from the
traditional coordination theory that focuses on modes of coordination and task interdependencies (Okhuysen and Bechky 2009). A prime example is provided by Faraj and Xiao (2006) who re-framed the concept of coordination to accommodate the nature of knowledge-intensive work. They argued that “for environments where knowledge work is interdisciplinary and highly contextualized, the relevant lens is one of practice. Practices emerge from an ongoing stream of activities and are enacted through contextualized actions of individuals (Orlikowski 2000)” (Faraj and Xiao 2006:1157).

Scholars have studied knowledge coordination by adopting a practice-based perspective, to enhance the understanding of how complex and highly interdependent work can effectively be coordinated in different knowledge-intensive organizational settings. This emergent work on knowledge coordination has focused on studying practices that enable organizational members to overcome specific boundaries associated with the unique organizational setting they are part of. Examples include various post-bureaucratic organizations such as cross-functional collaborations (Kellogg et al. 2006); globally distributed teams (Kotlarsky et al. 2014; Leonardi and Bailey 2008; Orlikowski 2002); online communities (Faraj et al. 2011); new product development teams (Carlile 2002; Carlile 2004); ego-centered networks of professionals protecting national security (Jarvenpaa and Majchrzak 2008); emergency response teams (Faraj and Xiao 2006); and emergent groups responding to disasters (Majchrzak et al. 2007).

While these studies are influential in setting the scene for further theory development on knowledge coordination, they provide a static view on knowledge coordination practices associated with specific types of organizations. In reality, however, organizations operate under different circumstances as they dynamically respond to changes in their political, economic, business, cultural, and social environments. Any organization, whether it is a traditional organization (e.g., a chain of retail shops) or a fast-response organization (e.g., an Accidents and Emergency (A&E) unit in a hospital, a fire brigade, or a police department), faces times of more pressure (e.g., pre-Christmas periods for shops, or weekends for A&E units), which have implications for the way an organization operates in order to deal with the pressure and/or emergency. Therefore, it is naïve to assume that the enactment of knowledge coordination practices will remain the same under different operating conditions. We, therefore, build on previous work that studied knowledge coordination practices in different organizational settings by focusing on how knowledge coordination practices change under different organizational circumstances.

In addressing our overarching theoretical concerns, we develop the following research question to guide our empirical study: *How is the process of knowledge coordination affected by changes in the operating environment – from normal situations to emergencies – in traditional and fast-response organizations?*

To address this question we first conceptualize the knowledge coordination process by distinguishing between four dimensions – what, when, how, and who – that together capture the full scope of the knowledge coordination process. This conceptualization of knowledge coordination reflects a broader definition of coordination by Faraj and Xiao (2006:1157) as “a temporally unfolding and contextualized process of input regulation and interaction articulation to realize a collective performance” where “input” comes in the form of knowledge, as an object of coordinative action (Okhuysen et al. 2009). We use these dimensions to analyze knowledge coordination practices in the Information Technology (IT) functions of traditional and fast-response (more specifically, military) organizations where we distinguish between “normal” and “emergency” operating conditions. By adopting the practice lens we view the ongoing knowledge coordination process as taking place through a repertoire of knowledge coordination practices. Each practice is associated with a range of activities comprising the practice. This approach is consistent with past studies (Faraj and Xiao 2006; Kellogg et al. 2006; Leonardi and Bailey 2008; Orlikowski 2002).

The main contribution from this study is that it provides a dynamic perspective on knowledge coordination, and shows that a change from normal to emergency conditions has different effects for traditional versus fast-response organizations: in a traditional organization, emergencies create a tendency towards more improvised and informal knowledge coordination practices, whereas in a fast-

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1 Faraj and Xiao (2006) define a “fast-response organization” as an organization that operates under conditions of high uncertainty “where decisions must be made rapidly and where errors can be fatal” (p. 1155).
response organization the knowledge coordination practices become even more structured and formalized under emergency conditions.

**Theoretical Background: Knowledge Coordination under Different Conditions**

Traditional coordination theory usually focuses on one (dominant) dimension of coordination: the *how* (i.e., mode) of coordination. However, as Faraj and Xiao (2006) stressed, where knowledge-intensive work is concerned and the focus shifts to “knowledge” as the object of coordination, the *what* (content) and *when* (circumstances) of knowledge coordination become increasingly important. In particular, when dealing with specialized knowledge that is localized, situated, and embedded in practice, individuals from different organizational functions face difficulties associated with certain boundaries between different domains of knowledge (Carlile 2002). Different terminology, meaning, perspectives, and interests impede knowledge coordination, creating a need to clarify and agree on *what* knowledge is being coordinated. Furthermore, different knowledge boundaries create obstacles for communication between organizational members (Carlile 2004) which hinder knowledge coordination. However, there is no “one size fits all” approach to dealing with knowledge boundaries. Different boundaries require different approaches and specific techniques to transfer, translate, or transform knowledge across boundaries (Carlile 2004). Therefore, it is important to distinguish between circumstances associated with a specific knowledge boundary in order to decide on the appropriate approach to coordinate knowledge across (a combination of) boundaries. Last but not least, identifying *who* (specific individual) is the right person to coordinate specific knowledge with is revealed as an important dimension of knowledge coordination, in particular in situations when tacit and personalized expertise is required (Kotlarsky et al. 2014; Majchrzak et al. 2007). Bringing these four dimensions together, the *how*, *what*, *when*, and *who* dimension of knowledge coordination, and integrating them into one dynamic practice-based perspective extends and complements current research on knowledge coordination.

