# IMPROVING LEARNING FROM EMERGENCY MANAGEMENT TRAINING

**Sweden and The Netherlands are teaming up**

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**Keywords:** Team training, scenario-based training, performance measurement, feedback, supporting tools

## Abstract

When an emergency occurs, it is of the utmost importance that the teams managing this emergency are well prepared. In order to achieve this, training teams, also in a multi service context, is a necessity. A major misconception is that, just by being involved in training, the team members will learn from it. Teams will, however, only learn from a training event when several conditions are met. First, the training should be based on valid training objectives. The training should be systematically designed to guarantee that the team could show the behavior as described in these training objectives. Secondly, it cannot be predicted what kinds of emergencies will occur and which outcomes are best. Therefore, the focus of the training should not be on the product, but rather on the team processes. Next, the measurement of the team's performance should be based on the training objectives and capture the team processes. Besides, a systematic performance measurement will facilitate the feedback to the team. Finally, the training staff, especially the observers and debriefers, should be provided with adequate supporting tools. Both TNO Human Factors and FOI have many years of research and training experience in emergency management. In this paper, we will give our view on training emergency management teams following the conditions mentioned before: design and development of team training, training team processes, performance measurement and feedback and supporting the training staff. We will end with a discussion in which we will share our intentions on teaming up together.

## 1 Systematic design and development of team training

The realization grows that just putting together a team of individual experts does not make an expert team (Salas, Cannon-Bowers, & Johnston, 1997). In recent years, it has been shown that a good approach to training teams with complex training technology is linking training goals to events in training scenarios in a controlled fashion. This is called the 'event-based approach to training' (EBAT: see Figure 1) (Hall, Dwyer, Cannon-Bowers, Salas, & Volpe, 1993; Johnston, Smith-Jentsch, & Cannon-Bowers, 1997).

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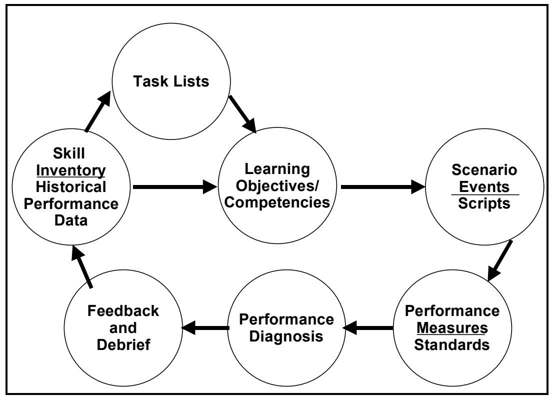
Figure 1: The EBAT framework (Johnston, Smith-Jentsch & Cannon-Bowers, 1997)




The EBAT framework starts at the top left hand side with the tasks to be performed by the team. The basic assumption is that training should provide opportunities for practice, enabling a team to develop critical competencies to conduct their mission, or, to manage an emergency. The team and individual behavior indicating these competencies is explicitly described in the learning objectives. Based on these learning objectives, the training scenario is developed. A training scenario consists of several events that are specifically designed to trigger the team members' behavior as described in the learning objectives. Events are critical incidents that can occur during the course of the emergency and on which the team should react. For every event, the observers know what behavior the team should demonstrate, and which prototypical mistakes could be made. This facilitates a systematic observation of the team members' behavior. Based on these measurements the training staff is able to make a valid diagnosis of the performance and to assess to what extent the learning objectives have been achieved. During the debrief, feedback is provided to the team and, together with the team, the lessons learned are formulated. The strength of EBAT is the systematic linkage among these components. Without this linkage is impossible to ensure that team members will have learned anything from the training.

## 2 Training team processes

During the course of training, and that includes the debriefing, training methods should be employed to ensure the team's learning (see also Van Berlo, Stroomer & Van den Bosch, 2003). Two training methods, that have proven their value for training teams and their leaders, will be described in this section: Team Dimensional Training and Critical Thinking. A computerized training environment that enables the training of team processes, CrisisKit, will be described as well.

