

TOWARDS A MODEL FOR TEAM LEARNING IN MULTIDISCIPLINARY CRISIS MANAGEMENT TEAMS

Selma van der Haar¹

PLATO, Leiden University, The Netherlands

Karen E. Jehn²

Department of Social and Organizational Psychology, Leiden University, The Netherlands

Mien Segers³

Department of Educational Studies, Leiden University, The Netherlands

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Abstract

Crisis Management Teams have the duty to perform immediate, reliable, and effective in case of an emergency incident, crisis, or disaster. The teams are composed of members that are diverse in expertise, experience, parent organization, and familiarity. This makes these teams ad hoc multidisciplinary action teams that have to function as a team and perform in a reliable and effective way, as quickly as possible. Our expectation is that team learning is very important for establishing this team performance. In this paper, we develop a broad model of how this team learning occurs in Crisis Management Teams, especially in the Operational Crisis Management Team. In summary we state that reliable and effective performance in these teams requires team connectivity about the task and the team (i.e. available knowledge and opinions are shared using communication, leading to shared visions and intentions). This connectivity can be established using team learning behavior and face-to-face-communication, developing a Transactive Memory System, a shared situational awareness, shared mental models of the task and the team, and a model for how to cooperate in this team. Can this team learning be influenced to improve performance? This is the general question underlying the PhD project that we started in the summer of 2007 at Leiden University.

¹ PLATO, Leiden University, Wassenaarseweg 52, 2333 AK, Leiden, The Netherlands
T: +31725273418, E: haarsvd@plato.leidenuniv.nl

² Leiden University, Wassenaarseweg 52, 2333 AK, Leiden, The Netherlands
T: +31725273750, E: jehnka@fsw.leidenuniv.nl

³ Leiden University, Wassenaarseweg 52, 2333 AK, Leiden, The Netherlands
T: +31725273401, E: segers@fsw.leidenuniv.nl

Introduction

When regional or national crisis situations and disasters occur, a crisis management organization is developed, existing of several ad hoc multidisciplinary action teams⁴ with responsibilities for the practical, the tactic, and the strategic level. Different organizations cooperate in these ad hoc multidisciplinary action teams: the police force, the fire brigade, the government, medical care, water management departments and the military force. Each organization delivers a representative that is on duty at the time of the emergency incident, crisis or disaster. This means the team composition of Crisis Management Teams varies.

These Crisis Management Teams are an example of an action team. These teams have highly skilled members cooperating to perform urgent, unpredictable, interdependent, and highly consequential tasks while simultaneously coping with frequent changes in team composition and, in some cases, also training their novice members (Klein, Ziegert, Knight & Xiao, 2006). Action teams thus have a clear common goal, a mix of experience and resources, and a task that calls for team work (Edmondson, 2003; Baker, Day and Salas, 2006). And this team work has to be an immediate response to a crisis situation.

Team

- Highly skilled members
- A mix of experience and resources
- Interdependent
- Frequent changes in team composition

Task

- Urgent, immediate response needed
- Unpredictable
- Highly consequential
- With a clear common goal
- In some cases, also training their novice members
- Calls for team work

Figure 1: Characteristics of ad hoc multidisciplinary action teams (Klein, Ziegert, Knight & Xiao, 2006; Edmondson, 2003).

Due to the frequent changes in team composition, these Crisis Management Teams lack a history as a team. These teams therefore need to learn how to cooperate in the most reliable way in that particular team composition, under the specific circumstances that appear in the crisis situation at hand, in a very short period of time. Past research has not been specific about how this learning process occurs and how it can be supported. There has been some research about team learning in surgery teams and trauma teams defined as extreme action teams (i.e. Edmondson, Bohmer, and Pisano, 2001; Edmondson, 2003; Michinov, Olivier-Chiron, Rusch & Chiron, 2008), but little in the field of Crisis Management. The goal of the PhD project started in the summer of 2007 is to explore this learning process in Crisis Management Teams and understand what conditions and factors are critical to the success of these teams. Finally, we want to develop an intervention to support this team learning process.

