Training teamwork skills to prepare for emergency management

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Abstract

In order to reduce the effects of disasters, people in the emergency management organization have to be trained. To be optimally prepared, people need to be trained in those situations they can expect to encounter. However, for the emergency management organization it is impossible to think of every possible situation or event in advance. It is therefore important that the organization is trained to work as a team in such a way that the entire organization can adapt flexibly and efficiently to whatever situation occurs. Training to work as a team means that, next to training task skills to perform individual tasks (like system operation), team members also need to be trained in team skills. Team skills can be distinguished into several dimensions: coordination to jointly perform the team task, the performance of different roles within a team (like leadership) and the development of team attitude. Training team roles and team attitude are team specific activities and therefore less applicable to training for emergency management, which requires generic team skills. Coordination skills to jointly perform the team task are more or less generic teamwork skills. To train these teamwork skills, the different types of coordination activities between team members have to be made explicit and measurable. To do this, a training session has to be structured and teamwork skills have to be described in detail for the specific team and the specific situation that is trained. Proven solutions for some of these problems with shaping team training are available.

Introduction

A characterizing feature of disasters and crises is that they are unpredictable. To reduce the impact of a crisis situation, it is of great importance that a well-prepared team manages the situation. However, it is often difficult to prepare for such a situation, because a crisis can hardly be predicted and therefore it is not clear beforehand exactly what kind of situation to prepare for. There is however, a necessity to train, and in the Netherlands there is an official obligation for emergency management teams to train once a year (Opleiden voor samenwerking in de rampenbestrijding, 1998). In training for optimal performance in unpredictable situations two elements can be distinguished: individual task training and team training (Cannon-Bowers and Salas, 1998). These two kinds of training will be explained further in the next paragraphs.

Individual task training
Up until now, training for emergency management consists mainly of practicing the skills needed for the performance of individual tasks on the actual scene of action, like fire-fighting and providing medical assistance to victims. Skills that have to be learned for individual task performance, are mainly position specific task skills (Smith-Jentsch, Johnston and Payne, 1998). Individual task training often seems to be the less difficult part of training. Individual task training means that everyone in the team knows exactly what his individual tasks are and how to perform them (for example system operation). Within organizations there is often also at least one expert with a lot of experience in performing particular tasks. This expert is therefore the one who can and has to teach new people about these tasks. Training individual task skills is of course the most basic requirement for a member of a crisis management team, but this kind of training will not be sufficient to optimally perform in a team during a crisis situation. Optimal team performance also requires team training.

Team training
To manage a crisis situation, several smaller organizations are joined together into a large emergency management organization. Each subgroup in this organization has its own tasks and responsibilities, and they often have their own training system to train these tasks. The bottleneck for such an assembled organization is that the sub-teams are not familiar with each other's tasks and responsibilities in great detail and are not trained to coordinate and cooperate within the larger organization. This may result in rather inefficient performance, and could actually result in delayed and error-prone reactions to emergencies. So it is very important that participants in every sub-team in the emergency management organization are specifically trained in teamwork skills, that will help them to cooperate and coordinate within and across teams effectively.

Skills that have to be learned for optimal team performance can be divided in three dimensions: team task performance, performance of different roles within a team (like leadership) and the development of team attitude. All of these skills

require some kind of coordination. Training team tasks means tuning the coordination of the individual tasks of the team members. Although this kind of coordination can be prescribed in operational procedures, it also needs to be trained. Training team roles focuses on the sociological part of team training: learning about the different roles that have to be performed in a team (leader, information gatherer, critical thinker etc.) and what role fits in with the way a particular participant works. When it is possible to divide these roles among the team members (that is when participants always work with the same team members), this kind of training can help the team members to perform the team tasks, that is to coordinate their individual tasks. Here, training team roles will not be discussed as such, because in assembled emergency management teams it is not possible to divide team roles in advance. Participants in emergency management teams therefore need to focus on training team tasks rather than on training to perform a particular role within a team. Like training team roles, the last dimension of team training, training team attitude (building team spirit), is a team specific training activity. Because of the team specificity, this kind of training is also less important for emergency management teams and will not be discussed any further here. The only kind of team training, that is more or less generic to teams and to situations, is training team tasks or training teamwork skills. What exactly are teamwork skills? In the figure below (figure 1), the processes that lead to team performance are unraveled into individual skills and teamwork skills. These team processes or teamwork skills can be regarded as general learning objectives, applicable to both different organizations and different scenarios.

