Developing an EVADE (EVAluation and DEbriefing) Method to Assess Trainees during Crisis Management Training for Major Hazards and Feedback Them

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Lessons learnt from past accidents emphasize that major crisis management's limitations are mainly characterised by collective failures (organizational, behavioural and cognitive), absence and/or maladaptive training of actors (Guarnieri et al., 2015; Heiderich, 2010; Lagadec, 2012). Indeed, the training exercises have limitations such as the assessment: it focuses on the technical skills of the group, not on non-technical skills mobilized, and it is not conducted in real time. The presentation of the results during the debriefing is also incomplete (Tena-Chollet, 2012). The present work aims to present our method to assess trainees during crisis management training and feedback them, the EVADE (EVAluation and Debriefing) method. This method required the upstream creation of a typology of training objectives to be integrated into training and the identification of technical and non-technical skills of a crisis cell. The approach is based on behavioural markers which are used to identify mobilized skills of a group during exercise. The assessment tool is presented, through its construction and its functioning, and it is tested with trainees in crisis management exercises. Various examples of the results of restitution are then proposed in this paper.

1. Introduction

The crisis management team (often called the 'crisis cell'), works in a dynamic environment in suboptimal conditions. Its objective is to implement measures based on anticipation, vigilance, and intervention to provide the appropriate response to the crisis (Lachtar, 2012). A crisis erupts abruptly, and is complex for decision-makers to manage, even more so during the acute phase, which combines time pressure, uncertainty, and decisions taken under urgent conditions (Crocq et al., 2009). This acute phase, which follows the event triggering the crisis, generates stressful situations and the need for rapid coordination of those involved so as to provide an initial operational response (Dautun, 2007). It requires major decisions to be taken under urgent conditions and based on an assessment of the real state of things (Heiderich, 2010). A crisis can totally or partially affect the organisation handling the crisis, which may have to pay a heavy tribute in terms of human lives, equipment, money, or even its reputation (Coombs, 2010). Decision-making is therefore complex during crisis management, which is exacerbated by the unexpected nature of the event and its detection. A crisis is characterised by the following properties:

- Uncertainty: there may be multiple or vague sources of information, and the information may be lacking or ambiguous (Crichton, 2001; Lagadec, 2012; Pearson and Clair, 1998) or massive and contradictory (Yammarino et al., 2010). However, the confusion reigning requires a rapid response based on a decision that must be taken fast (Sayegh et al., 2004),
- Urgency: whether the 'kinetics' are slow or fast, decision-makers must react very quickly and with major time pressure (Pearson and Clear, 1998),
- Significant short-term losses: minimising these losses is the principal objective of crisis management (Pearson and Clear, 1998),
- A loss of control of the situation: events spin out of control, and reality falls apart (Heiderich, 2010),

–   High levels of stress (Kowalski-Trakofler and Vaught, 2003).

These properties alter the basic activities that affect the crisis management organisation, particularly at the very beginning of the crisis management process. Given the complexity of a crisis, managers must prepare themselves to be surprised, while learning to be creative in unfamiliar situations (Lagadec, 2012). Taking training courses, and in particular completing crisis management exercises, is one way to achieve this objective. Crisis management stakeholders should also acquire experience and improve their level of expertise and all their skills linked to teamwork (Heiderich, 2010; Sayegh et al., 2004). Crisis manager trainers must therefore include training activities that focus on using skills linked to teamwork in stressful situations. During a crisis management training session, trainees must use this set of skills progressively to react to the specific events in the exercise scenario, while their evaluators assess how these skills are used throughout the exercise (Shapiro et al., 2008). At the end of the exercise, the feedback given to trainees during the debriefing phase is crucial. It is a vital part of the learning process, because it will enable them to understand how they performed (Fanning et Gaba, 2007; Salas et al., 2009; Shinnick et al., 2011). Whereas it is commonly acknowledged today that crisis management training is indispensable for decision-makers, this paper shows that there is, however, no operational tool for real time assessment of trainees (skills, actions) of strategic crisis cell specializing in major hazards.

Thus, by using an approach based on crisis management training exercises, this paper aims at presenting an assessment tool that takes account of technical skills as well as human and organizational factors during crisis management exercises (simulations). This paper is organised in three parts. Part 1 establishes the state of the art concerning malfunctions encountered by a crisis cell managing a crisis situation. It describes different training courses that prepare crisis management decision-makers to cope, in terms of technical as well as non-technical skills. The state of the art of current assessment tools is also presented, highlighting in particular how difficult it is to adapt them to the crisis management context. The next part presents the methodology used to create a tool that is operational during crisis management training courses. Finally, the initial results of our experimentation using this methodology during crisis simulation exercises are presented and discussed.

