

# Training organizational resilience in escalating situations

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## Introduction

This chapter focuses on the ability to maintain organizational resilience in unexpected and escalating situations. The concept of escalation is described by Woods and Patterson (2003) as a dynamic process in which an initial irregularity develops into a continually deteriorating situation and starts affecting other areas in an accelerating tempo, with consequences that are difficult to overview and impossible to predict (for a discussion about unexpectedness, see chapter 3 in this volume).

In the previous book on Resilience Engineering Dekker, Dahlström, van Winsen and Nyce (2008) proposed that training aimed at development of generic and non-domain specific competencies can increase organizational resilience in unexpected and escalating situations. One example of this being that enhancement of adaptive and flexible competencies can support problem solving in a group by enabling group members to disconnect from prescribed role behaviors and routines.

Building further on their argument this chapter outlines a theoretical framework describing the adaptive and flexible competencies that add up to an organization's resilience in escalating situations. The framework is called *Generic Competencies in Management of Escalating Situations*. The term generic is chosen to distinguish the competencies from the domain specific, and more technical, competencies that are usually practiced in domain specific training, as in use of high-fidelity simulations. This chapter will also present guidelines for scenario design aimed for training of generic competencies in unexpected and escalating situations. We will also show the potential of using training programs, adhering to the given scenario guidelines, for securing front end resilience in unexpected and escalating situations by

presenting an experiment that was performed with Swedish fire safety engineers.

### Generic Competencies in Management of Unexpected and Escalating Situations

To explore and explain the competencies which can support organizational resilience in unexpected and escalating situations, a theoretical framework has been developed. The framework can be used as an explanatory tool when discussing the concept of organizational resilience, as well as a tool for qualitative evaluation of decisions and actions in unexpected and escalating situations. The framework has been developed through case studies of unexpected and escalating situations in various industries as well as studies of teams managing escalating situations in simulated environments. The competencies should be regarded as team competencies, and not the competencies of an individual team member. Figure 1 shows a simple illustration of the framework.

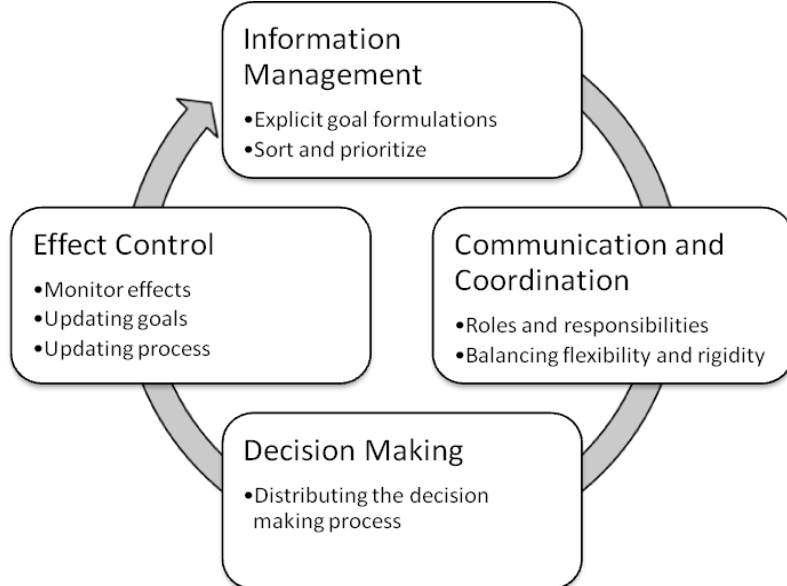


Figure 1. A theoretical framework of generic competencies in managing escalating situations

The first competence category is *Information Management*. In terms of data processing the effects of the escalation is dual. With the escalation follows an increased amount of data to process (Woods & Patterson, 2003). On the one hand having greater access to data may be beneficial in principle, but on the other the flood of data challenges the ability to find what is informative and meaningful in the data flow. Woods, Patterson and Roth (2002) refer to this as the data availability paradox. One way to make sense of the high incoming data load is to use shared and explicit goals (Dörner, 1996), based on which the incoming data can be sorted, distributed, and shared.

In the *Communication and Coordination*-processes the importance of knowing each other's roles and tasks in the team is emphasized (Klein, Feltovich, Bradshaw & Woods, 2005). There are however two main challenges facing the team structure during an escalation. The first challenge is to recognize how the demands on each participant develops during the escalation, and respond to possibly overloaded team members by reformulating certain tasks or bring in additional resources. The second challenge is to be aware of that escalating situations do not necessarily adapt to our (often rather bureaucratic) idea of how the respond system should be set up (Uhr, 2009). There is therefore a need for a constant monitoring of whether the response organization is suited to manage the situation at hand, and adapting the organizations role- and task structures as the situation develops (Brehmer, 2008). The organization has to be able to balance between a predefined role structure and a flexible structure to respond to the dynamics of the escalation (Heath, 1998).