	Individual	Team
p r o c e s s	• Position-specific task work skills	• Information exchange • Communication • Supporting behavior • Team leadership

Figure 1. Taxonomy of processes leading to team performance (Smith-Jentsch, Johnston and Payne, 1998. Derived from Cannon-Bowers and Salas, 1997).

Current limitation in team training design

As opposed to training individual skills, training teamwork skills often seems to be the most difficult part of training for emergency management and least understood. The difficulty with team training for emergency management is that it requires complex, but possible scenarios of (un)expected crisis situations, and role players to be able to practice coordination within the team. In addition, to determine the effect of training teamwork skills, team performance measurements are needed. Measuring performance and the effect of a training session is often a weak element and so is providing feedback. Especially, when the feedback should comprise providing advice for improvement of the performance and providing

learning objectives for successive training sessions. The following paragraphs will go further into the matter of these problems with team training.

Possible scenarios of (un-)expected situations
For current training sessions, a trainer often makes up a scenario. In order to make the scenario resemble reality as much as possible, the trainer wants the scenario to provoke stress and time pressure among the team members. To create stress and time pressure, the trainer has to make a complicated scenario with a variety of events that succeed each other rather quickly or emerge at the same time. However, making scenarios more realistic by provoking stress and time pressure does not necessarily make the scenarios appropriate for training. A scenario that is appropriate for training provokes the kind of behavior the team members should be trained in and a scenario that provokes stress and time pressure does not necessarily provoke the team members to perform behavior that leads to optimal team performance.

Role players
To train team tasks (coordination between different team members and between different teams within an organization), it is not only required to have the entire team present, but there also needs to be higher and lower control to perform a certain scenario. It is often not possible to gather as many participants as there would be there during an actual crisis. And even if it would be possible, it probably would not be beneficial for the training session. When all the participants that are present have to be coordinated and when all of them have to learn from the joint training, the training session can not guarantee a beneficial effect for everybody. Different participants may have different learning objectives and one training session can not focus on so many different learning objectives and the coordination of so many different participants at the same time, because all of this also has to be measured and evaluated for an optimal beneficial effect of the training session.

Team performance measurement and feedback
There is often no clear definition of what actually comprises the coordination that the team members should learn during training sessions or how to learn this. The concept of team performance is often perceived as being not very concrete or measurable. In many cases the trainer observes the processes and performances during a training session and asks the team members to give their own opinion about their performance in retrospective. This kind of evaluation does not guarantee an effective training, because the teamwork skills are not explicitly trained and therefore probably not explicitly learned or evaluated.

Team training design: the road ahead

Efforts to solve the problems with team training are generally aimed at designing realistic scenarios. To survey possible risk situations, a risk analysis can be performed for a certain region, so that a training scenario can involve the kind of

risk that is expected. In the Netherlands guidelines are being developed to be able to predict to a certain extent the size of several different crisis situations and the respective range of upscaling that is needed in the particular situation (Leidraad Maatramp, 2000). These activities probably provide very valuable information and insights. It will help in making better plans and procedures for emergency management, but it most probably will not be enough to prepare for emergency management, because it does not explicitly take care of the preparation for team tasks and team skills.

The problems with team training as mentioned above, result from an omission to embed training teamwork skills in an appropriate training structure. To make sure that coordination in teams is explicitly trained during preparation for emergency management, and that this training for coordination is embedded in an appropriate training structure, the entire training should be designed according to certain guidelines. The figure below (figure 2) shows the Event Based Approach to Training (EBAT) that can structure the design of training, because it shows the relation between task requirements, training goals, scenarios and scripts, performance measures, performance diagnosis and feedback.
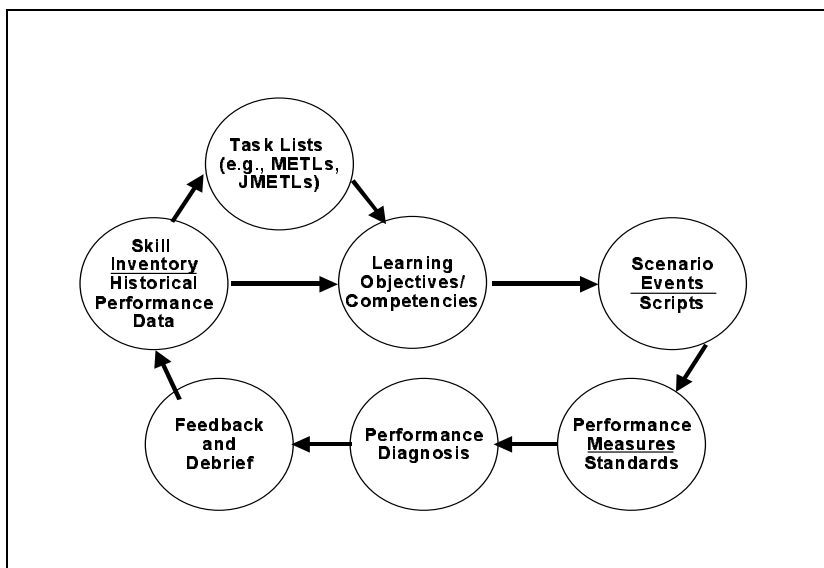