The first step in the project is to develop a model for this team learning process in Crisis Management Teams using literature and information from practitioners in the field. First, we describe the Crisis Management Team, focusing on the Operational Team (OT). Then we answer two questions: 1) What does it mean to perform in a reliable way as a Crisis

⁴ We define teams as work groups that exist within the context of a larger organization and share responsibility for a team product or service (Hackmann, 1987).

Management team? In other words, what is the goal of the team learning process we want to understand? And 2) considering the team learning goal, how can team learning in this kind of team be described according to the team learning literature?

We present our first version of the team learning model in this article. The model is open for reflections and further development. Therefore our next step will be a structured feedback process in the field. Presenting this article on the TIEMS conference in June 2008, we consider to be part of this process.

Towards a theoretical model for team learning in Crisis Management teams

One type of Crisis Management Team in The Netherlands: The Operational Team

The Crisis Management structure in The Netherlands depends on the span of the crisis. Every region in The Netherlands has three separated team levels: the first level is the CoPI (Commando Plaats Incident, command place of incident) responsible for the work to be done in the field defeating the source of the incident, and by doing so, working 'right here and now'. The second level is the OT (Operationeel Team, operational team) responsible for the area effected by the incident and for the coordination and communication between the field and the decision makers. This OT has to act on what can be foreseen to happen in the next couple of hours. The third level is the BT (Beleids Team, policy team), responsible for the strategic process and decisions, as for instance related to the evacuation of citizens. This team is concerned with the consequences of the incident that can occur in the next couple of days.

When there is an effect area (foreseen) caused by a source that is out of control for a CoPI, an OT is added to the CoPI. When the effect demands for strategic decisions, a BT is added, and becomes a regional one when several districts of a region are involved. When the incident has effects on a national level, the Dutch national government gets involved. In this project, we focus on the OT, since this team is in the center of activities and has a key position in the communication process between the team layers.

The OT consists of several members: a team leader, heads of staff sections, and staff section members. Depending on the incident, the staff sections present can be: fire brigade, police force, GHOR (medical intermediary organization), the local or regional government, the navy, water management, internal reporter, logistics, and information management. There is also an internal reporter and a 'plotter'. The latter is responsible for creating a picture of the incident area. These people are gathered in one or two rooms.

The task of the OT is, in short, to organize and coordinate the process needed to get the source and effects of an incident under control in a reliable and efficient way. This means the team has to develop a collective image of the incident, collecting and communicating information provided by the CoPI and other sources. This image building is done in frequently planned short meetings with the heads of the staff sections and the team leader. The plotter depicts this image and keeps it up to date. Based on this image, the team develops a strategy and actions, using formal procedures about, for instance, the division of tasks between the disciplines and protocols based on real incidents. Each time new information is provided, the team needs to check the image built, the strategy, and the action plans. To support this process, a situational report is available, kept up to date continuously by the section Information Management. Between the meetings the staff sections communicate necessary information with their colleagues in the CoPI, in the action center in the field, and possible other relevant colleagues, and give instructions. The team leader communicates with the BT in the meanwhile. The process of reporting to the citizens is a BT responsibility, though prepared by the OT.

The composition and task make the OT an ad hoc multidisciplinary extreme action team. The team is composed of professionals on duty in their parent organization at the moment an incident occurs. Because of this ad hoc composition, the team members might or might not have cooperated before. Changes in the team composition during incident management

happens when the OT has to operate longer than 8 hours, because then people are relieved from their duty. The team members vary in discipline, function, and parent organization. The different expertise of all team members is needed for the complex task. This demands for constructive information sharing and communication. When an incident occurs, the response of the team has to be quick to avoid unnecessary damage and victims. The task is unpredictable due to the development of the incident. The consequences of errors of the OT can be high. A wrong decision can cost lives, as to be expected when the OT, for instance, has underestimated the possible number of victims caused by the expected gas explosion due to a fire. This can lead to lacking enough ambulances and hospital trauma centers ready for action. The decision-making in the OT clearly has to be highly accurate and is under a constant time pressure. Combined with the risks at stake, this can cause stress, possibly influencing the team process and the team members behavior.