**Knowledge Coordination Practices in Traditional and Fast-Response Organizations**

The type of organization (characterized by conditions under which an organization operates) has implications for the *how*, *what*, *when*, and *who* of the knowledge coordination process. In particular, Faraj and Xiao (2006) argued that traditional coordination theory has limited applicability for organizations that operate in a high-velocity environment, such as a fast-response organization. They claimed that “the dilemma of coordination in such settings is that, on the one hand, there is a need for tight structuring, formal coordination, and hierarchical decision making to ensure a clear division of responsibilities, prompt decision processes, and timely action; but, on the other hand, because of the need for rapid action and the uncertain environment, there is a competing need to rely on flexible structures, on-the-spot decision making, and informal coordination modes” (p. 1557). Faraj and Xiao (2006) defined a “fast-response organization” as an organization that operates under conditions of high uncertainty “where decisions must be made rapidly and where errors can be fatal” (p. 1155). It is more dynamic, able to improvise and has a higher ability to adapt to uncertain environments. A traditional organization, also known as a hierarchy or top-down structure, focuses on vertical structuring that is strictly defined by a chain of command. It is more bound by rule-based work processes and centralized decision making in a stable environment (Kellogg et al. 2006) than a fast-response organization. Even though a fast-response organization can also possess bureaucratic features, like a command and control structure, the way they operate under emergency conditions can differ as the impact of the emergency (error can be fatal) differs. Clearly, focusing on the coordination mode (the *how* question) alone does not help in an attempt to explain this phenomenon.

Faraj and Xiao (2006) emphasized that focusing on the *what* and *when* aspects of coordination helps us understand how individuals coordinate knowledge in fast-response organizations. Knowledge coordination, however, is a process that largely relies on people being aware of where certain knowledge and knowledge needs reside – in other words, on their knowing *who* has (a) particular expertise, and *who* needs to be informed about what (Jarvenpaa and Majchrzak 2008; Kotlarsky et al. 2014; Majchrzak et al. 2007). Therefore, we posit that to be able to develop a holistic perspective of the knowledge coordination process we need to add the *who* dimension to the *how*, the *what*, and the *when* dimensions of knowledge.
coordination suggested in the work of Faraj and Xiao (2006). In line with this conceptualization of the knowledge coordination process as addressing the what, how, when, and who dimensions, our first aim in this study is to identify the practices that both traditional and fast-response organizations enact in their coordination of the how, what, when, and who of knowledge, and how these practices might differ between these kinds of organizations. Therefore, we specify our overarching research question in the following two research questions:

**RQ1:** What practices can be distinguished in terms of the “how”, “what”, “when”, and “who” dimensions of knowledge coordination?

**RQ2:** How do these practices differ between traditional and fast-response organizations?

**Knowledge Coordination Practices under Normal and Emergency Operating Conditions**

Although the distinction between traditional and fast-response organizations is very relevant in terms of knowledge coordination, we feel a more fine-grained distinction is called for. After all, the conditions that Faraj and Xiao (2006) identified for fast-response organizations (high uncertainty, fast decision making, mistakes can be catastrophic) are also valid for emergency situations in traditional organizations. A bank, for instance, can also be confronted with an emergency (the collapse of the financial market, or the electronic banking system being hacked) in which fast-response and error-free activities are crucial for the organization’s survival or the integrity of customer data. Conversely, a fast-response organization is not always in emergency mode: even fire fighters, Emergency Room physicians and military personnel have routine processes and procedures guiding the non-emergency part of their day-to-day work. Therefore, additional to the distinction between fast-response and traditional organizations, we make a distinction between normal and emergency operating conditions within these organizations, as these conditions are likely to put different demands on knowledge coordination. Exactly how these demands change, however, is unclear. Jarvenpaa and Majchrzak (2008), for instance, found that professionals tend to prefer their own personal networks over formal organizational structures for the rapid ad-hoc knowledge collaboration required by emergencies. Similarly, Majchrzak et al. (2007) discussed how emergency situations lead to a shift from formal mechanisms and shared mental models towards action-based coordination through dialogic practices. As noted above, however, Faraj and Xiao (2006) stated that emergencies create a coordination dilemma, requiring tight structuring, formal coordination, and hierarchical decision making, as well as flexible structures, on-the-spot decision making, and informal coordination. Thus, it is especially interesting to analyze how knowledge coordination changes when an emergency happens – i.e., when an organization (either traditional or fast-response) moves from a normal operational condition to an emergency. This leads to our third research question:

**RQ3:** How do knowledge coordination practices change when operating conditions change from normal to emergency?

Although both traditional and fast-response organizations experience normal as well as emergency operating conditions, they are likely to deal quite differently with an emergency situation. Obviously, emergencies are much more common for fast-response organizations than for traditional organizations, as they are confronted with unpredictable environmental demands on a much more frequent basis. Even for these organizations, though, we expect to see differences in knowledge coordination practices when operating conditions change into a more urgent emergency. Faraj and Xiao (2006), for instance, discussed how the trauma center they studied relies on expertise coordination practices when things follow the habitual trajectory (which would still mean a high need for fast-response and error-free actions), but when a deviation from the trajectory takes place (e.g., a patient does not respond to treatment as planned), dialogic coordination practices become prominent. Though Faraj and Xiao (2006) did not distinguish explicitly between different degrees of urgency (when what knowledge needs to be coordinated) in situations they observed (i.e., “normal” and “emergency” conditions according to the terminology we use in this paper), their empirical findings showed that structured coordination that relies on a range of pre-defined formal mechanisms (Okhuysen et al. 2009) co-exists with more improvised ways of coordinating knowledge (e.g., Kanawattanachai and Yoo 2007; Kotlarsky et al. 2014; Majchrzak et al. 2007) in fast-response organizations.
Understanding Knowledge Coordination Dynamics in IT Organizations

