

Do's and Don'ts in Inter-Organizational Crisis Management Exercises

Kristoffer Darin-Mattsson

Swedish Defence Research Agency
Kristoffer.mattsson@foi.se

Niklas Hallberg

Swedish Defence Research Agency
Niklas.hallberg@foi.se

ABSTRACT

It is commonly assumed that conducting exercises will contribute to better crisis management. However, the exact mechanisms of cause and effect are hard to isolate empirically. The objective of this paper is to compile and analyze the recommendations in the literature on inter-organizational exercises and learning. While not claiming to meet the strict scientific demand of empirical validation and general applicability, the compilation may nevertheless provide some guidance from research to practitioners. Forty-four papers about learning in inter-organizational exercises were analyzed. Out of the analyzed papers, 28 discussed obstacles or success factors. However, the recommendations applicable in one setting are not automatically valid in others, and some are even contradictory. The recommendations have therefore been categorized according to two criteria; when in the exercise cycle and for whom they apply. Several recommendations concern individual learning, but maximizing individual learning can sometimes hamper learning on the organizational level.

Keywords

Inter-organizational, exercise, learning, crisis management, collaboration

INTRODUCTION

Crises are major sudden events that affect many people. Regular resources and procedures are not enough for an unpredictable development, far-reaching consequences, and the need for a managed response from the society as a whole (Al-Dahash et al., 2016). This managed response requires collaboration between professionals in various organizations (Berlin and Carlström, 2014). Some of those organizations are used to inter-organizational collaboration and view it as a part of regular work, for instance the police and rescue services (Borodzicz and van Haperen 2002). However, in many crises, professionals and organizations that are not used to inter-organizational collaboration are needed in the response. Their main way of preparing themselves is through exercises.

It is commonly assumed that conducting crisis management exercises will contribute to better crisis management, but evidence suggests they often produce weak learning results (Borell and Eriksson, 2013). In addition, the exact cause and effect mechanisms are challenging to isolate and prove empirically (Wahl et al., 2015). Further, several researchers question the learning effect of exercises (e.g. Berlin and Carlström, 2015a; Beerens and Tehler, 2016;). As it is difficult to prove learning effects, let alone comparative effectiveness of various exercise designs, it is also difficult to decide on the best practice or guideline for crisis management exercises. One way to improve exercise practice is to compile recommendations in terms of what seems to work better or worse, even if no definitive answers can be provided.

There are a few compilations of do's and don'ts for exercises (e.g. van Laere et al., 2007, Berlin and Carlström, 2014; Grunnan and Fridheim, 2017). However, two of them are specific to format (role-playing exercise or simulation-games) (van Laere et al., 2007), and table-top (Grunnan and Fridheim, 2017), whereas one is limited to blue light services (Berlin and Carlström, 2014). None of them are specific for large scale inter-organizational exercises covering a whole of society response. However, there is reason to believe that the drawbacks as well as success factors identified in these studies can be valid for other kinds of exercises. Some of the exercises studied can be seen to be inter-organizational in nature.

The objective of this paper is to compile and analyze the recommendations in the research literature on the subject of inter-organizational exercises. The study is based on a scoping study covering learning in cross sectoral, inter-

organizational crisis management exercises.

BACKGROUND

Crisis management is aimed to prevent, protect against, respond to and recover from crises. These systems are inter-organizational by nature as crises are events that do not respect organizational boundaries. Furthermore, crises are not known beforehand and, therefore, the exact composition of a response organization cannot be narrowly defined in advance. Nor are crises frequent events, so the opportunity to learn, assess and evaluate the functioning of crisis management systems in real life are also rare. Therefore, exercises have a natural place within most crisis management systems (Bidinger et al., 2010). However, they can be used in different ways and for different purposes within a crisis management system.

One way of describing individual exercises and their role is to state the aim for conducting them, combined with a design description (e.g. table-top, full-scale, functional or simulation), and what kind of actors are part of it as well as a short scenario description. Aims for exercises are sometimes described as platforms for assessing capacities or validating plans and procedures (Bidinger et al., 2010). In addition, goals are often expressed in terms of capability building and/or learning (Berger et al., 2015). How learning or capability building actually takes place or how to measure it is less frequently discussed (Wahl et al., 2015; Berlin and Carlström, 2015b).