### 2.1 Team Dimensional Training (2.1)

An important distinction that resulted from research on team training is the concept of 'taskwork' and 'teamwork' skills underlying team performance (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; Cannon-Bowers & Salas, 1998). Taskwork consists of the position-specific requirements of the job, which are usually technical in nature (such as operating a certain workstation). Teamwork has more to do with processes that individuals use to coordinate their actions. Both taskwork and teamwork skills are important in any given team and team member (see Table 1).

Table 1. A distinction of skills related to training teams and team members (Van Berlo, 1997)

| Level | Content: Taskwork | Content: Teamwork |
|---|---|---|
| Individual | 1. individual task skills (e.g. plotting of data) | 2. social and communication skills to function in a group (e.g. leadership skills) |
| Team | 3. team task skills (e.g. conducting an evacuation plan) | 4. social and communication skills to function as a team (e.g. supporting each other) |

Smith-Jentsch, Johnston and Payne (1998) have further delineated the skills underlying teamwork, and they identified four dimensions underlying effective teamwork: information exchange, communication, supporting behavior, and initiative/leadership. Information exchange includes seeking information from all available sources, passing information to the appropriate persons before being asked, and providing situation updates on a regular basis. Communication includes using proper phraseology, providing complete internal and external reports, avoiding excess chatter, and ensuring communications are audible. Supporting behavior includes correcting team errors, and both providing and requesting backup or assistance when needed. Finally, initiative/leadership includes providing guidance or suggestions to team members, and stating clear team and individual priorities.

These four generic teamwork skills can be regarded as key competencies of any member of an emergency management team. Learning how to work together is especially important for teams consisting of team members that frequently vary. Being a member of an emergency management team is often not a primary job; only when an emergency occurs, the team members are called together and the team is formed. In these cases, team members should possess adequate teamwork skills.

Team Dimensional Training (TDT) is a training methodology designed to aid instructors in training and evaluating teamwork skills (Smith-Jentsch *et al*., 1998; Schaafstal, Johnston & Oser, 2000). This is accomplished through a four step training cycle: briefing a team, observing a team's performance during a training exercise, diagnosing this performance, and de-briefing the team about its performance. During the briefing phase the four teamwork dimensions delineated by TDT, and behaviors associated with each, are presented to the team by the trainer. During the exercise itself, the observers gather positive and negative examples of behaviors that fall under each TDT dimension. One or two of the best examples (i.e., most relevant to the training objectives) under each dimension are summarized for the debrief. During the debriefing phase, the trainer facilitates the discussion of the team's performance, providing positive and negative examples of team behavior (Smith-Jentsch, *et al*., 1997).