Turning to traditional organizations: they often have bureaucratic structures and processes that lack the flexibility to formally respond to sudden crises, which necessitates them to turn to alternative forms of organization and coordination when an emergency does arise (Bigley and Roberts 2001). Therefore, although both fast-response and traditional organizations are likely to change the execution of knowledge coordination practices in response to an emergency situation, the exact nature of these changes in both types of organizations is unclear. This leads to our fourth research question:

**RQ4: How do the changes in knowledge coordination practices from normal to emergency situations differ between traditional and fast-response organizations?** In the next section we explain how we designed our empirical research to address the four research questions outlined above, and the methods we used to collect and analyze the data.

**Research Design and Methods**

**Research Design**

We adopted a case study approach, which advances understanding of a particular phenomenon by investigating it in its real-life context (Eisenhardt 1989; Lee and Baskerville 2003; Yin 2003). This approach has been traditionally used to study knowledge-related issues in organizational settings (e.g., Faraj and Xiao 2006; Majchrzak et al. 2012; Kotlarsky et al. 2014). We designed our empirical investigation to allow us to study in depth (1) how knowledge coordination practices change between normal and emergency operating conditions, and (2) how findings compare between traditional and fast-response organizations. In particular, we have studied two separate IT divisions that fit the characteristics of traditional and fast-response organizations and in each of these two divisions we established what constitutes normal and emergency operating conditions (as we elaborate below). Therefore, in terms of analysis, we treated one organization under a specific operating condition as a “case study”, which implies we had four individual case studies which we compared. First, we focused on within-case analysis to address RQ1 and second, conducted cross-case analysis to address RQ2, RQ3 and RQ4.

**Empirical Setting**

The study site, Sigma (a pseudonym – as are all names used in this paper), is a large European Governmental IT Service Organization, part of the Ministry of Defence (MoD) of a European country. Sigma has approximately 1,900 employees who maintain over 70,000 workstations across the globe, the underlying IT infrastructure and hundreds of software applications. The organization also delivers additional (IT-related) services such as conducting analyses, giving advice, delivering hard- and software solutions and developing specific applications. Sigma is the internal Information Technology provider of the MoD, but also delivers services to other Ministries.

Sigma is divided into two separate organizations, one responsible for all IT products and services in the civil (non-operational/bureaucratic) domain – Civit, and one responsible for all IT products and services in the operational domain – Milit. Due to the nature of the work context of Milit, concerning the IT provision for military operations and missions, we can classify this organization as a **fast-response organization** (Faraj and Xiao 2006). Milit often deals with time-critical and complex situations where there is no room for mistakes as for example, a lack of connection in the operational field may actually cost lives. Civit, on the other hand, is a traditional (hierarchical) organization. However, employees at Civit also periodically deal with emergency situations where connections fail and consequences can be disastrous, though (usually) not life threatening. Both organizations are physically located throughout the country in diverse military bases and across the globe in former colonies of the European country. Table 1 summarizes key characteristics of the two organizations and highlights differences between them, including different interpretations of “emergency” operating conditions.

<table>
<thead>
<tr>
<th>Civilian IT Division: Civit</th>
<th>Military IT Division: Milit</th>
</tr>
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<tbody>
<tr>
<td>Type of organization</td>
<td>Traditional</td>
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<td></td>
<td>Fast-response</td>
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### Data Collection

As we intended to compare knowledge coordination during normal and emergency situations, in the first few meetings with top managers when we discussed the scope and other arrangements for data collection (where two authors participated), we established a clear understanding between “normal” and “emergency” operating conditions, as perceived by each organization. Later, we asked interviewees for additional clarifications and specific examples of situations when they faced conditions of emergency.

Data was collected over a 14-month time period between March 2011 and May 2012. We conducted 33 in-depth semi-structured interviews with employees from all hierarchical layers of the organization and in different functional roles. Interviews lasted between 45 to 120 minutes, focusing on understanding the various activities and situations in which interviewees were involved in their daily work in order to effectively share and coordinate knowledge. Most of the interviews were taped and transcribed verbatim. The first author also spent time talking to employees informally, joining them for lunches during her visits to different military bases. She also participated in several management team meetings as an observer. In addition to the interviews and observations, we also gained insight into the formal meeting structure at both organizations and examined documents describing projects (e.g., project initiation documents, “PID”), work instructions (extended documents containing examples for several functional roles) and process guidelines. These documents provided important contextual information about the organization and were used for triangulation.

During the interviews we discussed normal and emergency conditions separately. Interview questions aimed to capture the who, how, what, and when dimensions of knowledge coordination, starting by asking the interviewee to whom they turn when (s)he needs specific knowledge or advice, and with whom (s)he shares knowledge. We asked about reasons and considerations that influence the choice of a specific individual over other colleagues as a source of knowledge. When we established an immediate knowledge coordination circle of an interviewee, we expanded our questions to explore what (context) knowledge, when (under which circumstances or situations) and how (actions or mechanisms) is coordinated within their circle.