The third competence category is named *Decision Making* and focuses on the strategies used to make decisions in escalating situations. Decisions in escalating situations cannot be based on consensus in the managing team. Such a process would simply 'drown' the team members in too much data to process, and result in reactive decision making behavior. Nor is a hierarchical structure, with a team leader making all decisions, likely to be successful, because of the workload that would face such a team leader responsible for making all decisions (Bergström et al., 2009). Instead the shared and explicit goals need to be used for decision-making in a distributed decision making environment. In such a process decisions are made by all participants. Such a strategy

poses high demands on the information sharing strategies in the team. Information about decisions made and updates of goals needs to be shared in order to keep such a distributed decision making environment functioning.

In the fourth category; *Effect Control*, the importance of constantly monitoring and updating the process, by which the escalating situation is managed, is stressed. Goals have to be questioned and updated, task descriptions and areas of responsibility have to be negotiated and adapted to the dynamics of the situation and questions like ‘what could be wrong in our understanding of this situation?’ needs to be raised.

### Scenario design

Scenarios developed to practice the generic competencies in escalating situations need to comprise some basic principles of escalating situations, as described by Woods and Patterson (2003):

- There is a cascade of effects in the monitored process.
- The cascade of effects should demand an increase of cognitive activities among the participants.
- The nature of the cascade of effects should demand an increase in coordination among the participants. The process cascading should therefore not be isolated to one particular participant’s area of responsibility, but instead demand different reactions by all participants.
- The cascade and escalation should be a dynamic process.

In addition, in order to maximally utilize the escalation scenario, and enhance people’s generic abilities to manage it, the scenario should:

- Try to force people beyond their learned roles and routines. The scenario can contain problems that are not solvable within those roles or routines, and forces people to step out of those roles and routines.
- Contain a number of hidden goals, at various times during the scenario, that people could pursue (e.g. different ways of escaping the situation or de-escalating it), but that they have to vocalize and

articulate in order to begin to achieve them (as they cannot do so by themselves).

- Include potential actions of which the consequences are both important and difficult to foresee (and that might significantly influence people's ability to control the problem in the near future). This can force people into pro-active thinking and articulation of their expectations of what might happen.
- Be able to trap people in locking onto one solution that everybody is fixedly working towards. This can be done by garden-pathing; making the escalating problem look initially (with strong cues) like something the crew could already familiar with, but then letting it depart (with much weaker cues) to see whether the crew is caught on the garden path and lets the situation escalate.
- Or the scenario, by creating so much cognitive noise in terms of new warnings and events, should be able to trip people into thematic vagabonding—the tendency to redirect attention and change diagnosis with each incoming data piece, which results in a fragmentation of problem-solving.

### **Training generic competencies**

To evaluate the possibilities to build front end organizational resilience in unexpected and escalating situations, by using training programs adhering to the scenario design-criterias above, an experiment was made at the Swedish Civil Contingencies Agency's (at the time of the experiment known as the Swedish Rescue Service Agency) school in Revinge, Sweden. A two-day crisis simulation exercise was used to practice the generic competencies of two experimental groups.

The simulation allows five to seven participants to assume different roles on the bridge of a poorly maintained passenger vessel caught in a stormy night on the Atlantic Ocean (Strohschneider & Gerdes, 2004). The simulation program adheres closely to the principles for scenario design, listed above. During the simulation different events occur (see figure 2 for a simple sketch of the first day scenario) that increasingly demand that the participants establish strategies to apply generic competencies to prevent the situation from escalating beyond their control.

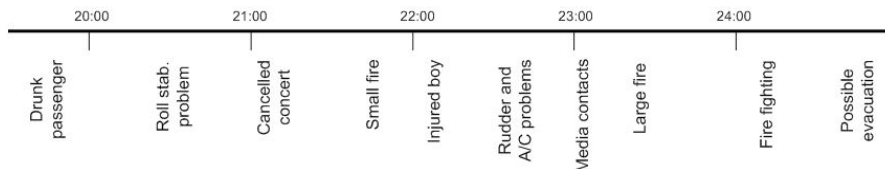


Fig. 2. Simple outline of the first day scenario. Other things might occur depending on the actions taken by the participants along the session

The simulation is complex and run by a computer. The participants are able to affect the development of the situation by the actions they take. The simulation provides information to the participants in the form of computer printouts. Beyond blueprints and maps there is no visualization of the simulation and the participants are not equipped with any predefined strategies for managing upcoming situations. The simulation is part of a two-day training program which, apart from one simulation session (taking about three hours) each day also includes lectures, discussions and debriefing sessions.