Reliable and effective performance in Crisis Management Teams

Team performance in Crisis Management teams is related to the team goals: getting control of the source of the incident (i.e. a fire) and of the effects (i.e. evacuation of citizens, taking care of victims). Getting control of the source is measured in time. This is especially relevant in case of incidents that frustrate certain societal processes, for instance mobility of citizens in case of a train accident. Control of the effect is measured by the inevitable damage and the inevitable number of victims of an incident, compared to the actual damage and victims.

What does it require to work in a reliable and effective way towards these goals as a team under these extreme circumstances? Wilson, Burke, Priest and Salas (2005) state extreme action teams should function as High Reliability Teams (HRTs), described in values and behavior. The concept of HRTs is derived from literature about High Reliability Organizations (HRO). Originally the concept HRO is used in research for organizations that are effectively managing and operating complex and hazardous technical systems, like air traffic control, and by doing so, maintaining a safe workplace (Roberts, 1990; Rochlin, 1996; La Porte, 1996; Wilson, Burke, Priest & Salas, 2005).

Wilson, Burke, Priest and Salas (2005) have translated the HRO concept from the organizational level to the team level, stating that in practice the teams create the HRO. They have described the idea of an HRT in a model of values and behavior of HRT members having to perform in a reliable way. In their definition, HRTs are teams that consistently and effectively work interdependently towards a shared goal in a complex and dynamic environment while working under high levels of stress. The behavior of team members should match their parent HRO values according to the authors. This definition seems to match the team composition and task of OTs as Crisis Management Teams. For the OT, reliability means the team gets control of the effects of the source of the incident as quickly as possible, so that the number of victims and the damage is as limited as possible. The following HRO values and HRT behaviors are identified by Wilson, Burke, Priest and Salas (2005).

The first value is *sensitivity to operations*, which means all members know the 'big picture'. Therefore the team needs closed-loop communication, information exchange, and a shared situational awareness. The second is *commitment to resilience*, demanding a team members attitude of serving as a redundant system to avoid, trap, and mitigate the consequences of errors. To be able to have this attitude team members need back-up behavior, performance monitoring, and feedback from each other. The third value is *deference to expertise*, recognizing the value of differences in expertise for the team and the task. Team members need their assertiveness to be able to communicate ideas and observations in favor of the team, and to give feedback if necessary. The team members need a collective orientation expressed in interdependent behavior and cooperation. Furthermore the expertise of the team members should be reliable. The fourth value Wilson, Burke, Priest and Salas mention is *reluctance to simplify*, meaning team members need to recognize the complexity of the task and the task environment and respond in an adapting way. This emerges when team members

use planning as a tool to improve performance. It is about setting goals, sharing relevant information, clarifying members roles, prioritizing tasks, discussing expectations, and environmental characteristics and constraints. The team also needs adaptability or flexibility to adjust strategies to changing situations and new information. The fifth value is *preoccupation with failure*. This value is about managing, trapping and quickly learning from errors. This demands for a system of error management, for feedback and for team self correction behavior. (Wilson, Burke, Priest and Salas, 2005)

This model describes behavior that should lead to a reliable and effective team work process, needed by extreme action teams according to Edmondson (2003) and Baker, Day and Salas (2006). They refer to their research concerning extreme action teams in health care. Baker, Day and Salas (2006) state teamwork is distinct from task work (e.g. fire fighting). Both are needed for effective team work they say, but knowledge and skills at the task are not enough. According to them, teamwork means anticipating the needs of others, adjusting to each others actions, and having a shared understanding of the problem to solve and how the procedure should happen.

Baker, Day and Salas (2006) have summarized the characteristics of effective teams explored in research. They state every team member needs certain knowledge and skills, and a certain attitude (KSA). These KSAs are not related to a function or to expertise. These KSAs make it possible for a team to function in a reliable and efficient way. The KSAs are described in their article. The authors also present characteristics of effective teams, citing Salas, Sims and Klein (2004).