## 2.2 Critical Thinking

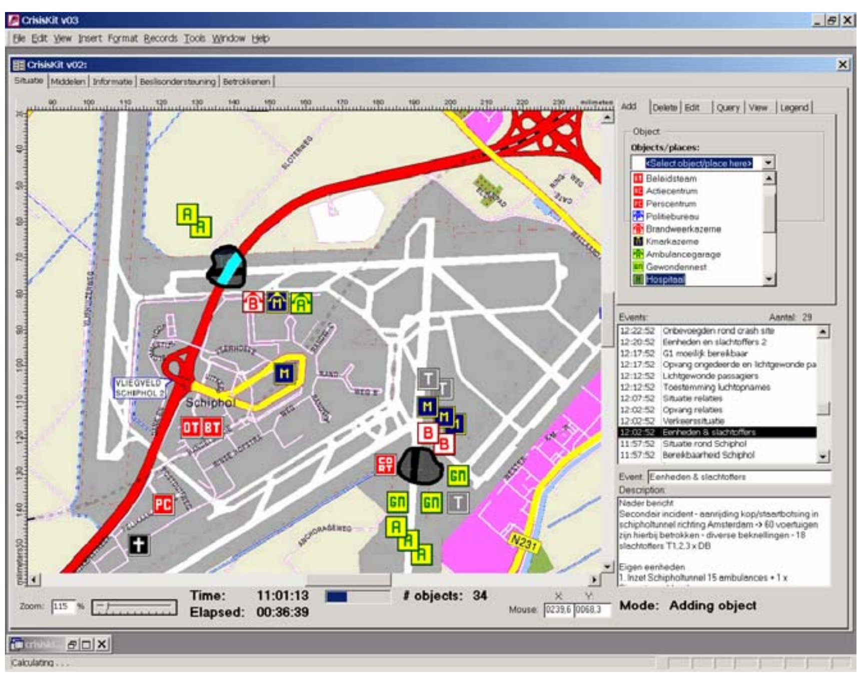
Expert decision-makers treat decision making as a problem-solving process. They use familiar elements to construct an initial interpretation of the situation. The plausibility of this interpretation is verified by explicitly challenging its critical assumptions. When faced with a complex and unfamiliar problem, experts collect and critically evaluate the available evidence, seek for consistency, and test assumptions underlying an assessment. They then try to integrate the results of the processes in a comprehensive, plausible, and consistent story explaining the actual problem situation. Experts assess the risks associated with potential courses of action by consulting their experience as well as by means of mental simulation (Zsambok & Klein, 1997). Novices, on the other hand, tend to interpret situations more superficially, and often assess the nature of a situation on isolated cues, without taking the larger pattern into account.

Furthermore, they are often not explicitly aware of the assumptions they maintain, hence are less critical about them, and are more likely to 'jump to conclusions'.

The knowledge of experts and the strategies they employ when dealing with complex situations have been used to develop a new form of training in decision making and risk management: Critical Thinking (Cohen & Freeman, 1997; Van den Bosch & Helsdingen, 2001; Van den Bosch & van Berlo, 2002). The aim of Critical Thinking training is to keep trainees from assessing situations solely on isolated events. Instead, trainees are taught how they can integrate the available information into its context, which may include elements as: the history of events leading to the current situation, the presumed goals and capacities of the enemy, potential risks associated of the environment, the opportunities of the enemy, etc. Trainees are instructed how to identify (in)consistency and uncertainty, and how to adjust or refine their story by deliberate testing and evaluation. Critical Thinking training also includes a procedure for handling time constraints.

<u>2.3 CrisisKit</u>
CrisisKit is a training and support program that can be flexibly adjusted to many situations, for example to different organization structures and to different assignments of tasks and responsibilities to teams and their members (Van Rijk, Post, Van Verselveld, 2001). The primary user interface consists of a number of displays. It has a large screen display visible for every team member; this is shared situation screen, displaying for example a map of the disaster area. This display is also available on every team member's individual workstation (see Figure 2). If this is required by their tasks, team members can place objects on this display, as well as links to additional information concerning these objects. CrisisKit has an overview screen on which casualties can be registered and a decision support tool helping team members to deliberate over important issues. Further, it has an e-mail system, implemented with Microsoft Netmeeting, through which the participants can interact with each other.

<u>Figure 2: A screenshot from the CrisisKit system</u>




CrisisKit supports the training staff during the development and conduct of scenarios. It is possible to completely prepare an exercise in advance, including creating information events and time stamping them. During the conduct of the scenario, an overview of events is presented. In specific time slots during the scenario, CrisisKit automatically sends events to team members. They have to respond to these events, for example by placing an object on the situation screen, or by informing colleagues. Besides, the order of events can be changed. Finally, it is possible to temporarily freeze the scenario, for example for a short briefing to the team, and to adjust the scenario to the specific behavior of the team. A more detailed description of CrisisKit, and case studies in the field of emergency management, can be found elsewhere (Van Rijk & Zwartenkot, 2003; Schaafstal & Post, 2002).