2. Review

Serious malfunctions are identified in crisis cell, generating by an emergency environment. They are grouped in several categories:

-    Malfunctions linked to problems of communication like poor information sharing, loss of information, only basic information retained (Kowalski-Trakofler and Vaught, 2003)
-    Malfunctions linked to understanding the situation lead to difficulties in obtaining a common operational image, to the negation of unexpected events which therefore brings to meaning collapses (sensemaking) (Seppänen et al., 2013; Lagadec, 2012; Weick, 1995)
-    Malfunctions linked to managing emotions and stress as feeling of invulnerability, denial, disorientation, incapacity to act (Kouabenan et al., 2006; Heiderich, 2010)
-    Malfunctions linked to organizational issues like collapse of coordination measures, blindly following procedures, undermined leadership (Kanki, 2010; Lagadec, 2012)

All these malfunctions impact the perception and assessment of the situation, and so does decision making. It highlights the need to organize training exercises in crisis management: it's necessary to train decision makers, to promote learning or to reduce collective malfunctions. The identification of these malfunctions confirms that many of them are linked to technical issues, but also that many others are related to human factors and non-technical skills. Today, it is vital to take account of human and organisational factors more adequately in this kind of crisis management training. No valid exercise or assessment of trainees can take place if the trainers do not first identify the training objectives precisely (Dubiau, 2007). Therefore, to be able to assess the trainees, a method of assessment must be set up that is first based on the clear identification of the training objectives. However, even if the assessment criteria have been defined, the trainers must also be able to assess them during the training session. The direct observation of the trainees during the training sessions is the most widely used method for collecting information about a group. This information must be organised, and the assessors must also be trained in how to use the various media for collecting data (Dimock and Kass, 2010). The assessment is thus based on direct observation contrary to virtual simulations in which trainees do is directly recorded by a computer (Caird-Daley et al., 2007). Of particular importance is the fact that observation-based assessment can evaluate the group dynamics leading up to the decision taken. We also made a review of existing assessment tools that could be used to assess both the technical and the non-technical skills of a group of trainees. Our study was performed in fields in which organizations work in emergency situations, and enabled us to identify similar fields in which crisis management is used in medicine, military, aeronautics, and aerospace (Helmreich and Foushee, 2010). Based on this observation, we looked for assessment tools used in training courses in these different fields. We identified 42 tools for assessing

trainees during a training session. Comparing them enabled us to differentiate them on the basis of the following criteria:

- The media: checklists, grids, questionnaires and interviews were identified
- The time period: assessment can be carried out before, during or after the exercise
- The scale: the assessment tool can be used at the scale of the individual or the group
- The content: it may concern the expected technological outcomes specific to the crisis management exercise, the technical and non-technical skills of a group, the content of a training course, the experience of the members in a group, and their needs or feelings

Our comparison showed that for a real time assessment at the group scale, covering technical and non-technical skills, only 3 tools satisfy all of these criteria: TARGETs (Fowlkes et al., 1994), LOSA (Thomas et al., 2004), TEAM (Cooper et al., 2010). However, their principal drawbacks are that they are effective especially for small groups (6 people maximum) in a small space. On the contrary, a crisis cell is organised and has interactions in ways that are much more mobile. In addition, the design of these tools, which are specific for each exercise, is costly in terms of time, and also requires input from experts to identify the expected outcomes. Finally, the expected outcomes entered into these tools are generally coded for each event in the exercise, which gives them limited flexibility. We may thus observe that the tools we identified are hard to adapt to crisis management training, so another method must be created that will enable us to improve them.

3. Methodology

Our methodological approach to create a real-time assessment tool for a crisis cell made up of trainees involves several steps.