Inter-organizational exercises are different from many other types of crisis management exercises. In theory, they can use any format or kind of scenario and have many different objectives. They typically include several different organizations from different sectors of society and focus on collaboration in multi-agency responses fraught with conflicting objectives (Berlin and Carlström, 2014). They are often aimed at evaluating the crisis management response from a system perspective, rather than the individual's performance or the participating organizations. Therefore, there should be obstacles and success factors specific for this kind of exercises.

METHOD

According to Djikers (2016) the term scoping review has been used since 2001. It is used interchangeably with several other terms (e.g. scoping study, scoping report, evidence mapping, and systematic mapping). However, most researchers using the method use the one by Arksey and O'Malley (2005). This is also the case in the study presented in this paper.

The steps followed in this paper are the steps identified by Arksey and O'Malley (2005):

1. Identifying the research question
2. Identifying relevant studies
3. Study selection
4. Charting the data
5. Collating, summarizing and reporting the results

The research question in this study is: In terms of success factors and obstacles to successful learning, what recommendations does the literature offer concerning inter-organizational crisis management exercises? Relevant studies were identified through a search in the SCOPUS database using the search string: (learn*) AND (exercise*) AND (crisis OR emergency OR disaster). Only publications written in English were included. This generated a list of 744 papers. From the initial result relevant studies were selected in four steps; A title review, an abstract review, a quick full-length review and, finally, an in-depth full-length review.

In the title review, irrelevant papers were excluded. For instance, *emergency* might refer to individual psychological emergencies, the word *exercise* referred to workouts, or *crisis* was used to refer to a crisis of confidence. At this stage, 465 papers remained.

In the abstract review, three inclusion criteria were used. (i) The crisis/emergency/disaster described had to be of a magnitude that would require a large crisis management response from society, including several different organizations. (ii) The actual exercises presented must include several organizations from different sectors of society, or the exercise concepts presented must be relevant for organizations across different sectors of society. (iii) Some idea about how learning can be achieved through exercises must be stated, implicitly or explicitly. At this stage, 77 papers remained.

For the full-length review the same criteria as for the abstract review was used. After scanning through the papers, an additional 33 could be excluded on the grounds that they did not include any aspects of how learning can be achieved. Only statements indicating that something was indeed learned, typically in a topic or list. The remaining 44 papers formed the basis of the in-depth analysis

RESULTS

Forty-four articles about learning in inter-organizational exercises formed the basis for the analysis. Despite being about learning and inter-organizational crisis management exercises, not every paper discussed obstacles or success factors for learning. Out of the 44 analyzed papers, 28 discussed obstacles for learning and 26 success factors in some manner. In addition, in 13 papers the incentives for learning were mentioned. The success factors and obstacles identified in the literature were categorized and are presented in Table 1. However, the advice applicable in one circumstance is not automatically valid in other circumstances, and sometimes recommendations are contradictory. Therefore, the recommendations were categorized according to who (individuals, organizations or systems) is meant to learn, and when in the exercise cycle (planning, implementation, evaluation and dissemination) learning is meant to take place. There is no consensus about whose learning is the most important or if the learning is different in different phases, in terms of quality, quantity or effectiveness. Therefore, no grading of the recommendations are provided in the paper. However, it is clear that the focus of various papers is on different phases and entities of learning. By sorting them this way, seemingly contradictory recommendations can be reconciled.

Another effect of this tabular presentation is that it becomes clear that there is a lack of success factors identified in the literature when it comes to the dissemination phase as well as a systemic learning in general. This might be due to the scope of the study being too narrow. Perhaps these questions are dealt with more thoroughly under topics such as 'knowledge management and exercises', rather than learning and exercises.

Success factors

Four success factors were identified (Table 1).