## 3 Performance measurement and feedback

Retrospective analysis of system trajectories offers a way toward understanding the interplay between people and artifacts during full-scale emergency-response exercises. In fact, this approach has been adopted to support reflection in training (Jenvald, 1999; Morrison & Meliza, 1999), to promote learning the lessons from real operations (Johnson, Birnbaum, Bareiss & Hinrichs, 2000; Jenvald, Morin & Kincaid, 2001), and to help investigating critical decisions (Hoffman, Crandall & Shadbolt, 1998). Woods (1993) proposed behavioral protocols as a means of combining data from a variety of sources to account for the behavior of operators and systems in relation to changes in a dynamic environment over time. Contrasting the traces of embedded systems and environmental factors with the human actors' interpretations and actions enables new ways of examining the cooperative management of complex processes. Morin, Jenvald, and Thorstensson (2000) described how computer models of tactical operations could be constructed from data collected from multiple sources in the field.

In this section, two examples will be provided of how technology can support the training staff in performance measurement, assessment and debriefing: the MIND visualization framework, and a hand-held tool for distributed team training.

### 3.1 The MIND visualization framework

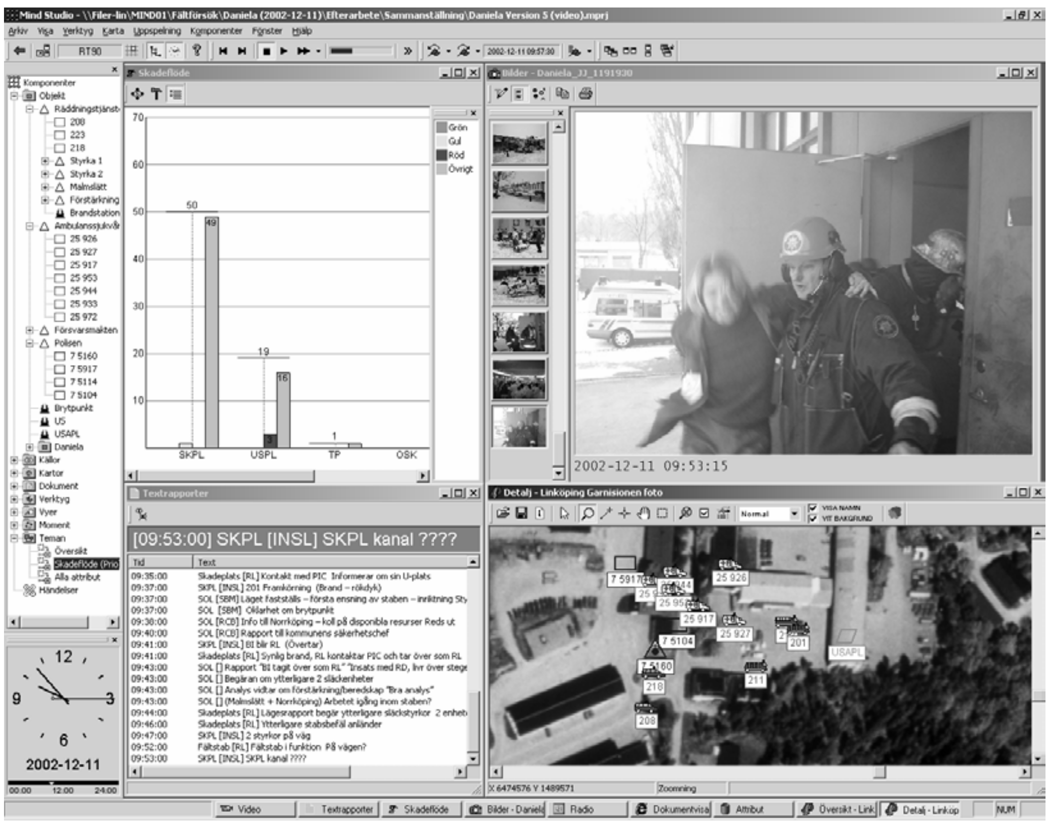
The need to handle large amounts of data pertaining to diverse aspects of distributed rescue operations motivated our development of the MIND visualization framework. MIND uses data collected in the real environment, regardless if it is a live operation or a training exercise, to construct a time-synchronized, discrete-event representation of the course of events of the operation. The resulting model is a multimedia representation of the distributed tactical operation (Morin, 2002), that can be presented in a visualization tool that supports time-based navigation and animation using multiple views. MIND includes a component model that enables the development and deployment of customized models and visualizations to meet the requirements of different domains, research questions, and target audiences. MIND has been used to support assessment of emergency plans (Jenvald *et al*., 1998) and for supporting after-action reviews in different settings (Crissey, Morin & Jenvald, 2001; Thorstensson, Tingland *et al*., 2001). Examples of visualization views deployed with MIND are:

- **Map view:** Presents the time-dependent location of actors using symbols in customizable maps
- **Photograph view:** Displays time-stamped and annotated digital photographs of actors at work
- **Video view:** Displays time-stamped video sequences of activities in the operation
- **Audio sequence view:** Provides random access to time-stamped audio data from various communication networks
- **Communication link view:** Presents audio data represented both as communication links and audio sequences
- **Dynamic timeline:** Shows an overview of selected events to support temporal navigation
- **Document view:** Displays written information, for example plans, standard operating procedures, and orders

A more thorough description of the MIND framework can be found in Morin (2001). MIND also includes a set of communication-analysis tools (Thorstensson, Axelsson *et al*., 2001; Albinsson & Morin, 2002) supporting evaluation of the communication dimension in TDT, which can be used to improve trainer feedback during debriefing sessions.

Figure 3 shows a screenshot from the MIND system with data from the Daniela exercise. The exercise was conducted in Linköping on December 11, 2002. The screenshot shows the situation 09:53. The component tree (top) and the mission clock (bottom) are displayed to the left. A detailed map based on an aerial photograph (bottom right) show the location of rescue vehicles (symbols with numbers). To the right is a photo view displaying a digital photograph of a firefighter helping a victim out of a smoke-filled building. To the left at the bottom is a view that shows the textual reports from various subject-matter experts acting as observers during the exercise.

Figure 3: A screenshot from the MIND system with data from the Daniela exercise.




Using the MIND methodology and visualization framework in emergency response training supports the training staff in providing a frame of reference for the trainees and a context for team actions and performance measurements. During debriefing sessions emphasis can be made on *why* things happened and actions where taken, instead of *what* happened.

## 3.2 Mobile support during distributed team training

Distributed team training, often in joint settings, is becoming more and more important in emergency management training today. As the teams and training staff are not physically on the same location, special attention should be paid to performance measurement and feedback. The question is what should be measured in distributed training and how should the training staff be supported in doing this? Previous research has shown that communication, information exchange, team leadership and supporting behavior (Smith-Jentsch *et al.*, 1998) are important dimensions of team performance. These dimensions are even more important for distributed teams, due to the lack of face-to-face contact. In addition, preparation before task performance as well as a common understanding of the various roles (convergence) seem to be crucial factors in the success of distributed teams (Rocco, 1998). To improve the training effectiveness, performance measurement and feedback should be conducted systematically and in a standardized manner across all distributed teams. Observations of the processes within the distributed team should be consistent among the various (distributed) observers in order to provide consistent feedback to the team members.

Previous research on team performance measurement resulted in the Command and Control Process Measurement Tool (C2PMT; Van Berlo & Schraagen, 2000). The C2PMT is a generic checklist comprising standards a command & control team should meet. Every standard is briefly clarified and explained in order to ensure a uniform interpretation by the evaluators: it describes the contents and coverage of the standard and, if applicable, the relation with other standards. For every standard, performance indicators have been formulated giving concrete form to the standard enabling the evaluators to observe and interpret the team processes. These performance indicators are formulated concisely, and are easily scored in terms of whether the behavior was observed or not. The evaluator can explain and illustrate every observation: this contains both positive and negative examples being observed. Inclusion of these example behaviors is important for providing feedback in the final written report and for enhancing learning opportunities. The C2PMT was adjusted for distributed team training (C2PMT-Distributed). With this tool the evaluator can score targeted behaviors that are both important within the team and between the distributed teams.