3.1 Two bricks are required before presenting the construction of the method

In the first step, we wanted to identify technical and non-technical skills which are essential for crisis management. In the second step, we designed a typology of objectives training and expectations; a learning base enables the assessment of the trainees. Firstly, three domains were worked: non-technical skills of team working in emergency, skills to enhance the group performance and technical skills of crisis cell. Sixteen technical and non-technical skills have been identified ("leadership", "communication", "promote a shared vision", "decision making", "coordinate"…). We organized them in three main areas of work: the first one is "Operation of the crisis cell". This section concerns factors specific to the organization of crisis cell and to human factors. The second one is "Carrying out the strategic response", it is linked to missions of hazard assessment, determination of affected stakes, anticipation of threatened stakes…and, finally, the "Operation of crisis communication". Secondly, the second step concerns the construction of the learning base: it involves the creation of a typology of training objectives that we could incorporate into our training sessions. Through the 3 areas of work previously retained, 17 missions were identified. From these 17 missions, 65 objectives to be achieved were determined, divided into three levels of difficulty (beginner, intermediate, expert), consequently 195 training objectives were finally put forward. For example, among the various missions connected with "carrying out the strategic crisis response", one of the decision-makers' missions is "anticipating the threatened issues" in the area concerned. If we seek to assess the objective "collecting data concerning threatened issues", we highlight three ways to collect this information: 1) map reading for beginner-level trainees, 2) seeking existing typologies of issues in regulatory documents for intermediate-level trainees, and 3) directly contacting specific crisis stakeholders for expert-level trainees. Expectations for higher-level trainees include those required for the lower levels. The final step was to combine 16 skills with 195 training objectives: the learning base is created. It is applicable to different crisis cells like local (competent authorities), industrial, emergency teams and various hazards are concerned: natural, technological, nuclear power or health.

3.2 Design to EVADE method

First of all, the EVADE (EVAluation and DEbriefing) method is established in 4 steps: the first step is to characterise the profile of trainees group before the training exercise. The second step consists in constructing a specific assessment for each session training, the third one aims at conducting a dynamic assessment of the trainees in real time considering their reactions. Finally, the last step is to process the results for post-exercise debriefing and makes recommendations. The profile is carried out by a questionnaire: it includes several indicators like "expressed needs, crisis management experience, encountered difficulties, knowledge of the territory, knowledge of emergency plans, knowledge of hazards, control equipment, reflexes to have, previous training". Tendencies (beginner, intermediate, expert) are obtained by a questionnaire indicator. Moreover, we can extract different data: existing skills must be validated during training, the skills lacking, must be solicited, and undetected skills must be worked before exercise. After the identification of the group's

profile, we can extract training objectives, specific to the exercise. The structuring of the assessment is as following: there are training objectives for observers, located in training room, especially on leadership and organisational factors. And there are training objectives for facilitators, located in facilitation room, with expected outcomes. All these objectives are divided into the different phases of the scenario. Well, the selection of training objectives will influence the choice of scenario elements like hazard(s), actors mobilized, territory, stakes, documents available, equipment disposition or exercise duration. The third step is to conduct dynamic assessment in real time during the training exercise (Figure 1).
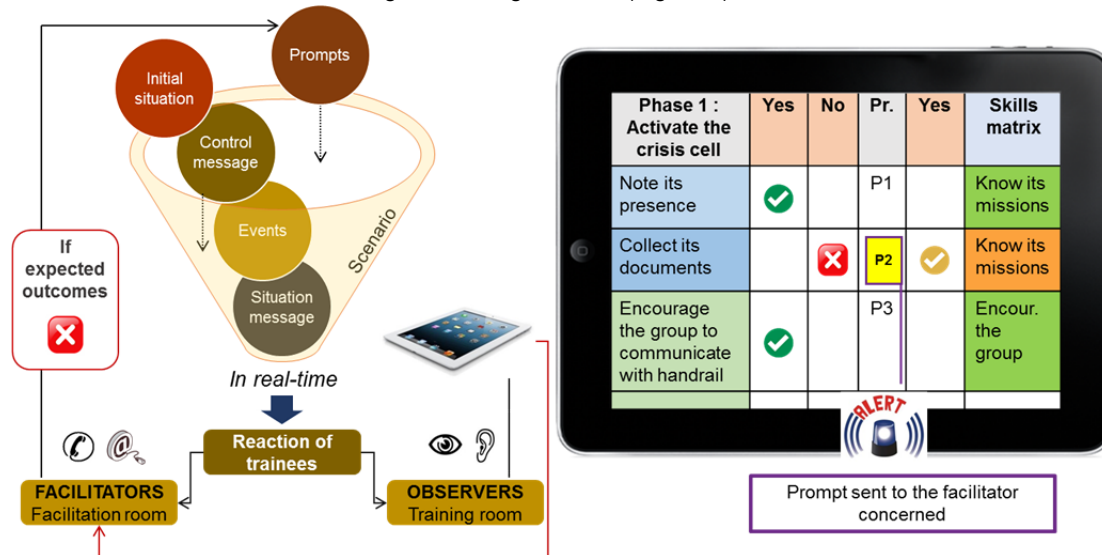