Table 1. Success factors for learning in inter-organizational exercises

	Planning	Implementation	Evaluation	Dissemination
Individual level	Everyone learns	Variation Realism Everyone learns	Everyone learns	
Organizational level	Involve actors	Variation		
Systemic level	Involve actors			

Realism

Realism is the most frequently mentioned recommendation in the research literature (Meesters and Van de Walle, 2013). This primarily concerns the implementations phase of an exercise. According to Hills (2015), it is important that the scenario and format are realistic in order to expose the participants to a situation they find likely, so that they take it seriously and can experience the stress and pressure a real crisis would inflict on them. In this case, realism pertains to likelihood of the event as well as props. It is clearly aimed at learning opportunities for individuals by managing stressful situations. However, Borodzicz and van Haperen (2002) have claimed that too much focus on realism is bad as there is a risk that surprises and unlikely events are not taken into account on an organizational level and consequently not planned for, nor exercised. Crisis management is full of examples where the unforeseen and events deemed improbable have actually occurred.

Edzen (2014) has stressed that realistic means that there is no pre-established common understanding of what exactly the crisis consists of and how to respond properly. That is to say, the exercise must present a wicked problem. It is for the participants to define the crisis and find solutions through cooperation. Chen et al., (2008) claimed that exercises must be similar to the everyday workings of an organization in terms of the tools and support systems used. This is not always practiced; instead many exercises use alternative IT-support and computer aids not familiar to the participants. These kinds of exercises run the risk of teaching the participants the not in using tools, and not actual crisis management.

Variation

Variation is a recommendation thoroughly discussed in the literature. It also seems to be the most widely accepted one. The argument is that individuals need variation (in scenarios) in order to construct models of understanding

with general applicability (Borell and Eriksson, 2013). Variation can be understood as being important over a series of exercises such as slow or fast developments, different sectors, natural events or manmade ones (Chrichton et al., 2009). Another theme is variation within the same exercise, where “what if” scenarios can be developed (Macario et al., 2009). In both situations it is stressed that it is the possibility to compare and contrast different situations that enables the creation of general concepts and models. Borell and Eriksson (2013) adds that it is through dynamic scenarios, rich in variation, that facilitate unexpected meetings between individuals, combined with an openness for discoveries that constitute a good learning opportunity. Further, it could be argued that variation of format and design is important since they have the potential to generate qualitatively different results and conclusions.

Involve actors in the planning

This factor is about ownership of the results and willingness to learn from an exercise. Adult learning is sometimes different from traditional pedagogy, which is aimed at children. Adult learning (andragogy) demands a higher involvement of the learner in the planning processes with respect to what and how to learn (Tretsiakova-Mcnally, 2017). In a more practical sense, it is a fact that in inter-organisational exercises, no single organization controls all relevant factors. For instance, participating organisations often control what representative they send to an exercise. In order to select the right people, and the right format and content for the aims and purposes of an exercise, a great deal of coordination is needed in the planning process. It is also the case that a central organization does not always know what participating organizations need to exercise, nor what they want to exercise. This needs to be settled in the early planning stages and is best done through collaboration (Gleason, 2003). Many inter-organizational exercises focus on collaboration. To make sure that collaboration is actually needed during an exercise, the scenario and design need to be chosen with this in mind (Andersson, 2016). Constructing them together is a simple solution to this problem.

Everyone learns

When it comes to theories of learning, focus is often on the exercised individual. The rationale is that participation in exercises teaches the participant something. Through evaluation process, organizations and systems too are offered an opportunity to improve themselves by internalizing the results described in the evaluation report. However, this is too narrow a focus. Planners, observers, facilitators and evaluators could also learn from their involvement in the exercise. Borodzicz and Van Haperen (2002) suggested that participation in these functions constitutes a learning opportunity equally important as participation in the exercise, albeit a much less studied learning opportunity. Considering who is asked to plan, facilitate and evaluate exercises as well as consider who participates thus becomes important. Further, the evaluation should also take into account the experiences of others than the participants. This is rarely done in a structured way, for instance, hot washes are not meant for facilitators and observers (Borodzicz and Van Haperen, 2002).