From a course with 23 Fire Safety Engineers, on a year-long training program to become incident commanders in rescue services, half received the two-day program before scheduled emergency management staff training on their course. At this stage of their program the Fire Safety Engineers had already gone completed six months of rescue operation training in a rescue service-environment. They had practiced standard emergency response in mostly fires and rode accidents, but also in more complex scenarios like chemical accidents.

During the simulations data collections were made in regards to the students' abilities to use generic competencies. Data collections were later made during the Fire Safety Engineers' emergency management staff training, i.e. where they were performing within the boundaries of their own domain (playing the role of the emergency staff responsible for controlling and coordinating the various actors in a particular emergency operation). That training was given two weeks after the first, and one week after the second, experimental group went through the non-domain specific training outlined above. Each of the four groups (the experimental groups being intact from the prior non-domain

specific training) was individually observed when respectively managing two different emergency scenarios each taking approximately one hour. In these scenarios the teams were situated in a room from which they communicated with other actors (e.g. rescue services on the scene, the alarm central, and anyone else that they wanted to get in contact with) over phones and radio devices. The facilitators running the scenario, and playing all the roles that the participants would like to get in contact with, were situated in another room. Prior to going through the emergency management team training all groups participated in a brief introduction lecture in emergency staff structure (role of the staff and roles in the staff). Differences in the use of generic competencies between those engineers who had received the two-day program and those who had not were observed and analyzed.

In analyzing the performance of the teams, a distinction was made between the two perspectives of *process* and *outcome*. Outcome relates to the quantitative results of the simulation; primarily numbers of injuries and casualties, and damage to the ship (in the case of running the vessel bridge simulation). As a performance measure, however, the outcome of the simulation is dependent on the interaction between the participants and the facilitators of the simulation and therefore renders it a less reliable measure of performance. *Process* refers to qualitative aspects of how the group managed situations encountered in the simulator sessions in relation to accepted and recommended practices for emergency management. When analyzing team performance based on the generic competencies in managing escalating situations we were interested in the qualitative aspects of the *process*.

The two experimental groups were initially not successful in handling the simulated vessel during the non-domain specific simulation program. None of the groups established strategies to handle the high data load, did not state explicit goals, and held rigidly on to their assigned roles and tasks without updating the process to the dynamic nature of the situation. Shortly into the simulation the teams' performance could be described as normal operations-behavior, focusing on what to do to solve current problems based on their urgency rather than trying to refocus on how to create structures and strategies to solve problems based on an assessment of their importance. However both teams did improve their performances at

the second day's exercise and expressed that the exercise had been useful for their training.

During the following emergency management team training an increased ability to apply generic competencies was demonstrated by the experimental groups compared to the control groups that had only received the ordinary emergency operation training.

Both experimental groups chose a goal driven *information management*-process in which participants with the assigned roles of moderators controlled the information flow into and out from the team as well as within the team. One of the teams used a strategy in which the moderator wrote important information on notes that was then distributed to the participant responsible for the particular task of interest. In the high load of incoming information both experimental groups used explicit goal formulations to guide the process of determining what information that was relevant. The control groups did not use such a strategy, but rather sorted incoming information based on their perceived urgency than importance. In none of the control groups were a particular role assigned to manage the information sharing process. Rather the one closest to a calling phone would take the call and then update everyone in the team of the content of the incoming information. In one of the control groups the assigned team leader was during an entire exercise session caught up in talking in the phone.

The *communication and coordination*-process was in both experimental groups characterized by the participants being assigned specific roles. So were the control groups. However when managing the dynamic scenarios the role structures of the control groups immediately broke down and the process of assigning specific tasks to specific participants seemed unorganized and ad hoc. In both experimental groups the role of the assigned team leader was to overview the process and suggest updates of goals, role formulations and tasks. The role of the team leader in the control groups was not as clear, at several times resulting in the team leader being bogged down in telephone and radio communication. In the experimental groups the different tasks to manage were distributed among the different participants and they regularly gathered for briefing each other on the latest decisions made, and other information that they thought was needed for other team



members, based on the shared goals. The control groups also gathered for briefings, but without a clear role structure these briefings were held as soon as any new information was received so that everyone could be updated on all information. With the high load of incoming information this made the control groups spending more time updating each other with all available information than actually making judgments and decisions.