Characteristic values and behavior of HRTs (Wilson, Burke, Priest and Salas (2005))	Team knowledge, skills and attitudes characteristic for effective teams (Baker, Day and Salas, 2006)
<p><i>Value: Sensitivity to operation</i></p> <ul style="list-style-type: none"> - <i>Closed loop communication</i>: ‘To exchange information accurately and clearly and acknowledge receipt of information’. - <i>Information exchange</i>: ‘The ability to speak clearly, concisely, and in an unambiguous manner with other team members’. - <i>A shared situational awareness</i>: ‘The teams ability to develop shared mental models of the environment’. <p><i>Value: Commitment to resilience</i></p> <ul style="list-style-type: none"> - <i>Back-up behavior</i>: ‘The capability to give, seek and receive task instructive feedback. Assisting team members to perform their tasks’. - <i>Mutual performance monitoring</i>: ‘Team members ability to monitor team members performance and give constructive feedback’. - <i>Shared mental model</i>: ‘Team ability to share compatible knowledge pertaining to individuals’ roles in the teams , the roles of fellow team members, their characteristics, and the requirements needed for effective team interaction’. 	<p><i>Team leadership</i> (Cannon-Bowers et al., 1995; Sims et al., 2004; Barach and Weingart, 2004): ‘The ability to direct and coordinate the activities of other team members, asses team performance, assign tasks, develop team KSAs, motivate team members, plan and organize, and establish a positive atmosphere’.</p> <p><i>Back up behavior</i> (McIntyre and Salas, 1995; Porter et al., 2003): ‘The ability to anticipate other team members needs, through accurate knowledge about their responsibilities. The ability to shift workload among members to achieve balance during high periods of workload or pressure’.</p> <p><i>Mutual performance monitoring</i> (McIntyre and Salas, 1995): ‘The ability to develop common understandings of the team environment and apply appropriate task strategies in order to accurately monitor teammate performance’.</p> <p><i>Communication</i> (McIntyre and Salas, 1995); ‘exchange of information between a sender and a receiver irrespective of the medium’.</p> <p><i>Adaptability</i> (Cannon-Bowers et al., 1995; Kozlowski et al., 1999; Klein & Pierce, 2001): ‘Ability to adjust strategies based on information gathered from the environment through the use of compensatory behavior and reallocation of intrateam resources. Altering a course of action or team repertoire in response to changing conditions (internal or external)’.</p> <p><i>Shared mental models</i> (Klimoski & Mohammed, 1994; Mathieu et al., 2000; Stout, Cannon-Bowers, and Salas, 1995): ‘An organizing knowledge structure of the relationship between the task the team is engaged in and how the team members will interact’.</p> <p><i>Mutual trust</i> (Bandow2001; Webber, 2002): ‘The</p>
<p><i>Value: Deference to expertise</i></p> <ul style="list-style-type: none"> - <i>Assertiveness</i>: ‘The willingness of team members to communicate ideas and observations in a manner that is persuasive for other team members’. - <i>Collective orientation</i>: ‘Interdependent behavior in task groups’. - <i>Expertise</i>: ‘Knowing how to do something well and is gained through experience’. 	

<p><i>Value: Reluctance to simplify</i></p> <ul style="list-style-type: none"> - <i>Adaptability / flexibility:</i> ‘Team’s ability to gather information from the task environment and adjust their strategies by reallocating their resources and using compensatory behaviors such a back-up behavior’. - <i>Planning:</i> ‘Setting goals, sharing relevant information, clarifying member’s roles, prioritizing tasks, discussion expectations, and environmental characteristics and constraints’. 	<p>shared belief that the team members will perform their roles and protect the interests of their team mates’.</p> <p><i>Team / collective orientation</i> (Driskell & Salas, 1992; Shamir, 1990; Wagner, 1995): ‘Propensity to take other’s behavior into account during group interaction and the belief in the importance of the team goal’s over individual member’s goals’.</p>
<p><i>Value: Preoccupation with failure</i></p> <ul style="list-style-type: none"> - <i>Error management:</i> ‘Based on understanding the nature and extent of error, changing conditions found to induce error, and determining and training behaviors that decrease errors’. - <i>Feedback:</i> ‘Team’s ability to provide constructive feedback, seek feedback on own performance, and accept feedback from others’. - <i>Team self correction:</i> Team’s ability to monitor and categorize their own behavior to determine its effectiveness, which generates instructive feedback so that members can review performance episodes and correct deficiencies’. 	