Obstacles

Nine obstacles for learning were identified in the literature and are presented in Table 2.

Table 2. Obstacles for learning in inter-organizational exercises

	Planning	Implementation	Evaluation	Dissemination
Individual level	Manage expectations Complexity	Wrong participants Manage participants Wrong focus	Manage resources	
Organizational level	Manage resources Complexity	Wrong focus Lack of learning culture	Wrong participants Unfocused	Comparable documentation Lessons not shared
Systemic level	Manage expectations	Wrong participants Wrong focus Lack of learning culture	Manage expectations Wrong participants Unfocused	No incitement Comparable documentation

The wrong thing is exercised

In the field of crisis management, work is being done to analyze risks and vulnerabilities, to identify what preparations should be made and what needs to be exercised. Unfortunately, these are not always the things that are subsequently exercised. Often, exercises focus on decision-making processes and information management, and the exercise typically starts well into an ongoing scenario. At the same time, research has pointed out that the early phase before an event has been defined as a crisis situation that needs to be exercised (van Laere et al., 2007).

It should be noted that few of the exercises analyzed in this study concern typical inter-organizational aims and tasks. In fact, some of them could be described as organizational exercises running in parallel. Anderson et al. (2016) suggested that the focus for inter-organizational exercises should be the boundaries between exercising organisations. The purpose of inter-organizational as opposed to intra-organisational is to learn the specifics of coordination and collaborative work, rather than the regular procedures of one's own organization. Examples given are differences in vocabulary, priorities and overlapping responsibilities.

The wrong people are exercised

Who participates in an exercise is important, and failure to include the right people is pointed out as a frequent problem in the literature. The choice of who is to participate must be made early in the process, keeping in mind what level participants should be at and preparing them for the exercise at an early stage (Grunnan and Fridheim, 2017). Choosing the wrong participants can happen in several different ways. A great deal of crisis management is carried out by private actors who frequently do not participate in exercises conducted by government agencies. The public is also an important actor in crisis management. However, few exercises are aimed at the general public. A different mistake in choosing participants is that missing parties affect the realism of the exercise and cause great strain on facilitators who then have to simulate their participation. Therefore, it is often difficult to determine if the simulation was good enough (van Laere et al., 2007). Another problem is that participants sometimes are under-prepared and that more senior participants were needed. A frequent mistake in these circumstances is blaming the failure on plans and procedures instead of lack of preparation and selecting the right participants. An additional problem is that no one from the participating organizations has the mandate (in their own organization) to act on any identified measures for improvement (Macario et al., 2009).

Manage resources, participant and expectations

Different actors sometimes have different expectations and understandings of the purpose and goal of an exercise (Meesters and Van de Walle, 2013, Ruty and Ruty, 2012). This has consequences for who will participate in an exercise. For instance, one actor sends new member of staff to participate because the exercise is seen as an opportunity for them to learn. However, other actors understand the purpose to be a test of the system and therefore send their most experienced people. This mismatch is likely to cause friction and make evaluation more difficult. It is often the case that several purposes are adopted for an exercise without considering the consequences regarding participants and the exercise design.

Exercises are often designed with a focus on the intended participants. Participants in exercises often contribute to the design of the exercise both at the planning stage, as they often influence the scenario, and during the exercise when their estimates of time and effect of different actions are allowed to drive the exercise forward. Participants may refer to resources that are not actually available and overestimate the effects of their chosen actions while underestimating the timeframe (van Laere et al., 2007). The focus on the participants also has consequences for the evaluation work, hot-wash being a common example. In these, evaluators try to capture the participants' experiences (what they learned). It is equally important that observers and evaluators themselves participate and give their views, which often complement or even contradict the participants' experiences. Their view is important, both for feedback and for a broader context for the participants (Borodzicz and van Haperen, 2002).

Participants' efforts in hot-washes and other evaluation efforts are often inadequate. Gleason (2003) suggested that this may be because they are tired and want to go home. In many cases they have struggled through an intensive management simulation and were never given an opportunity to learn or reflect on alternatives. The latter can also be said about exercise managers. They focused on implementation and did not plan for the whole process. After the implementation, resources are drained and when the time comes for evaluation and experience management, there are no resources left (van Laere et al., 2007). For a successful exercise, planning must cover the whole process.