### Data Analysis

Interviews were transcribed and coded using NVivo software for qualitative data analysis. Data analysis followed several steps. Through sorting and refining themes emerging from the data, we applied axial coding for the emerging topics (Miles and Huberman 1994). Based on successive reviews of interview transcripts, documents, notes, and summaries of observations, we started grouping codes into themes. Two authors engaged in several rounds of intensive discussions that lasted over several months during which they re-examined emerging topics, referred back to codes and re-analyzed the data. Through this iterative process, we identified knowledge coordination activities (different sets of activities associated with Civit and Milit). These activities were grouped into themes that distinguish between four types of knowledge coordination practices: prioritizing tasks, following procedures, using roles and responsibilities, and utilizing networks. These four themes were evident in both normal and emergency situations.
operating conditions; however, they relied on different sets of activities under different operating conditions.

In line with our research design, we conducted cross-case analysis to compare knowledge coordination practices and the activities they comprised of between different organizations, and different operating conditions. We report our findings in the following sections.

Findings and Analysis

Background to Normal and Emergency Situations in Civit and Milit

Both organizations dealt with emergency situations, but the impact of these was different on both the organization and its employees. In Civit when something disrupts its normal operating conditions (i.e., all or a large part of the organization is not able to function), the organization is considered to face an emergency which needs to be resolved so that normal operations can be restored. In Milit, however, “emergencies” are urgent tasks (typically associated with military missions) that need to be accomplished in an effective and efficient manner. Such tasks are of immediate priority for Milit. Although what exactly constitutes an “emergency” in both organizations may be different, for both organizations it means a deviation from “business as usual”.

A Repertoire of Knowledge Coordination Practices

Through the data analysis, we have identified four knowledge coordination practices. The first practice, prioritizing tasks, aims to establish what knowledge will be coordinated and when this coordination is to take place, which is decided based on an assessment of the relative importance of the knowledge-intensive tasks associated with on-going projects. The second practice, following procedures, concerns a range of activities that offer formal approaches to establishing what knowledge should be coordinated in which manner (i.e., how). The third practice, using roles and responsibilities, concerns knowledge coordination activities that establish who should be responsible for coordinating what (i.e., specific) knowledge or who is likely to be an expert in what based on matching someone’s role or area of responsibility with expertise that fulfilling this role/responsibility would require. The fourth practice, utilizing networks, focuses on formal and informal links between individuals to determine who could coordinate what knowledge in which manner/through which channels (i.e., how), in particular when quick access to relevant knowledge is required.

While all four practices address the what dimension of knowledge which is concerned with the specific knowledge domain or task-specific context, each practice is unique in addressing a combination of dimensions that together support the knowledge coordination process as it unfolds over time (what and when; what and how; what and who; what, how and who).

The higher-level knowledge coordination practices, being structured or improvised, are relevant to both organizations under both operating conditions. However, activities that constitute these practices do differ between the two organizations and operating conditions. In the following four sections we analyze each knowledge coordination practice, focusing on activities through which these practices are enacted in both organizations, and how they differ under different operating conditions. Tables 3 and 4, included at the end of this section, summarize activities comprising the four knowledge coordination practices in Civit and Milit under different operating conditions.

Practice 1: Prioritizing Tasks (The What and When Dimensions)

Under normal conditions, Civit’s main priority is maintaining 70,000 workstations and a multitude of IT systems. Incoming IT-related requests from clients (clients can be internal within Civit, external within the MoD, or external organizations) can be standard (e.g., setting up a new workstation for a new employee), non-standard (e.g., a request for a new custom-made application), or a project (e.g., a set of computers and infrastructure need to be delivered to the Ministry of Internal Affairs for a special occasion). For standard and non-standard projects, there are set rules and regulations regarding the time to deliver the requested need based upon the impact of the problem for the user of the system. Project delivery times are negotiated with some clients, and products and services delivery times for other clients
are covered in service level agreements (SLAs). Priorities are discussed during formal work meetings and tasks are carried out according to the set times. The agreed priorities define when particular knowledge (what) is required to accomplish a specific task.

When an incident or calamity happens in Civit, however, this triggers the need to urgently respond to avoid further disaster. Therefore, tasks associated with resolving the emergency situation become the first priority. For example, when a whole system shuts down and thousands of employees are without a network connection, priorities on standard and non-standard requests and projects are put aside and the situation at hand will be dealt with “right now”. In such situations, knowledge about the what (the calamity) defines the emergency situation, i.e., when (right now). What sometimes happens within Civit is that, due to time pressure and busy schedules, during formal meetings some priorities are misaligned with reality or overlooked. As one of the Product Managers at Civit noted:

No one sets priorities, everybody keeps shouting, emailing, and calling and, in the end, no decisions are taken. Some tasks are ignored under pressure, like extensive maintenance of systems.

As a result, certain tasks remain “on the shelf” until they become the source of an incident. Then they receive a red flag, become a calamity, and suddenly rise to the top of the to-do list of the organization.

In Milit, under normal conditions, the work is structured and priorities are negotiated in a similar manner as in Civit. In particular, Milit employees often deal with similar requests as their Civit colleagues; but work within Milit usually concerns military-operation IT systems and clients who work in military active missions or training areas. The way Milit employees deal with incoming requests is somewhat different from Civit, as becomes evident from the list of activities included in Table 4. For example, Milit has so-called morning prayers at several locations, where every morning at 7:45 AM, tasks and projects are discussed and priorities are set for both the short and long(erm) term.

Under emergency circumstances, tasks must be carried out immediately, putting ongoing tasks and projects on hold. Prioritizing in Milit is driven by the importance or severity of a situation associated with a specific client. Milit internally refers to this as a “client-based perspective”. For example, a router that is malfunctioning leaving one agent in a military activity zone without a connection may be much more important than a malfunctioning router that serves 50 individuals in a safe location. As Head of Operations Room at Milit explained:

You should not assess the situation based on whether this is one workstation that does not work, or here we have 20 workstations that do not work. No, you should keep the client perspective in mind and assess the importance of the situation and when that single workstation is more important than those other 20, then those 20 will just have to wait a little while. If you look at it from an IT network perspective, and you have never been on a mission and don't know the backgrounds, you only see 20 people without a connection and you think that needs to be solved first.