Figure 2 Characteristics of High Reliability Teams (Wilson, Burke, Priest & Salas, 2005) and team work (Baker, Day & Salas, 2006).

When we analyze the characteristics in figure 1, we can recognize the behavior and KSAs all relate to a reliable and effective process for performance. It is not about the content of the task. Even expertise, mentioned in the HRT model, is a process feature, since the authors statement is that team members must value each others knowledge and actions and take them into consideration. So, we could say both the models shed light on the social behavior of team members needed for reliable performance.

There are several characteristics highlighted in the model for HRTs that are less prominent in the model for team work. Compared to the team work model, the description of HRTs in particular highlights coping with the high risks and with the stress level, and dealing with the complexity of the task. Related behaviors are the need for closed-loop communication, a shared situational awareness, flexibility, valuing expertise, error management, and team self correction. This is not mentioned in the team work model. Besides this difference, the importance of team leadership is mentioned in the team work model, but not in the framework for HRTs. This item could be added to the HRT model, since Klein, Ziegert, Knight, and Xiao (2006) have explored the team leadership role in extreme actions teams (Trauma Resuscitation Units) and concluded dynamic delegation enhances extreme action teams’ ability to perform reliably.

Important to notice is that the HRT model is a theoretical framework. Research is needed to explore the reliability and validity of the model. In this stage of our research project we use the team work model and the HRT model to develop an idea of what it could mean to perform in a reliable way as a Crisis Management Team and from there we derive possible needs of the team learning process we want to understand.

Team learning needs of Crisis Management Teams

Derived from the characteristics of a reliable and effective team process, as described in the team work model and the HRT model, the central mission for team learning seems to be getting connected or leveled within the team, create a connection between the members. This connection idealistically means available knowledge and opinions are shared using clear communication, leading to shared visions and intentions. Reliability of the OT performance

means getting control over the effects of the incident as quick as possible, and limit the number of victims and the damage.

There is a connection and agreement needed about the task, resulting in a *shared situational awareness*, a *shared mental model of the task* and *shared mental models of the team*. This seems to be a basic need for a team to perform in a reliable and effective way. In addition, the team needs to develop a connection about how to communicate and cooperate, the behavioral ‘rules of the game’. We could also say the team needs to develop a reliability culture. This reliability culture refers to the norms, shared perceptions, workways and informal traditions (in: La Porte, 1996, following Roberts, 1990 and Rochlin and Von Meier, 1994) needed for reliable performance. It is about the creation of a team connection about: *the social structure and communication pattern of the team* (what information is shared with whom and who is the informal leader?), *error management* (what happens when an error occurs and how do we make use of mutual performance monitoring, back-up behavior, feedback, and team self correction?), *cooperation* (what is our level of adaptability, flexibility and how do we make use of planning?), *collective orientation* (to what extent are we a team and what are our boundaries?).

So the team members need to establish an internal task-related connection and a team-related connection. The logic of this division is illustrated in table 3 by questions team members possibly have at the start and during the team cooperation process. These questions can get answered through a process of team learning.

Team learning needs in Crisis Management teams	
Team characteristics	
Team	
<ul style="list-style-type: none"> - Highly skilled members - A mix of experience and resources: expertise diversity (differences in the knowledge and skill domains in which members of the team are specialized as a result of their work experience and education (Van der Vegt & Bunderson, 2005).’ - Interdependent - Frequent changes in team composition 	
Task	
<ul style="list-style-type: none"> - Urgent, immediate response needed - Unpredictable - Highly consequential - With a clear common goal - In some cases, also training their novice members - Calls for team work 	
Goal: Performance improvement	
<ul style="list-style-type: none"> - Getting control of the source of the incident (i.e. a fire) , measured in time. - Getting control of the effects of the incident (i.e. evacuation of citizens, taking care of victims), measured by a comparison between the inevitable damage and the inevitable number of victims of an incident, and the actual damage and number of victims. 	
Team learning needs	
<i>task related connection</i>	<i>Team related connection</i>
<ul style="list-style-type: none"> - Shared situational awareness - Shared mental model of the task - Shared mental models of the team 	<ul style="list-style-type: none"> - The social structure and communication pattern of the team - Error management - Cooperation: adaptability, flexibility and how do we make use of planning - Collective orientation
<i>Illustrating team questions</i>	<i>Illustrating team questions</i>
<ul style="list-style-type: none"> - What is happening? 	<ul style="list-style-type: none"> - With whom am I working today, who is the team