Choose complexity level carefully

Too many exercises are conducted in a vacuum in relation to other exercises. They are often planned and conducted as well as evaluated as a one of event and managed and financed as a project rather than as part of a continuous series of exercises. It is normally better to plan the complexity of an exercise progressively, where one exercise

build on a previous one (Kim, 2014). This makes it easier to view learning as a cumulative and ongoing process, leading to a focus beyond testing existing procedures and producing an accurate description of the current status.

Complex scenarios also make it difficult to exercise in inter-organizational settings, since there is a risk that a situation will be created where one organization has to wait for another for long periods during the exercise. Moreover, too much complexity can result in everyone waiting for someone else to take the lead (Berlin and Carlström, 2014).

The lack of a gradually increasing difficulty level makes it harder to match participants with a suitable level of difficulty. The complexity and difficulty level of an exercise is very important. If participants enter into an exercise that is too difficult their learning is compromised. On the other hand, if participants are too qualified there is nothing to learn (Rankin et al., 2012). They also risk jeopardizing the learning for the participants for whom the exercise is suitable. A common mistake in this respect is to simplify what should be a very complex exercise. It is better to choose a simpler scenario and format altogether, rather than simplifying a difficult one (Borodzicz and van Haperen, 2002). Another way of handling complexity levels far above the participants' capability is through active instructor participation (Rankin et al., 2012).

Unfocused Evaluation

An evaluation cannot capture everything. It has to be selective and focused on specific aims; otherwise it runs the risk of being superficial. Furthermore, there is often too high expectations on the observers' capability to see and hear and understand everything that is going on (Greenberg et al., 2017). Also evaluation is not just the report, it is the planning for and the actual organization for constructing, collecting and analyzing data during and after the exercise. This is often an organization with a limited budget and timeframe.

The exercise format and scenario do not match the goals of the evaluation. First, the format and scenario are chosen and only thereafter, ad hoc, the evaluation aims. The objectives must control the choice of format and scenario. Otherwise, there is a risk that the same mistakes reappear in later exercises (van Laere et al., 2007).

Lessons are not shared

A common mistake is that conclusions and recommendations are not allowed to spread outside the circle of those directly concerned. Chricton et al. (2009) believe that the threshold for learning from other actors and sectors of society may be high due to differences of contexts and terminology, differences that lead to greater resource utilization to adapt conclusions and recommendations. Furthermore, this may also be the case because the relevance is deemed to be low when conclusions are drawn by others outside one's own organization. One solution is to position exercises as part of a larger process of change. (Chricton et al., 2009) Lessons learned by other organizations and in exercises where the scope is broader than in one's own sector are often relevant. This is obvious as the same conclusions are often drawn in different exercises in different fields and, moreover, repeatedly over time for the same actors. This sometimes leads to frustration and scepticism towards exercises as a driver of change (Savoia et al., 2012). Epler and Hunt (1999) emphasized that the problem with exercises are that they often show the same result. Yet, participants often learn anyway, although the lessons are not translated into changed procedures or internalized on an organizational level. This risk is likely to be higher in inter-organizational exercises as no single organization can be said to fully own the results and responsibility for improvement.

Lack of learning culture

Some actors will try to distort results in evaluations or not share correct information during exercises. According to Upton (2009), both individuals and organizations, particularly in inter-organizational settings, feel that their reputation is at risk as the results may be seen as a comment on their plans and preparations. Further, a poor result may be used against them in the future by pressure groups or public opinion. Therefore, an unofficial goal of not looking bad tends to be a part of exercises. In addition, people can be afraid or uncertain and hide information or choose not to act in fear of mistakes (Hills, 2015). In organizations there is often a natural resistance to change. It is costly and admitting faults or failure can change power balances within organizations (Upton, 2009). It is difficult but important to foster a culture of learning in exercises (Kim, 2013).