Unlike Civit, where prioritization in emergency situations becomes an issue, in Milit the highest in rank decides what to do, and instructs the others down the pyramid accordingly. However, decision makers do listen to the experts when it comes to dealing with certain situations; so, where possible, consultation and verification takes place with the expert on the topic

Practice 2: Following Procedures (The What and How Dimensions)

Procedures are important when it comes to coordinating the knowledge and skills required to execute different tasks. Organizational members base their decisions regarding how to search for required skills and relevant expertise on formal procedures, and the extent to which they believe these formal procedures must be followed. In the bureaucratic and large Civit organization, employees are expected to follow formal procedures at all times. Procedures are institutionalized through ITIL (Information Technology Infrastructure Library), which is a set of practices for IT service management that focuses on aligning IT services with the business, PRINCE (projects in controlled environments, a project management methodology), as well as through securing deliveries to clients via SLAs (Service Level Agreements).

However, when facing a crisis situation, formal procedures are discarded. In Civit, in crisis situations, formal procedures are often replaced with a “carte blanche”, which means that any possible means are legitimate, as long as they help to resolve the situation. As one Senior Project Manager
commented: “We don’t have to go through 16 steps before reaching an ‘approval’ state.” Our analysis shows that, in Civit, formal procedures are designed for normal conditions, which break down in critical situations that require urgent action. However, there are no “emergency” procedures to kick in under such circumstances. Therefore, formal procedures are replaced by shorter, much more informal and improvised approaches.

In Milit, following formal procedures is very important under both normal and, even more so, emergency conditions. Because of the nature of the military work, Milit has a zero-tolerance policy for mistakes regarding many procedures. This means that, when it comes to classified projects or services, every step of the process must to be followed “to the letter”.

The military way of doing things is illustrated in the following quote: “Under operational [emergency] circumstances it’s important to go through the plan-do-check-act phases as soon as possible, in order to stay ahead of your opponent” (Senior Program Manager at Civit, military). In emergency situations, military employees greatly rely on formal structures and protocols that define knowledge flows (i.e., which party is responsible for what knowledge, and how knowledge from different parties will be integrated). So where, in Civit, the formal procedures are shortened by taking out steps or replacing with informal ones, in Milit, procedures followed in emergencies are even more formal.

The way in which organizational members use these formal procedures is closely linked to the formalization of roles (“Forward, march! says the general”).

Practice 3: Using Roles and Responsibilities (The What and Who Dimensions)

To engage in knowledge coordination, organizational members need to be aware of who holds what knowledge, and based on this awareness, retrieve the knowledge to solve their problem or work-related issue. They develop knowledge about who-knows-what in a variety of ways: e.g., through perceptions of the relative expertise of others which is usually associated with formal roles and responsibilities, or through stereotyping.

In Civit, the assignment of roles and responsibilities is formalized by the RACI matrix that captures four key dimensions of involvement with a task: responsible, accountable, consulted, and informed (RACI). These dimensions provide the hierarchical role index where a role is a descriptor of an associated set of tasks that can be performed by many people and one person can perform many roles. The organization relies on formalized procedures describing which role (person in this role) to contact in which situation/for specific information. One Product Manager at Civit provided an example:

> Once, when I had to request a rental [telephone] line at K [supplier], our Information Security Officer told us that we were not allowed to exchange information via regular email, because it contained Defense location information that must not become available to ‘the wider public’. In such situations the exchange goes through sealed letters, which take five days to send and receive an answer. I needed a tool through which I could send encrypted [secured] emails and for this, I needed to contact our Information Service Specialist and tell him the tools I needed him to deliver to me.

Under normal circumstances, the assignment of a person (who) to a task is based on their formal role and function and is matched with their expertise (what). The experience of the employee with the type of project, or the client, also plays an important role. Within several sub-departments of Civit, initiatives were put forward to capture all employees’ expertise, skills, and experiences with clients in a system combined with educational details in order to facilitate the search for information.

Civit, being a large IT maintenance organization with many hierarchical layers, formalized a number of “crisis roles” such as Crisis Manager and Escalation Manager, which have been institutionalized to deal with crisis and emergency situations. These crisis roles come on top of other (“normal”) responsibilities that these individuals deal with on a daily basis. One Escalation Manager described his role: “I am a hub, connecting people, building bridges, resolving issues.” He knows he cannot act under time pressure in too complex situations; but he is active in managing part of the complexity of situations within the organization.
What actually happens when a crisis occurs in Civit is that the crisis mandate effectuates and organizational members have complete freedom (carte blanche – i.e., unrestricted power to act at one’s own discretion) when it comes to assigning people to a certain task to get things done.

In Milit, employees are recognizable according to their uniform, indicating from which Armed Forces Division (Navy, Army, Air Force) they stem, and their “stars and stripes” indicating their rank. Only 17% of this organization is civilian personnel, so most people wear a military uniform. A uniform provides a good indication of a person’s background and experience, both in terms of client information (as the uniform corresponds to the Armed Forces Division, which are all clients of the Milit organization) and years of experience within the Defense organization (rank approximately indicates tenure in the Armed Forces), but not necessarily their role or function in the Milit IT department. Under normal circumstances, organizational members at Milit rely on formal roles that are associated with specific functions. The allocation of tasks can be both person-based (i.e., targeted to a specific individual) as well as expertise-based. Person-based allocation is related to the role or responsibility a specific person is assigned to, which is similar to Civit, while expertise-based allocation is related to a specific task to which an individual with relevant expertise is assigned when the task (usually a problem or issue) is being raised. In particular, when expertise is needed to address a high priority issue, a fast response can be counted on when sending out an email with a request for information to a functional email box instead of approaching a specific person.