Based on previous research on the Mobile Aid for Training Evaluation (Lyons & Allen, 2000), the C2PMT-D was implemented on a hand-held device. Some functional features of this device are digital ink, drop down windows, on call checklists and a debrief organization screen that facilitates the observer's preparation of the after action review. The observer can easily send data to a central database. At the central database the data of all observers of the distributed team are analyzed and then sent back to the observer, who can now complete the debrief (Van Berlo, Hiemstra & Hoekstra, 2003). Figure 4 shows the C2PMT-D tool.

Figure 4: The C2PMT-D tool

The mobile tool with the C2PMT-D helps the training staff in observing team performance and in quickly generating, sending and receiving data to support his evaluation of the distributed team training. Besides, it can also improve the quality of the observations made because of the standardized format in which targeted behaviors are scored.

## 4 Discussion

The organizations the authors are affiliated with, have extensive experience in emergency management training, both within civil services and the military. The strength in teaming up with each other is the combination of human factors knowledge, computer science and training experience. The systematic design, development and evaluation of training emergency management teams, as described in the EBAT framework, can be improved by combining the methods and tools already available. Coupling CrisisKit with the MIND system can result in a more controlled training environment with improved debriefing and after-action review capability. An integration of the MIND system and the hand-held C2PMT-D can enhance the quality and speed of the data collection and analysis. Supporting the training staff in using these tools, and in applying appropriate methods for debriefing exercises, will definitely increase the added value of training.

New methods and tools could aim at the retention of skills learned during emergency management team training. Quite often lessons-learned are formulated, but easily forgotten as well. Providing take home packages for the team members, comprising the most important results of the training, could be a solution. Another possibility in this respect is the development of web-portals, making the lessons-learned available also for personnel that was not present at the training. This also relates to the increasing integration of learning and working. Personnel do not only learn during formal training activities, but more and more on the job. Often it is quite difficult to gather all members of an emergency management team to engage in a training, let alone several teams in case of a distributed team training. A possible solution could be to use simulated, synthetic team members: in this case a team training can be conducted although not all human team members are actually present (Schaafstal, 2002). Another promising possibility is conducting e-learning courses or a web-based training with (a)synchronous communication between team members. Tactical decision games, presenting challenging emergency management problems, could be placed on a web page or in a relevant journal; possible solutions can be published promoting discussions between members of the emergency management community and enhancing (informal) learning. Learning and working can also be integrated by applying the same methods and tools. During an actual operation an emergency management team can be supported by CrisisKit, the performance can be monitored using the MIND system, while the debriefing can be structured using TDT and the MIND visualization framework. Making these methods and tools more suitable for supporting real life emergency management teams is a big challenge.

Integrating and refining existing methods and tools, as well as developing new methods and tools, should be based on research. In our view, the combination of empirical studies in more or less controlled situations on the one hand, and practice oriented field studies on the other, will provide the most optimal results. Our joint efforts are aimed at actually improving learning from emergency management training. Technological support is useful, but it is still the human personnel making the critical decisions. Enhancing learning, and improving the quality of team processes, are of key importance in increasing the probability that actual emergencies will be managed successfully.

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## References

Albinsson, P.-A. & Morin, M. (2002). Visual Exploration of Communication in Command and Control. In Proceedings of the Sixth International Conference on Information Visualisation (IV'02), pp. 141-146, 10-12 July, London, England.

Cannon-Bowers, J.A. & Salas, E. (1998) (Eds.). Decision Making under Stress: Implications for Individual and Team Training. Washington, DC: American Psychological Association.