The lack of explicit goals and the broken role structure made the control groups establish a *decision making*-process in which decisions were made in consensus. The experimental groups instead used the explicit goals and role formulations to establish a distributed decision-making process in which decisions were constantly made by all team members, based on their specific tasks to manage. They then used the briefing sessions to brief each other of decisions made and agree upon new goals, rather than using the briefing sessions for actually making decisions. The briefing sessions in the experimental groups were in that way proactive, setting the goals for the decisions to come, while the briefing sessions in the control groups were reactive with a focus on making decisions based on what had already happened. Finding this proactive switch seemed to be of decisive importance for the organizational resilience in escalating situations.

In the dynamic environments that were simulated and the rather short exercises that were conducted none of the teams felt that they had the time to establish an *effect control*-process in the sense of following up decisions made. However the experimental groups used the briefing sessions to update the agreed-upon goals and revise role descriptions based on the development of the situation and the workload on different members of the team.

The ability to establish strategies based on their generic competencies made the experimental groups able to establish more proactive processes, focusing on expectations rather than history, than the control groups which rather were stuck in the inability to sort, prioritize and distribute information and tasks. A summary of the observations made during the staff exercises is shown in table 1.

**Table 1.** A comparison between the groups that had received the simulation training program and the control group's performances at the staff exercises

<b>The experimental groups</b>	<b>The control groups</b>
Indistinct roles at high data load	Hardly any roles
Using goals to establish a proactive process	Reactive process
Briefing sessions to update each other of decisions made and revise the process	Briefing sessions to establish a consensus on what decisions to make
Team-leader over-viewing the process	Team-leader often stuck up in radio-communication and operational decision-making
Assigned participants the task to sort and distribute incoming information	Who answers the phone was selected by chance
Tasks were performed	Thematic vagabonding
Some explicit goals	No explicit goals

The most significant difference between the groups was however observed during the debriefing sessions. During these the control groups, often taking a defensive position, expressed confidence in the roles and procedures that they would use in the "real world" in case of a "real world crisis". They questioned the usability of the staff exercises because of this lack of correspondence with the "real world"-situation. After receiving the non-domain specific training the experimental groups instead expressed the belief that there is no need for exact coherence with the "reality" to gain learning from an experience. In this they showed a deepened knowledge about the unpredictable nature of the escalating crisis, and an understanding of the need to adapt a crisis management system to the dynamics of the escalating situation at hand.

The experimental groups also performed far more qualified analyses of their performance and their shortcomings. Their statements showed understanding of the need for generic competencies and the difficulties in establishing strategies for applying them. A summary of

the observations made during the debriefing sessions is shown in table 2.

**Table 2.** Differences in reasoning at the debriefing sessions after the staff exercises.

<b>The experimental groups</b>	<b>The control groups</b>
Identifies the problems in doing other peoples' work	No understanding for the importance of roles
Discusses the difficulties in formulating explicit goals and the benefits from doing so	Believes implicit goals are capable of guiding the management
Discusses the difficulties in being proactive	Wrongly believes that some actions were proactive
Generally good in evaluating their own actions	Express believes that in real life there are predetermined roles and procedures for all situations

## Discussion

The experiment outlined here shows that designing a training environment in which people really face the uncertainty and unpredictability of escalating situations (whatever the domain) generates "resilient" competencies that are not generated by current training strategies aiming at drilling correct behavior in known scenarios.

It also shows that the non-domain specific training deepens the understanding of the nature of escalating situations and the difficulties in managing them. The potential is great to apply this sort of training in various industries that demand rapid and well structured response to escalating situations, although more research and further testing is needed. However, as a part of the overall aim to increase the understanding of resilient organizations and their characteristics non-domain specific simulation have already proved to be an effective tool.

It also seems as if the training of generic competencies benefits from taking place outside of the participants known domain. This is shown by the control groups' defensive attitude in the debriefing sessions in which they criticized the training for not being an exact replica of "the real world" (thereby suggesting that the entire training

was useless). Having the training taking place in a, for the participants, completely unknown domain seems to give an understanding of the unexpected nature even of “the real world”, and it also seem to remove the prestige-loss that follows from failing in the participants everyday domain. That can be seen by participants often discussing failure in an unknown domain not by taking a defensive position but by more complex discussion about the difficulties of managing any unexpected and escalating situation.

The theoretical framework explaining generic competencies for proactive crisis management proved to be a useful tool for contextualizing statements made, and strategies chosen, by the observed teams in their managing of the unexpected and escalating situations. The framework should, together with the scenario guidelines, also be a useful tool for development of new programs and methods for managing and training of escalating situations in numerous industries like aviation, ship management, health care and the nuclear industry.

The generic competencies in management of unexpected and escalating situations are of decisive importance for any organization to secure resilience in unexpected and escalating situations. These competencies must be practised, not by drilling prescriptive plans and procedures, but by adhering to the principles of the very nature of unexpected and escalating situations. Developing scenarios and training programs based on the guidelines presented here could be one way of starting such a process.

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