Figure 2. The Event-Based Approach to Training (Schaafstal, Johnston, Oser, 2000).

The Event-Based Approach to Training can be contrasted with simulation training that is somewhat more characterized by "free-play". The free-play method for example does define training goals at the beginning of the simulation, but the instructors are free to inject extra events in the training as they see fit. When new events are invented and injected on the spot, it often is not clear what purpose these new events serve and what kind of reaction of the participants is expected. Consequently, feedback about the performance during training will be less meaningful and specific. Because of this there is no opportunity to formulate

appropriate training goals and learning objectives for subsequent training sessions (Johnston, Smith-Jentsch & Cannon-Bowers, 1997; Stroomer and Schaafstal, in prep.).

Based on the EBAT method, the following points will describe some guidelines that can structure the design of training and training scenarios.

- **Task analysis**. A thorough design of a structured training starts with a task analysis. A task analysis can be performed on the basis of a realistic or operational scenario. One way to perform a task analysis is to produce a descriptive model of the processes that take place during a scenario. Descriptive modeling proved to be an appropriate method to gain insight in complicated processes in command and control (Essens, Post, and Rasker, 2000). The modeling implies that the entire process is broken down into its essential elements to decrease the complexity of the analysis. This way, modeling can be an appropriate way to learn to understand the crisis system. In addition, a model can also serve as a visualization of the system to facilitate communication. A closely related technique for task analyses is making Team Operational Sequence Diagrams (TOSD's). Operational Sequence Diagrams depict information flows, with respect to sending, receiving and processing information, making decisions, and performing an action. The team processes can be visualized by horizontally depicting different team members, and distinguishing the steps comprising the team task performance for each of the team members in a time-dependent sequence (figure 3). A TOSD provides an explicit representation of the interdependencies between the team members' task performances, and an adequate description of time order of these tasks (van Berlo and Stroomer, 2000).
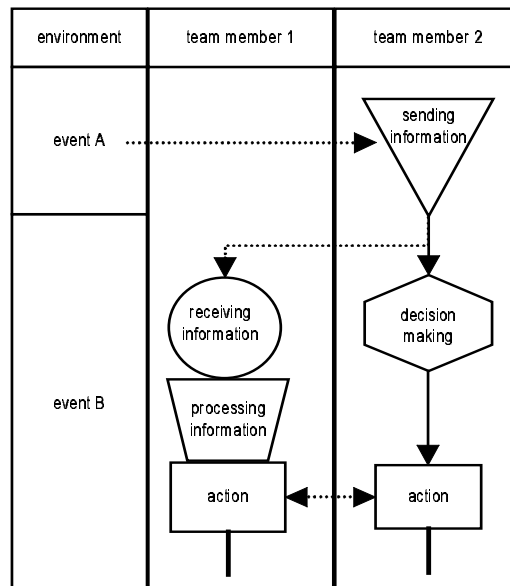

Figure 3. The format of a Team Operational Sequence Diagram (TOSD)