Cannon-Bowers, J.A., Tannenbaum, S., Salas, E., Volpe, C. (1995). Defining competencies and establishing team training requirements. In R. Guzzo & E. Salas (Eds.), Team Effectiveness and Decision Making in Organizations. San Francisco, CA: Jossey Bass.

Cohen, M.S., & Freeman, J.T. (1997). Improving critical thinking. In: R. Flinn, E. Salas, M. Strub & L. Martin (Eds.), Decision making under stress: emerging themes and applications (pp. 161-169). Brookfield, Vermont: Ashgate.

Crissey, M. J., Morin, M., and Jenvald, J. (2001). Computer-Supported Emergency Response Training: Observations from a Field Exercise. In Proceedings of the 12th International Training and Education Conference, ITEC'2001, Lille, France.

Hall, J.K., Dwyer, D.J., Cannon-Bowers, J.A., Salas, E. & Volpe, C.E. (1993). Towards assessing team tactical decision making under stress: The development of a methodology for structuring team training exercises. Proceedings of the 15th Annual Interservice / Industry Training Systems and Education Conference (pp.89-98). Washington, DC: National Security Industrial Association.

Hoffman, R. R. & Crandall, B. & Shadbolt, N. (1998). Use of the critical decision method to elicit expert knowledge: A case study in the methodology of cognitive task analysis. Human Factors, 40(2), 254–276.

Jenvald, J. (1999). Methods and Tools in Computer-Supported Taskforce Training. Linköping Studies in Science and Technology, Dissertation No. 598, Linköping: Linköpings universitet.

Jenvald, J., Rejnus, L., Morin, M., and Thorstensson, M. (1998). Computer-supported Assessment of Emergency Planning for Rescue Operations. User report FOA-R--98-00910-505--SE, Swedish Defence Research Agency, Linköping, Sweden

Johnson, C., Birnbaum, L., Bareiss, R. & Hinrichs, T. (2000). War stories: Harnessing organizational memories to support task performance. Intelligence, 11(1), 16–31.

Johnston, J.H., Smith-Jentsch, K.A., & Cannon-Bowers, J.A. (1997). Performance measurement tools for enhancing team decision making. In M.T. Brannick, E. Salas, & C. Prince (Eds.), Assessment and measurement of team performance: Theory, research, and applications (pp. 45-62). Hillsdale, NJ: Erlbaum.

Lyons, D.M., Allen, R.C. (2000). Mobile aid for training and evaluation (MATE): a hand-held configurable set of performance and measurement tools. Proceedings of the 22th Interservice/Industry Training Systems and Education Conference (I/ITSEC), Orlando, Florida, 27-30 November 2000 (pp. 662-671).

Morin, M., Jenvald, J. & Thorstensson, M. (2000). Computer-supported visualization of rescue operations. Safety Science, 35(1-3), 3–27.

Morin, M. (2001). MIND—Methods and Tools for Visualization of Rescue Operations. In Proceedings of The International Emergency Management Society´s Eighth Annual Conference, TIEMS'2001. June 19-22, Oslo, Norway.

Morin, M. (2002). Multimedia representations of distributed tactical operations. Linköping studies in science and technology, Dissertation No. 771, Linköping: Linköping University.

Morrison, J. E. & Meliza, L. L. (1999). Foundations of the after action review process. Special report 42, Alexandria: United States Army Research Institute for the Behavioral and Social Sciences.

Rijk, R. van, Post, W.M., & Verseveld, O.H. van (2001). CrisisKit: Development and evaluation of an environment for teamwork processes during crisis management (in Dutch) (Report TM-01-D016). Soesterberg: TNO Human Factors.

Rijk, R. van, & Zwartenkot, J.L. (2003) Using CrisisKit and roleplayers for training emergency management teams. Proceedings of the tenth TIEMS conference, June 3-6, Sophia Antipolis.