When a situation shifts to an emergency, the reliance on roles and responsibilities within this organization shifts from a formal cooperation mode to “hierarchy and command”. As one of the interviewees explains:

_First your name is just Leonie, and I am Captain Rallph. Suddenly things do not work anymore and then the boss says ‘Lieutenant Houtman’. It is at that moment when he calls you by your rank and last name that he invokes his rank and you have sworn to blindly follow a higher rank._ (Senior Technical Specialist at Milit)

There is a clear formalization in case of incidents or emergencies; the organization has institutionalized several mechanisms to ensure a direct response in case of an emergency. This is a 24/7 organization; employees are trained for and used to this context and rely on their formal roles to deal with emergencies.

**Practice 4: Utilizing Networks (The What, How, and Who Dimensions)**

In order to retrieve knowledge, answer a question or request relevant information, organizational members must be aware of who holds this information (what), and they need to use the appropriate communication channels (how) to get this information.

Within Civit, under normal conditions, employees mainly follow the formal line and use formal networks to find relevant expertise within the organization. This bureaucratic department institutionalized a very formal system through which every step is monitored or “otherwise we lose control” (Process Manager). As individuals work together on joint projects, they get to know one another and their areas of expertise, and they use this knowledge at a later stage to contact their peers when relevant expertise is required. Through such shared experiences informal networks emerge. Indeed, some people are very active in forming informal networks across the organization:

_When I look at my own function [Product Group Manager], I ‘network my ass off’ to get the best possible informal and ‘like knows like’ network. That also means I actively contribute to these networks. Anyone can call me at any time with questions such as ‘I have a problem…’; ‘Can you help me with this and that?’; ‘How would you do this?’._

When a certain situation escalates, employees seem to rely even more on their personal informal networks to quickly access relevant knowledge. Because incidents and emergencies require rapid action and there is no time to verify expertise and get approvals through the formal procedures, people can only go to those whom they know and trust as an expert in a particular area. Considering the crisis mandate (carte blanche – explained earlier), the formal procedures are avoided in order to get access to the right expertise quickly. Therefore, informal networks are key when it comes to knowledge coordination in emergency situations.
In Milit, when it comes to the utilization of networks under normal conditions, both formal and informal networks are utilized by employees to retrieve relevant knowledge. As one Senior Project Manager explained:

*If you work on a project and you need a satellite, you probably need to find a Transmission Specialist. So, if you do not know people that well, you rely on their formal function title and thus formal network. That is how you start; later on you develop the more informal networks.*

Unlike Civit, where informal networks are built through shared experiences of working together, in Milit employees often share similar experiences that were accumulated separately by having been at the same place or situation, rather than by active collaboration. For example, military employees share experiences if they have attended the same military training, or participated in the same military mission. Such shared experiences are evoked by recognizing the same uniform (internally referred to as "blood groups") or rank: these create trust and, to some extent, a perception of their relative expertise. Stereotyping plays a role as visual attributes such as rank and uniform are utilized in forming opinions about the person who is wearing the uniform. These mutual experiences are utilized in informal as well as formal networks.

According to the military principle (captured in the Code of Conduct to which military employees swear to obey), obeying orders and following procedures is key to knowledge coordination when it comes to solving problems under emergency situations. In accordance with this principle, the formalized way of coordinating knowledge is evident under emergency conditions in Milit. Employees follow strict instructions in complex situations and do not deviate from the formal line of command in these conditions. Unlike Civit, where formal networks are replaced by informal ones under emergency situations, in Milit formal networks become even stricter as they purely rely on ranks and the hierarchical chain of command. Ranks and military protocols define who is in charge in emergency situations and who is following whose command. Who-knows-whom and inter-personal relationships are abandoned and only orders and protocols invoked through the formal chain of command are followed.

**Summary of Activities Comprising Knowledge Coordination Practices**

Derived from the findings and analysis presented above, the following two tables summarize activities that constitute knowledge coordination practices in the two organizations (Civit in Table 2 and Milit in Table 3).

<table>
<thead>
<tr>
<th>Table 2. Activities Comprising Knowledge Coordination Practices within Civit</th>
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<tbody>
<tr>
<td><strong>Knowledge Coordination Practices</strong></td>
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<td>-------------------------------------</td>
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<tr>
<td><strong>Normal conditions</strong></td>
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<tr>
<td>Prioritizing tasks (what &amp; when)</td>
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<tr>
<td>Following procedures (what &amp; how)</td>
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<td>Using roles and responsibilities (what &amp; who)</td>
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Through meetings responsibilities are assigned to people
- Using carte blanche or crisis mandate

Utilizing networks (what, how & who)
- Following the formal and hierarchical lines
- Using informal networks to “work around” the formal organization

- (Mainly) using informal networks to retrieve relevant knowledge as people do not have time to verify expertise or build trust
- Reliance on “people we know and trust”