<ul style="list-style-type: none"> - What is the source and what are the (expected) effects of this incident? - What will be our strategy and what actions do we plan? - What am I supposed to do and what will others do? - Who has what KSAs in this team and is going to do what? 	<ul style="list-style-type: none"> leader? - Do I trust these others in their competences? - What does that mean for my behavior? - Do I trust us as a team in our flexibility, adaptability, communication patterns? Will we be able to manage this crisis as a team, even when things get tough? - Do I feel okay in this team, in this atmosphere?
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Table 3 Team learning needs in Crisis Management Teams

Team learning in ad hoc multidisciplinary action teams / Crisis Management Teams

Now we have defined what team learning in ad hoc multidisciplinary teams probably is about, we explore the process of team learning we expect to occur in these teams. In our view teams learn when they change what they do or how they do it as a group. Edmondson, Dillon, and Roloff (2006) have identified three distinct areas of research that provide insight into how teams learn, each with an own definition: 1) Outcome improvement: Team learning is performance improvement, usually efficiency improvement, 2) Task mastery: Team learning is task mastery, and 3) Group process: Team learning is a process of sharing information and reflecting on experience. Considering the learning needs of ad hoc multidisciplinary action teams Crisis Management teams, to get connected on the task and the team, we say team learning should both be a group process to establish the team-related connection and a process of task mastery to create the task-related connection in the team.

Task mastery to establish a task-related connection in the team

Team learning in this view focuses on task mastery. Task mastery is an outcome of communication and coordination that builds shared knowledge by team members about their team, task, resources and context. The measure of success is how well the team has learned its task. (Edmondson, Dillon & Roloff, 2006) For Crisis Management Teams the task changes every time. So task mastery is an issue of relevance each time a team starts a Crisis Management process.

In the description of the HRTs and team work, shared mental models are suggested as concepts for measuring the task connection that emerges in a team. Mental models are organized knowledge structures, that allow individuals to interact with their environment, and shared mental models are needed by teams that lack enough possibilities for communication (Mathieu et al., 2000). The Crisis Management Team is a good example of a team lacking these possibilities. The shared mental model literature states that a shared understanding of the task, the team, the equipment, and the situation improves team effectiveness (Kozlowski & Ilgen, 2006). So that is a motivation for focusing on developing these shared mental models in Crisis Management Teams.

An other concept of use for team learning for task mastery is the Transactive Memory System (TMS). This system consists of processing and structuring information, characterized by encoding, storing, retrieving, and communicating information within the team (Wegner, 1986; Hollingshead, 2000; Lewis, 2003, 2004; Kozlowski & Ilgen, 2006). Through a TMS the individual memories of team members are linked, so that team members have a shared awareness of who knows what and form a group information-processing system (Kozlowski & Ilgen, 2006).

Lewis (2004) has shown that a transactive memory system (TMS) is positively related to performance. Zhang, Han, Hempel and Tjosvold (2007) have found the same and more: TMS is positively related to team performance, task interdependence, cooperative goal interdependence, and support for innovation. The TMS seems to mediate between these team characteristics and team performance. Especially in teams with different work-related expertise a TMS is useful, Hollingshead (2000) has shown, since people then learn and recall more information in their own area of expertise. Member familiarity here plays a role in the

way that familiarity is a moderator of the relation between distributed expertise and the TMS: the more familiarity, the stronger the relation (Lewis, 2004). The consequence of having a TMS is that members can rely on one another to be responsible for specific expertise and are freed of the ineffective process of developing knowledge already available in the team (Lewis, 2003).