Lack of comparable documentation

Lack of comparable documentation is about the fact that reporting about exercises is not very stringent. It mainly concerns the lack of a common reporting format and archiving of evaluation reports, for instance after action reports (AAR) (Savoia et al., 2012). Systems and archives for the documentation of exercises must be available in order to avoid making the same mistakes over and over, as well as create aggregated conclusions. However,

there is also a lack of common terminology for exercises between organizations, societal sectors and in research, which makes it difficult to use and learn from archive material (Upton, 2009).

Lack of clear incentives to learn

A possible obstacle not explicitly mentioned in the analyzed material, is the creation of clearer incentives for learning. By and large there seems to be a lack of incentives (Gleason, 2003). Upton (2009) pointed out that for market actors there are financial incentives, but for the crisis community the only incentive for individuals is personal enjoyment in participating in exercises and the idea of learning something new. This, however, is not the same thing as formal incentives. This lack of incentives to learn and, even more so, to change practices permanently might be a reason why many exercises seem to generate the same results over time (Meesters and van de Walle, 2013). Others have pointed out that gaining a better and more flexible organization is an incentive in itself (e.g. Hills, 2015; Chricton et al., 2013). Ruddy and Ruddy (2012) explored the reasons why participants want to learn, but also pointed out that their reasons do not have to align with planners' and organizations' reasons. On an organizational level there is a lack of incentive to change.

DISCUSSION

A few of the recommended success factors are contradictory, although some contradictions can be easily solved. They apply to different circumstances and can be valid both in their own situation and in relation to a specific purpose. However, the need for realism in order to increase individual learning while simultaneously running the risk of not exposing organizations for improbable, yet possible, scenarios is hard to reconcile within the framework of a single exercise. This must be a strategic choice in the planning process.

Many authors in the analyzed papers have an idea of who is meant to learn and when learning takes place. However, few have grounded this in a theory of learning. This idea most often consists of an activity within the framework of exercises that the author highlights as the most important learning opportunity. For instance, several authors (e.g. Epler and Hunt, 1999; Savoia et al., 2012; Upton, 2009) have pointed to the evaluation as the most important learning opportunity. This position tends to correlate with a focus on organizational learning, where findings in the evaluation report can lead to updates and changes in guidelines, divisions of responsibilities or mandate. Others focus more on individual learning (e.g. Berger et al., 2015; Chen, 2014), and therefore tend to highlight participation in an exercise as the prime learning opportunity. In addition to this, debriefing discussions after exercises are often highlighted as the main learning opportunity for the individuals (e.g. Biddinger et al., 2010; Gleason, 2003; Greenberg et al., 2017). Less common but still argued by a few is the view that the planning and observation of exercises constitute the best learning opportunities (Borodzics and Haperen, 2002). This view is based on the assumption that planning and observing an exercise provides a position where a more holistic understanding can be gained compared to participation, and that that is more important than enhancing individual skills.

Differences of opinion when it comes to what constitutes the best opportunities for learning can to a large extent be explained by different views on who should learn; is it the individual, the team, organizations or inter-organizational systems of crisis management? Another factor for explaining this is that there is a great variation in the views of what it is that is important to learn, for instance, personal knowledge (such as how to handle your own stress and how others respond to stress), or skills (everything from how to use IT support programs, operate heavy machinery or treat wounds), or capabilities (such as communication with the public, decision-making processes and prioritization). These capabilities are often conceptualized as the right configuration of a set of skills appropriate for the situation at hand. A select few of the papers analyzed also stressed that the most important thing to learn is a holistic understanding of crisis management rather than individual feelings and reactions, skills and capabilities.