Figure 1: Conduct dynamic assessment in real time during a training exercise

The different messages scenario (initial situation, events, situation messages) are associated with training objectives. At the same time, the scenario is developed and the reactions of the trainees are evaluated by two entities:

- The first one is called "the facilitators": they can assess by phone and email responses the reaction of trainees (expected outcomes, used vocabulary and clarity of the request). They can also control the achievement of objectives by injecting control messages in the scenario
- The second one is called "the observers": they assess how the group organises itself to deal with the crisis, the leadership involved, the sharing of information, coordination, the way decisions are taken. They observe with several checklists, one by scenario phase. The objectives have been made in checklist to integrate behavioural markers and they can be easily checked

The innovative feature comes from the fact that those results are aggregated so that the facilitators can make a simple interpretation of the data they receive during the exercise. By this way, when the group of trainees goes the wrong way or does not achieve the expected outcomes, messages are generated for the facilitators to request or encourage them to reconsider a problem during the exercise. Facilitators can insert new messages asking trainees to fulfil the concerned objective. For example, when the objective "Note its presence" is observed, it is checked in checklist and it activates the skills matrix (in our case, "Know its missions"). When the objective "Collect its documents" is not observed, the associated skill is not mobilized and we must solicit it. An alert is sent to the facilitator, he injects a prompt in the scenario, in real time. The observer can assess again the objective but the activated skill appears in the skills matrix.

4. Results

The results presented in this section come from a training exercise (in Mines Alès crisis management platform) with nine trainees (beginner level), five facilitators and one observer. Trainees are located in training room, with computers, phones, emergency plans, map support, boards and an interactive board. Observers are in the same room, to assess them. The scenario of crisis, linked to a dam break, generated a flood requiring the activation of a crisis and the operability of the trainees. During one hour and a half, trainees were observed and evaluated on the mobilization of three specific kills: "leadership", "communication" and "promote a shared vision" through the achievement of different training objectives. The scenario consists of four phases, each corresponding to major events like the activation of the emergency plan or breach in the dam. During this

exercise, the observer assessed the training objectives relating to 3 skills retained. For the debriefing post-exercise, results of the observing may be presented in different ways by the observer: he can choose how he will return results to trainees. The restitution can focus on the achieved objectives by trainees or on specific skill. For example, the observer choses to return the results associated with the skill "Promote a shared vision" (of the situation) (Figure 2).

Figure 2: Extract on focus skill "Promote a shared vision" during the debriefing

At the end of the exercise, the observer has an overview of the results: the results show that beginners did well the actions "note the information on the handrail and the board" during all phases (beginner level). Better, they succeeded in the intermediate level through "make a situation point": several situation points were expected during the training, students have made two (phase 1 and phase 4), the objective is achieved. However, the results show that the group had a difficult phase 2 during the exercise with only one realized objective ("note the information on the handrail") for promoting a shared vision in the group. Therefore a prompt was sent to encourage trainees to use the board to share information collectively. The EVADE method will guide the restitution to trainees through different representations of the results. Actually, consequences trees have been developed to underline the impact of unrealized training objectives of trainees. For example, trainees have not realized the objective called "Present the objectives collectively". This omission has gradually affected other related training objectives. This objective must be worked on as a priority during the next training session. During the debriefing restitution, we can discuss of these representations, suggest recommendations and give feedback illustrations.

5. Conclusion

A lot of technical and organizational malfunctions occur in crisis cell during crisis management. Through twenty training exercises, we proposed a structured methodology called EVADE method to assess trainees in real time and feedback them. The EVADE method is established in 4 steps: the first step consists in characterizing the profile of the trainees group before the training exercise. The second step aims at constructing a specific assessment for each session training. The third step is to conduct a dynamic assessment of the trainees in real time considering their reactions. Finally, the step four processes the results for post-exercise debriefing and recommendations. This method allows to better understanding the observed collective malfunction during the debriefing. Based on the behavioral approach, this assessment tool is operational on different crisis cell and in different areas. The perspectives of this work are to research on the association between consequences trees and training objectives to understand the origin of errors, to precisely structure the debriefing and to continue a collective learning with trainees. It is also necessary to extend tests of the method to refine its operational capability and to expand the types of public concerned. And, to conclude, the structuring of a specific assessment depends on two criteria to consider. The first one is the observer and the scenario author must work together to ensure that training objectives can be assessed during exercise. The second one is that the observer needs a training to use effectively the assessment tools.

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