How is the TMS developed in teams? Wegner (1986) states that a TMS is constructed over time. The development begins when the team members learn something about each others' domains of expertise. Here the earlier mentioned familiarity plays a role. A TMS can be seen as a form of collective cognition of groups developed by a process of accumulation, interaction, examination, and accommodation (Gibson, 2001). The basic ingredient for a TMS is information, and the basis process is information sharing we suppose. Lewis (2003) found that the TMS is facilitated by face-to-face communication (but not other forms of communication). According to Palazzolo (2005) this communication is highly related to members' perception of others' expertise.

Crisis Management Teams we expect can benefit from having and developing a TMS, especially because of the proved relation with performance, expertise diversity, task interdependence, cooperative goal interdependence, support for innovation, team member familiarity, team members perception of others' expertise, and face-to-face communication. All the characteristics are potentially present in ad hoc multidisciplinary action teams.

Since the teams are ad hoc composed, the content of the TMS will initially be related to the functions of team members present, and in a later stage of the team cooperation this we expect can become more person related. Familiarity plays a role in Crisis Management teams too, since team members can know each other or not, but always meet in a different team composition. To understand the team learning process of Crisis Management Teams, we will take into consideration the development of the TMS and the influence of this TMS on performance.

Summarizing, for team learning for task mastery we have different concepts available: shared mental models and TMS. Kozlowski and Ilgen (2006) state these concepts should be clarified and more distinct form each other. For this project we will use the concept of TMS, to check whether there is a system for information processing and structuring present in the team. We will also check its content by exploring its complexity, its accuracy and its agreement (Edmondson, Dillon & Roloff, 2006). The concept of shared mental models is related to this agreement. We will explore the agreement about the situational awareness, the task demands and the team characteristics by using the concept of shared mental models as being part of the TMS.

Group process to establish a team-related connection

The second area of research relevant for understanding team learning in Crisis Management Teams conceptualizes team learning as a group process. This is about learning behavior in teams taking into consideration the effect of managerial and contextual factors (Edmondson, Dillon & Roloff, 2006). In our project we want to get a view of the learning behavior used in Crisis Management Teams. We will relate this to the development of connectivity about the task and the team. What behavior is used to get on the same page all together? And we are interested in the factors influencing this behavior and process of getting agreement.

There are different descriptions of learning behavior developed. Edmondson (1999) describes the team learning behaviors of seeking feedback, discussing errors, seeking information and feedback from customers and others. This is individual behavior. There is also a stream of research focusing on team reflexivity. This is about the extent to which teams reflect upon and modify their functioning (Edmondson, Dillon & Roloff, 2006). Others have made a distinction between learn-how and learn-what behavior (Tucker, Nembhard & Edmondson, 2006, in: Edmondson, Dillon & Roloff, 2006). The question is what kind of learning behavior is used by Crisis Management Teams.

Research has shown different factors influence this team learning focused on group process. The team climate, especially team psychological safety (the shared belief that a group is safe for interpersonal risk-taking, Edmondson, 1999) plays a role. Edmondson has concluded that to translate effective team design and leadership into team performance team learning behavior helps. The role of the team leader has an influence too (Edmondson, 2003) in the way that the team leader can promote this team psychological safety and hence learning behavior. This she has found in surgical teams, defined as extreme action teams.

In our project we explore team learning behavior used in Crisis Management Teams to establish team connectivity on the task and the team. We will explore the factors influencing this behavior in these particular teams.

Conclusion: Team learning model for Crisis Management Teams

Our expectation is that task mastery and group process are both needed for team learning. We expect that team learning behavior supports the development of the task connectivity, influencing the TMS and the shared mental models of the situation, the task and the team. Moreover team learning behavior supports the team in developing team connectivity. We do have to find out what kind of team learning behavior is used by Crisis Management Teams.

Discussion

Our reasoning about team learning in ad hoc multidisciplinary action teams like Crisis Management Teams is that via a face-to-face communication, using certain learning behavior, the team members develop knowledge about who knows what in this team (TMS) and develop shared mental models about the situation, the task and the team and about the way the team cooperates. We expect this to result in task and team connection, supporting team performance. Factors influence this process are team psychological safety, team leader behavior, task interdependence, cooperative goal interdependence, support for innovation and differences in expertise between team members, team member familiarity and team members perception of others' expertise.