Learning in inter-organizational exercises was the focus in the analyzed papers. It is, therefore, surprising that a large part of the material dealt primarily with individual learning and skills. There are individual skills that can only be learned in inter-organizational settings, e.g. collaboration between individuals from blue light organizations with different responsibilities on an emergency site (Berlin and Calström 2014). However, much of the skills and capabilities described in the literature is not inter-organizational in nature. For instance, learning the procedures and guidelines of one's organization can be done in an intra-organizational setting, which is often less costly. To adapt to conflicts of interest between different organizations' goals and procedures should be the focus of inter-organizational settings (Andersson, 2016). This suggests that the practicing of intra-organizational procedures should not be exercised together with others, only the specific aim of testing how they work in relation to other organizations' procedures. Hence, procedures in one's own organization should be well practiced before entering into inter-organizational exercises. This further highlights the need for the right participants.

The fact that no clear incentive for learning seems to exist is surprising and a likely cause for why few findings during exercises seem to be implemented. Further, little advice concerning dissemination of results from exercises is provided. This might be an effect of the focus on exercises in this paper rather than knowledge management or policy formulation. Nevertheless, it is interesting considering the fact that exercises are often expensive and that the aim of spreading lessons from an exercise in wider circles than the directly affected often is a part of crisis management exercises.

CONCLUSION

The main contribution of this paper is four factors that favor learning from exercises and nine obstacles that hampers learning from exercises. These factors can contribute to the planning and execution of inter-organizational exercises. Hence, making use of these factors may contribute to more successful inter-organizational exercises.

ACKNOWLEDGEMENT

This paper presents a study carried out within the research project KOMET, sponsored by the Swedish Civil Contingency Agency.

REFERENCES

- Al-Dahash, H., Thayaparan, M. and Kulatunga, U. (2016) Understanding the Terminologies: Disaster, Crisis and Emergency, *Management*, 2, 1191-1200.
- Andersson, A. (2016) Boundaries as Mechanisms for Learning in Emergency Exercises with Students from Emergency Service Organisations, *Journal of Vocational Education & Training*, 68, 2, 245-262.
- Andersson, A., Carlström, E. D., Ahgren, B. and Berlin, J. M. (2014) Managing Boundaries at the Accident Scene - A Qualitative Study of Collaboration Exercises. *International Journal of Emergency Services*, 3, 1, 77-94.
- Arksey, H. and O'Malley, L. (2005). Scoping Studies: Towards a Methodological Framework, *International Journal of Social Research Methodology: Theory and Practice*, 8, 1, 19-32.
- Beerens, R. J. J. and Tehler, H. (2016) Scoping the field of Disaster Exercise Evaluation - A Literature Overview and Analysis, *International Journal of Disaster Risk Reduction*, 19, 413-446.
- Berger, T., Fogel, I., Poles, L., Aran, A. A., Shental, O. and Kassirer, M. (2015) Implications Drawn from a Military Bioterror Exercise in Israel, *Health Security*, 13, 2.
- Berlin, J. M. and Carlström, E. D. (2015a) The Three-Level Collaboration Exercise - Impact of Learning and Usefulness, *Journal of Contingencies and Crisis Management*, 23, 4, 257-265.
- Berlin, J. M. and Carlström, E. D. (2014) Collaboration Exercises-The Lack of Collaborative Benefits, *International Journal of Disaster Risk Science*, 5, 3, 192-205.
- Berlin, J. M. and Carlström, E. D. (2015b) Collaboration Exercises: What do they Contribute? - A Study of Learning and Usefulness, *Journal of Contingencies and Crisis Management*, 23, 1, 11-23.
- Biddinger, P. D., Savoia, E., Massin-Short, S. B., Preston, J. and Stoto, M. A. (2010) Public Health Emergency Preparedness Exercises: Lessons Learned, *Public Health Reports*, 125, 5, 2010
- Borell, J. and Eriksson, K. (2013) Learning Effectiveness of Discussion-based Crisis Management Exercises, *International Journal of Disaster Risk Reduction*, 5, 28-37.
- Borodzicz, E. and Van Haperen, K. (2002) Individual and Group Learning in Crisis Simulations, *Journal of contingencies and crisis management*, 10, 3, 139-147.