- **List of required tasks and skills**. The output of the task analysis or the descriptive model will be an inventory of tasks that have to be performed to handle the scenario. Based on this inventory of tasks, the knowledge and skills, that team members should have at their disposal to properly perform these tasks, can be determined. This outline of required knowledge and skills, can help participants of an organization to verify what knowledge and skills they have already mastered and what knowledge and skills still have to be learned and practiced.
- **Learning objectives.** When one knows exactly what should still be learned and practiced one can assess learning objectives for a training to be. These learning objectives can be divided in individual learning objectives and team objectives. For instruction and training of tasks at an individual level there is no need to bring together all the members of a team, whereas for training of tasks at the team level the gathering of the team members is requisite. After all, team training involves the interaction between team members. Furthermore, the different participants first have to master the skills for the performance of individual tasks at a reasonable level before training as a team will avail. In figure 1, the processes that lead to performances are unraveled at the individual and at the team level. These processes are generic for team performance. The team processes in this figure can therefore be applied as generic learning objectives to different organizations and to different scenarios. The four learning objectives at the team level (figure 1) can be specified by the following sub-objectives (Smith-Jentsch et al., 1998):
  - Information exchange: seeking information from all available sources, passing information to the appropriate persons before being asked, providing "big picture" situation updates
  - Communication: using proper phraseology, providing complete internal and external reports, avoiding excess chatter, ensuring communications are audible and ungarbled
  - Supportive behavior: correcting team errors, providing and requesting backup or assistance when needed
  - Leadership: providing guidance or suggestions to team members, stating clear team and individual priorities
- **Training method, training scenario**. Based on the learning objectives, a method for training can be determined and a scenario can be developed. The method for training and the training scenario have to be developed in a way that they provoke the behavior that is required based on the learning objectives. The events in a scenario, designed according to the determined learning objectives, should give the participants the opportunity to practice the required behavior. The behavior provoked by different kinds of events in the same scenario can be focused on one and the same learning objective and therefore provide a richer opportunity to learn the required skills. A specific method for training teamwork skills is the concept of Team Dimensional Training (TDT). In this concept instructors provide an exercise prebrief, they observe the team's performance during the training, they diagnose the team's strengths and weaknesses after the training and they guide the team through a

self-critique of their performance. These four phases are all based on the four dimensions of teamwork. The cycle of these phases helps the team to diagnose the strengths and weaknesses of their teamwork processes and to establish goals for improvement. This training, that aims for team self correction, proved to be an effective means to enhance team performance. The positive effect of TDT results from: (1) more effective teamwork processes, (2) a greater proportion of team members that admit mistakes and that offer and request feedback, (3) a shared mental model and therefore a more effective mental model of teamwork, (4) a better diagnosis of teamwork breakdowns because of a more accurate mental model of teamwork.

- **Tools**. When the training method and the kind of scenario are determined, the question is whether or not this kind of training could be supported by using tools, and if so, what kind of tools this should be. Tools can range from paper based checklists to computer based simulation environments for training. Especially for training teams in emergency management, supporting tools can facilitate the coordination and the overview during the training session. Tools that facilitate coordination and overview for example support the development of shared situation awareness for the trainees or for the higher and lower control (such as Crisiskit and Gamma EC, developed by TNO)

- **Performance measures and diagnosis**. Finally, it has to be determined how to measure the quality and effectiveness of the performance and of the processes underlying that performance and how feedback about this can best be provided to the trainees. The question is how to measure the process during task performance. Here, it is also possible to use tools that support the measurement and diagnosis during the training session. When the learning objectives are explicitly described in detail at the level of the behavior that is required, this list of required behavior can serve to measure the quality of the process and its outcome. The Command and Control Process Measurement Tool (C2PMT) was developed especially to asses and evaluate the processes in team performance (van Berlo and Schraagen, 2000). This tool consists of a list of performance indicators, each of which is extended with several concrete and measurable activities. And from the assessment of the specific activities this tool also supports the inversion to the generation of a more general assessment of the entire process. Putting together the assessments of the different processes yields a diagnosis of the effectiveness of the training session, suggestions for improvement and an indication of the learning objectives on which the next training session should focus. To support the integration of the observations and assessments the Mobile Aid for Training and Evaluation (MATE) was developed (Lyons and Allen, 2000). MATE is a set of software tools that are implemented on small, lightweight portable computers, so that they can be used in field exercises. The observations can be linked to the scenario that is taking place. This enables the linking of observations of the team processes (the four teamwork dimensions), at what time in the scenario these processes showed strengths or weaknesses and the observations of the actual team performance or the outcome. All these data

can be integrated at a central computer, which makes it easier to conduct a central briefing at the end of training session.

Finally, it appears that although there are some problems with training teams for emergency situations, there are also some solutions. The guidelines, as discussed above, show that structuring the development of team training makes the concept of team training less complicated and easier to handle. A structured training for interactive behavior within a team leads to better teamwork and therefore to better team performance. Although such training sessions can be conducted with relatively simple means (TDT and C2PMT), it will lead to vigorous management in unexpected situations.

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Author Biography

Simone Stroomer studied cognitive ergonomics at the University of Utrecht in The Netherlands., She obtained her Master's degree in 1999. The research carried out for this degree was carried out at TNO Human Factors, and was geared towards shared mental models and communication strategies in command and control teams. Since then, she has been employed by TNO Human Factors, specializing in team training.