### Table 3. Activities Comprising Knowledge Coordination Practices within Milit

<table>
<thead>
<tr>
<th>Knowledge Coordination Practices</th>
<th>Normal conditions</th>
<th>Emergency conditions</th>
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</thead>
<tbody>
<tr>
<td>Prioritizing tasks (what &amp; when)</td>
<td>- Using formal meetings and “morning prayers” to prioritize tasks</td>
<td>- Relying on formal mechanisms; putting incidents and accidents first</td>
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<td></td>
<td>- Using Standard Requests, Non-Standard Requests and Projects</td>
<td>- Confirming to highest in command who decides (but also consults with the experts)</td>
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<td>- Using SLAs to set standards in solving problems for clients</td>
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<tr>
<td>Follow procedures (what &amp; how)</td>
<td>- Relying on formal procedures, especially those concerned with confidential processes</td>
<td>- Relying on a very formal approach: plan-do-check-act</td>
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<tr>
<td></td>
<td>- Through ITIL, PRINCE and SLAs</td>
<td>- Relying on formal structures and protocols</td>
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<tr>
<td></td>
<td></td>
<td>- Having zero tolerance for mistakes (attitude)</td>
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<tr>
<td>Using roles and responsibilities (what &amp; who)</td>
<td>- Relying on visual indicators such as person’s uniform which indicates background, experience and rank to “interpret” a person’s role/responsibility</td>
<td>- Following “command and control” which relies on exercising power based on rank and role and obeying orders (uniformity)</td>
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<tr>
<td></td>
<td>- Relying on a person’s functional (formal) role</td>
<td>- Responsibilities are associated with the uniform: the higher the rank, the more responsibilities</td>
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<td></td>
<td>- Using digital directories e.g., functional email boxes</td>
<td>- Using digital directories such as functional email boxes to ensure direct response (staffed 24/7)</td>
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<td>- Assigning tasks according to experience with a specific client</td>
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<td>- Using “morning prayers” to discuss and assign responsibilities</td>
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</tr>
<tr>
<td>Utilizing networks (what, how &amp; who)</td>
<td>- Using formal networks that are associated with formal procedures</td>
<td>- “Enforcing” utilization of formal networks only</td>
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<tr>
<td></td>
<td>- Using informal networks built through shared or similar experiences, creating trust</td>
<td>- Building trust through reliance on uniforms, rank and formal military procedures</td>
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</tbody>
</table>

### Discussion and Contribution

Our findings suggest that knowledge coordination is accomplished through four higher-level coordination practices – prioritizing tasks, following procedures, using roles and responsibilities, and utilizing networks. While each of these four practices addresses different combinations of the what, when, how, and who dimensions of knowledge coordination, interactions between these practices provide a dynamic perspective on the knowledge coordination process as it unfolds over time in organizations that operate under normal as well as emergency conditions.

The main contribution of our findings is that we find that the way knowledge coordination practices differ between normal and emergency situations is markedly different for traditional and fast-response
organizations. All four knowledge coordination practices are present in both traditional and fast-response organizations, under normal and emergency conditions. However, the activities constituting the practices, as well as the way in which the repertoire of coordinative activities change when operating conditions change from normal to an emergency, differ between the two organization types as depicted in Tables 2 and 3. When circumstances change from normal to emergency we see clear differences in the pattern of knowledge coordination practices enactment, as summarized in Table 4.

- In a traditional organization, the largely formal structures and processes that are present under normal conditions are replaced by more improvised and informal knowledge coordination practices to resolve the emergency.
- In a fast-response organization, the largely formal knowledge coordination practices become even more structured and formalized under emergency conditions.

<table>
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<tr>
<th>Table 4. Main Characteristics of Knowledge Coordination Processes under Normal and Emergency Conditions in Traditional and Fast-Response Organizations</th>
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<tr>
<td><strong>Normal conditions</strong></td>
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<tr>
<td><strong>Traditional organization</strong></td>
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<tr>
<td><strong>Fast-response organization</strong></td>
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The two types of organizations typically have a different interpretation of what an emergency means. This emphasizes the importance of not only looking at different types of organizations, or different types of situations, but to combine both dimensions. Where an emergency situation represents a (serious) disruption in a traditional organization that leads to a complete shift in organization and an abandonment of formal structures and processes, the fast-response organization reacts in a more prepared and organized way, speeding up activities and processes in order to resolve the situation and return to normal day-to-day business. The fast-response organization treats emergency conditions as an urgent but still a routine part of their daily activities (Bechky and Okhuysen 2011), but as a sort of intensified routine. Similar to high reliability organizations, the fast-response organization portrays resilience in their ability to recover from incidents (Weick and Sutcliffe 2011), enacted through formalized routines and activities. In the traditional organization, on the other hand, structures and hierarchy dissolve into informal networks that enable ad-hoc collaborations with known and trustworthy people to resolve the situation at hand, putting formalities aside.

**Integrating Conditions for Coordination**

The differing patterns in knowledge coordination we have observed when operating conditions change can be explained through the lens of three integrating conditions for coordination identified by Okhuysen and Bechky (2009): accountability, predictability, and common understanding. They argue that these conditions – “means by which people collectively accomplish their interdependent tasks in the workplace” (p. 483) – can be accomplished through a variety of coordinative actions or mechanisms. Thus in different situations individuals may choose to enact different coordination mechanisms, drawing from the wide range of options available for them. However, to ensure that coordination efforts will be successful (i.e., will deliver the desired outcome), the choice of coordination mechanisms should aim to create the integrating conditions for coordination. In the light of this theoretical lens, our findings indicate under normal conditions knowledge coordination practices enacted by Civit and Milit personnel create the three integrating conditions for coordination. When operating conditions change to emergency, Milit personnel are able to create accountability, common understanding and predictability by relying on different (more...
formal) coordination activities. Civit staff, however, face major breakdown in accountability, predictability and common understanding, which triggers the need to improvise and engage in informal ways to resolve emergency situations. We discuss each integrating condition below in greater details.