- Chen, Y. F. (2014) Evaluation of Strategic Emergency Response Training on an OLIVE Platform, *Simulation and Gaming*, 45, 6, 732-751.
- Chen, Y.-F., Rebollo-Mendez, G., Liarokapis, F., De Freitas, S. and Parker, E. (2008) The Use of Virtual World Platforms for Supporting an Emergency Response Training Exercise.
- Chrichton, M. T., Ramsay, C. G. and Kelly, T. (2009) Enhancing Organizational Resilience Through Emergency Planning: Learnings from Cross-Sectoral Lessons, *Journal of Contingencies and Crisis management*, 17, 1, 24-37.
- Dijkers, M. (2015) What is a Scoping Review? *KT Update* e-newsletter from the Center on Knowledge Translation for Disability and Rehabilitation Research, 4, 1.
- Edzen, S. (2014) Table-top Exercises for Emergency Management: Tame Solutions for Wicked Problems, *In Proceedings of the Annual Hawaii International Conference on System Sciences*.
- Epler, G. F. and Hunt, W. (1999) The Pipeline Industry-Planning and Exercising: Is Industry Deriving Full Benefit from Lessons Learned? *Proceedings of the International Oil Spill Conference*.
- Greenberg, B., Voevodsky, P., and Gralla, E. (2017) A Capabilities-Based Framework for Disaster Response Exercise Design and Evaluation: Findings from Oil Spill Response Exercises. *Journal of Homeland Security and Emergency Management*, 13, 4.
- Grunnan, T. and Fridheim, H. (2017) Planning and Conducting Crisis Management Exercises for Decision-Making: the Do's and Don'ts. *EURO Journal on Decision Processes*, 5, 1-4, 79-95.
- Hills, M. (2015) Assuring Organisational Resilience with Lean Scenario-driven Exercises. *International Journal of Emergency Services*, 4, 1, 37-49.
- Gleason, L. (2003) Taking a Step Back. Exercises as Training Opportunities. *International Oil Spill Conference Proceedings*, 2003, 1, 1055-1058.
- Kim, H. (2014) Learning from UK disaster exercises: Policy implications for effective emergency preparedness, *Disasters*, 38, 4, 846-857.
- Kim, H. (2013) Improving simulation exercises in Korea for disaster preparedness, *Disaster Prevention and Management: An International Journal*, 22, 1, 38-47.
- van Laere, J. van, Lindblom, J. and Susi, T. (2007) Requirements for emergency management training from a 'passion for failures' perspective, *Proceedings ISCRAM2007*, 449-456
- Macario, E., Heyden, L., and Nakahara, N., (2009) Preparing for a Pandemic Influenza: California Confronts the Legal Implications, *Health Promotion Practice*, 2009, 10, 4.
- Meesters, K. and Van De Walle, B. (2013) Disaster in my backyard: a serious game introduction to disaster information management, *Proceedings of the 10th International ISCRAM Conference*, 145-150.
- Rankin, A., Field, J., Kovordanyi, R., and Eriksson, H. (2012) Instructor's Tasks in Crisis Management Training, *Proceedings of the 9th International ISCRAM Conference*, 1-5.
- Rutty, G. N. and Rutty, J. E. (2012) Did the participants of the mass fatality exercise Operation Torch learn anything? *Forensic Science, Medicine, and Pathology*, 8, 2, 88-93.
- Savoia, E., Agboola, F. and Biddinger, P. D. (2012) Use of after action reports (AARs) to promote organizational and systems learning in emergency preparedness. *International Journal of Environmental Research and Public Health*. 9, 8, 2949-2963.

- Tretsiakova-McNally, S., Maranne, E., Verbecke, F., & Molkov, V. (2017). Mixed e-learning and Virtual Reality Pedagogical Approach for Innovative Hydrogen Safety Training of First Responders, *International Journal of Hydrogen Energy*, 42, 11, 7504-7512.
- Upton, D. (2009) some suggestions for making emergency response exercises more consistent and more successful, *In: Strategizing Resilience and Reducing Vulnerability*
- Wahl, E., Willumsen, B., Jensvoll, L., Finstad, I. H. and Berglund, T. M. (2015) The learning effect of a foodborne emergency exercise. *British Food Journal*, 117, 7, 1981-1994.