Rocco, E. (1998). Trust breaks down in electronic contexts but can be repaired by some initial face-to-face contact. Proceedings Computer-Human Interaction [CHI], Los Angeles, CA, April 1998 (pp. 492-502).

Salas, E., Cannon-Bowers, J.A., & Johnston, J.H. (1997). How can you turn a team of experts into an expert team?: Emerging training strategies. In C. Zsambok, & G. Klein (Eds.), Naturalistic Decision Making – Where are we now? (pp. 359-370). Hillsdale, NJ: Erlbaum.

Schaafstal, A.M. (2002). Training a Team with Simulated Team Members. Proceedings of the 46th Annual Meeting of the Human Factors and Ergonomics Society Conference, September 30 – October 4, 2002, Baltimore, Maryland, USA. Santa Monica, CA: Human Factors and Ergonomics Society.

Schaafstal, A.M., Johnston, J.H., & Oser, R.L. (2001) Training teams for emergency management. Computers in Human Behavior, 17, 615-626.

Schaafstal, A.M., & Post, W.M. (2002). Modeling and Simulation for Training and Support of Emergency Management Teams: The Development of CrisisKit. Proceedings of the First Swedish-American Workshop on Modeling and Simulation. Orlando, FL, November 2002.

Smith-Jentsch, K.A., Johnston, J.H., & Payne, S.C. (1998). Measuring Team-Related Expertise in Complex Environments. In: J.A. Cannon-Bowers & E. Salas (1998) (Eds.). Decision Making under Stress: Implications for Individual and Team Training. Washington, DC: American Psychological Association.

Thorstensson, M., Axelsson, A., Morin, M., & Jenvald, J. (2001). Monitoring and Analysis of Command-Post Communication in Rescue Operations, Safety Science, 39(1–2), 51–60.

Thorstensson, M., Tingland, B., Björneberg, A., & Tirmén-Carelius, M. (2001). Visualization of an Interagency Exercise in the Stockholm Underground. In Proceedings of The International Emergency Management Society´s Eighth Annual Conference, TIEMS'2001. June 19-22, Oslo, Norway.

Van Berlo, M.P.W. (1997). Team training vs team building and cooperative learning: Defining the Field of Research (Report TM-97-B019) (in Dutch). Soesterberg: TNO Human Factors.

Van Berlo, M.P.W., Van den Bosch, K., & Stroomer, S. (2003). Training of emergency management teams (in Dutch). Opleiding & Ontwikkeling, pp. 13-16.

Van Berlo, M.P.W., Hiemstra, A.M.F., & Hoekstra, W. (2003). Supporting observers during distributed team training – the development of a mobile evaluation system. Proceedings of the NATO Symposium on Advanced Technologies for Military Training. October 13-15, 2003, Genoa, Italy.

Van Berlo, M.P.W., & Schraagen, J.M.C. (2000). A generic assessment tool for evaluating C2 exercises. Proceedings of the 22th Interservice/Industry Training Systems and Education Conference (I/ITSEC), Orlando, Florida, 28-30 November 2000 (pp. 652-660).

Van den Bosch, K., & Van Berlo, M.P.W. (2002). Training and evaluation of tactical command (Report TM-02-A025) (in Dutch). Soesterberg: TNO Human Factors.

Van den Bosch, K., & Helsdingen, A. (2001). Critical thinking in tactical command: a training study. Proceedings of the Conference on Simulation Technology for Training (SimTecT). Canberra, Australia.

Woods, D. D. (1993). Process-tracing methods for the study of cognition outside of the experimental psychology laboratory. In G. A. Klein, J. Orasanu, R. Calderwood & C. E. Zsambok (Eds.), Decision making in action: Models and methods, pp. 228–251, Norwood: Ablex.

Zsambok, C. & Klein, G. (Eds.) (1998). Naturalistic Decision Making. Mahwah, NJ: Erlbaum.