**Accountability** emerges from identifying the person responsible for a specific task or outcome. This may arise from the formal hierarchy, but it can also be established via discussions, meetings and action (Okhuysen and Bechky 2009). In the fast-response organization, the person responsible for the organizational outcome is the person who is the highest in rank. When the impact of a given situation is high (e.g., during an emergency) and there is a need for immediate action, this rank-based control structure is amplified and people tend to rely on their and others’ “stars” and “stripes” (or other indicators of hierarchy/seniority) and, consequently, their knowledge. On the other hand, in a traditional organization, people start to take action and feel responsible, primarily, based on informal perceptions of power and/or expertise: who is in control of the situation at hand and who has the right knowledge to deal with the situation. The deviation from formal knowledge coordination mechanisms replaces formal accountability (associated with specific roles) with ad-hoc attempts to assume or allocate accountability for action. Such attempts are likely to create chaos and anarchy (e.g., “who shouts the loudest”), but also may occasionally facilitate organic emergence of accountability and leadership by informal recognition of expertise among individuals.

**Predictability** enables organizational members to anticipate any given situation and subsequent tasks and activities by knowing the likelihood of occurrence (Okhuysen and Bechky 2009). Being able to anticipate deviating situations allows people to adapt quickly to the situation at hand, allocating the right people, resources and knowledge to resolve the emergency. Having knowledge of these kinds of patterns or sequence of tasks is defined by the degree of preparedness. Here it becomes evident that, within the fast-response military organization, the predictability is high, allowing for a better anticipation of knowledge coordination requirements in extreme situations, as personnel are trained for this extensively. By definition, a fast-response organization requires such preparedness, to allow the employees to adapt quickly to new situations. In the traditional organization knowledge practices are designed to facilitate knowledge coordination under normal conditions. Any unexpected events affect personnel’s ability to predict future tasks and actions. Responses to emergencies in traditional organizations, therefore, differ from fast-response organizations as their degree of familiarity with these kinds of situations is low. As a result, knowledge coordination takes place in an ad-hoc and improvised manner. Repeated interactions in such emergent situations do, however, improve coordinative action in terms of predictability (e.g., what to expect from specific individuals) in consequent situations (Reagans et al. 2005).

Finally, **common understanding** is accomplished when organizational members develop a shared perspective on the goals and outputs of their interdependent work, and how their individual tasks fit within the whole (Okhuysen and Bechky 2009). Extensive training of people in fast-response organizations already instates a common understanding of planning for emergencies and the rules to abide to. For example, training that all military employees go through creates common ground across all staff in terms of organizational culture and code of conduct; it enhances familiarity with possible operating conditions and who fulfills which task in the whole process. Training serves as a coordination mechanism that ensures a minimum threshold of common understanding for staff in a fast-response organization. However, in a traditional organization, there is no such advanced shared training to enhance common understanding about which knowledge to coordinate and familiarity with the standard practices. In comparison to fast-response organizations where employees are going through intensive training before they assume their job position, in traditional organizations employees start their jobs with minimal or no training. Therefore, they typically learn about organizational culture and institutional practices over time, through interactions with their co-workers and engagements in daily work-practices and routines. The reliance on formal roles and documents describing the company’s policy and objectives helps to develop a shared understanding of the work itself and how it must be executed; however, such resources do not prepare employees for dealing with emergency situations.

Other differences between traditional and fast-response organizations that can explain the diverging patterns of change in knowledge coordination practices when emergencies arise can be identified as well. For instance, differences in **culture** between traditional and fast-response organizations mean that these organizations have different perceptions of **uncertainty** and that uncertainty triggers different behaviors (Bechky and Okhuysen, 2011). Different cultures are also related to differences in **decision making** – for
fast-response organizations, non-routine decision making (less bound by rules and customs) is much more common than for traditional organizations. Finally, the orchestration of knowledge resources and flows is also likely to be different in traditional versus fast-response organizations. Orchestration refers to the structuring, bundling and leveraging of organizational resources (Sirmon, Hitt, Ireland and Gilbert, 2011). In an emergency situation, such orchestration takes place in a much more top-down way in a fast-response organization, and in a more informal and bottom-up way in a traditional organization. How these, and other, factors explain the diverging changes in knowledge coordination practices between traditional and fast-response organizations is a subject for future research.

Conclusions and Practical Implications

The dynamics of the knowledge coordination process change as organizations face different operating conditions. Traditional organizations see a shift from tightly coupled, formal modes of coordination to more loosely coupled, informal ones. Fast-response organizations, on the other hand, shift from formal and structured coordination modes to even more formal and tightly structured modes when facing emergency conditions. The practices underlying the knowledge coordination process are the same for both types of organizations, as well as under both operating conditions; knowledge is coordinated by: prioritizing tasks, following procedures, using roles and responsibilities, and utilizing networks. However, specific activities comprising the four practices are different for both types of IT organizations and operating conditions.

For managers, our findings can provide indications on how to manage knowledge coordination and be better prepared for emergencies. For instance, traditional organizations may be able to learn from fast-response organizations in terms of more structured approaches towards emergencies, adapting the integrating conditions for coordination in order to become more resilient: improving accountability by establishing clear roles and responsibilities for emergencies, enhancing predictability by finding ways for structural learning from emergencies (Cooke and Rohleder 2006; Haunschild and Sullivan 2002), and increasing common understanding through training for emergencies. On the other hand, too much structure and preparedness may negatively affect the improvisation and creativity that can help find novel solutions for novel problems.

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