This broad model includes too many research questions for a PhD project of a couple of years. The reasons for this is we have developed this view using literature describing research in other fields, like health care. There is little research done about team learning in the crisis management area. Using a broad model to start with we want to prevent ourselves from too early taken decisions about what matters. Our aim is to develop a more succinct model in a dialogue with the field. That way we want to explore what factors we can expect to be relevant. We will organize a structured dialogue with the field, using individual and group interviews.

References

- Baker, D.P., Day, R. & Salas, E. (2006). Teamwork as an essential component of high-reliability organizations. *Health Services Research, 41 (4), Part II*.
- Edmondson, A.C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*, 350-383.
- Edmondson, A.C., Bohmer, R.M. & Pisano, G.P. (2001). Disrupted routines: team learning and new technology implementation in hospitals. *Administrative Science Quarterly, 46*, 685-716.
- Edmondson, A.C. (2003). Speaking up in the operating room: How team leaders promote learning in multidisciplinary action teams. *Journal of Management Studies, 40 (6)*, 1419-1452.

- Edmondson, A.C., Dillon, J.R., & Roloff, K.S. (2006, working paper). Perspectives on team learning: Outcome improvement, Task mastery, and group process. In A. Brief & Walsh, J. (Eds.; forthcoming 2007). *The Academy of Management Annals*, 1.
- Gibson, C. (2001). From knowledge accumulation to accommodation: cycles of collective cognitions in work groups. *Journal of Organizational Behavior*, 22, 121-134.
- Hackmann, J.R. (1987). The design of work teams. In: Lorsch, J. (Ed.), *Handbook of organizational behavior*. Englewood Cliffs, NJ: Prentice Hall.
- Hollingshead, A.B. (2000). Perceptions of expertise and transactive memory in work relationships. *Group Processes & Intergroup Relations*, 3 (3), 257-267.
- Klein, Ziegert, Knight and Xiao (2006). Dynamic delegation: Shared, hierarchical, and deindividualized leadership in extreme action teams. *Administrative Science Quarterly*, 51, 590-621.
- Kozlowski, S.W.J. & Ilgen, D.R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological science in the public interest*, 7 (3), 77-124.
- La Porte, T.R. (1996). High reliability organizations: Unlikely, demanding and at risk. *Journal of Contingencies and Crisis Management*, 4 (2), 60-71.
- Lewis, K. (2003). Measuring Transactive Memory Systems in the Field: Scale Development and Validation. *Journal of Applied Psychology*, Vol. 88, No. 4, 587-604.
- Lewis, K. (2004). Knowledge and performance in knowledge-worker teams: A longitudinal study of transactive memory systems. *Management Science*, 50 (11), 1519-1533.
- Mathieu, J.E., Heffner, T.S., Goodwin, G.F., Salas, E. & Canon-Bouwers, J.A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology*, 85 (2), 273-283.
- Michinov, E., Olivier-Chiron, E., Rusch, E. & Chiron, B. (2008). Influence of transactive memory on perceived performance, job satisfaction and identification in anaesthesia teams. *British Journal of Anaesthesia*, 100 (3), 327-332.
- Palazzolo, E.T. (2005). Organizing for information retrieval in transactive memory systems. *Communication Research*, 32 (6), 726-761.
- Roberts, K.H. (1990). Some characteristics of one type of high reliability organization. *Organization Science*, 1 (2), 160-176.
- Rochlin, G.I. (1996). Reliable organizations: Present research and future directions. *Journal of Contingencies and Crisis Management*, 4 (2), 55-59
- Wegner, D.M. (1986). Transactive memory: a contemporary analysis of the group mind. In: Mullen, B. & Goethals, G.R. (Eds.). *Theories of group behavior*. New York: Springer-Verlag.
- Wilson, K.A., Burke, C.S., Priest, H.A. & Salas, E. (2005). *Promoting health care safety through training high reliability teams*. *Quality Safe Health Care*, 14, 303 – 309.
- Zhang, Z.X, Han, Y.L, Hempel, P.S & Tjosvold, D. (2007). Transactive memory system links work team characteristics and performance. *Journal of Applied Psychology*, 92 (6), 1722-1730.