



Driving Innovation in Crisis Management for European Resilience

D51.2 - Learning in crisis management 2025

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List of Acronyms

Abbreviation / acronym	Description
ACRIMAS	Aftermath CM System-of-Systems
AI	Artificial Intelligence
CM	Crisis-management
CMS	Content Management System
CRISYS	Critical Response In SecuritY and Safety emergencies
EGT	European Group on Training
ETE	Education, Training and Exercises
ISLEs	Immersive Simulated Learning Environments
LA	Learning Analytics
LL	Lessons Learned
LMS	Learning Management System
SOTA	State of the art
SP	Subproject
TRLs	Technology Readiness Levels
WP	Work package
DRIVER	Driving Innovation in CM for European Resilience

Project Description

DRIVER evaluates solutions in three key areas: civil society resilience, responder coordination as well as training and learning.

These solutions are evaluated using the DRIVER test-bed. Besides cost-effectiveness, DRIVER also considers societal impact and related regulatory frameworks and procedures. Evaluation results will be summarised in a roadmap for innovation in crisis management and societal resilience.

Finally, looking forward beyond the lifetime of the project, the benefits of DRIVER will materialize in enhanced crisis management practices, efficiency and through the DRIVER-promoted connection of existing networks.

DRIVER Step #1: Evaluation Framework

- Developing test-bed infrastructure and methodology to test and evaluate novel solutions, during the project and beyond. It provides guidelines on how to plan and perform experiments, as well as a framework for evaluation.
- Analysing regulatory frameworks and procedures relevant for the implementation of DRIVER-tested solutions including standardisation.
- Developing methodology for fostering societal values and avoiding negative side-effects to society as a whole from crisis management and societal resilience solutions.

DRIVER Step #2: Compiling and evaluating solutions

- Strengthening crisis communication and facilitating community engagement and self-organisation.
- Evaluating solutions for professional responders with a focus on improving the coordination of the response effort.
- Benefiting professionals across borders by sharing learning solutions, lessons learned and competencies.

DRIVER Step #3: Large scale experiments and demonstration

- Execution of large-scale experiments to integrate and evaluate crisis management solutions.
- Demonstrating improvements in enhanced crisis management practices and resilience through the DRIVER experiments.

DRIVER is a 54 month duration project co-funded by the European Commission Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 607798.

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Executive Summary

This state-of-the-art report presents an overview of modern learning developments for Crisis-management (CM). The research for this report marks the start of DRIVER Subproject 5, which goal is to improve and demonstrate the effectiveness of learning solutions for CM competencies of both professionals and communities/citizens. The report introduces the learning context in CM, including the challenges for learning in the CM domain and characteristics of CM in general. Next, the consequences of cross-organisational and cross-border collaboration for learning are discussed. Then, an overview is given of stakeholders in CM and of national and international learning developments, both within and outside of Europe. These learning developments were identified by literature study and interviews with experts. The SOTA results are organised as follows:

- **What to learn for CM.** The SOTA on Lessons learned is described: Looking back to past experiences, and forward into the needs of unpredictable future crises.
- **How to learn for CM.** This part describes The SOTA on Instructional Design and the evaluation of learning interventions (e.g. training, education).
- **How to implement learning for CM.** The SOTA on Competences and Competence frameworks is presented in this part, to embed learning developments into the organisational, legal and political environment.
- **Special target groups:** This part pays special attention to learning for professional high-level decision-makers and spontaneous volunteer from the general public and their interaction with professionals.

Finally, the vision of SP5 on learning in CM is presented, based on the results of the SOTA:

Crises, stakeholders, tasks, roles, equipment, digital possibilities, political situations, they are all changing and will keep on changing. Learning needs to take account of changes in CM.

Two issues emerge from this vision. The first one is 'Changing learning goals in CM. Learning goals will emerge and will change unpredictable. A consequence is that new learning goals need to be identified quickly, and need a quick implementation into CM organisations. The second issue is 'Learning for change in CM'. CM professionals need to prepare for change. A consequence is that CM professionals need competences for coping with change. Furthermore, training has to invoke the physical and psychological stresses of a real crisis situation. To do so, immersive learning methods like serious gaming and simulation can be used.

The results of this SP5 SOTA can contribute to the overall DRIVER SOTA, as well as to planning of the work-packages of SP5 and to the other SPs. More important, its knowledge may inspire future developments on training and learning in CM, leading to the improvement of CM competencies of both professionals and citizens.

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1 Introduction

1.1 Subproject 5. Learning in Crisis-management

This state-of-the-art report presents an overview of modern learning developments for Crisis-management (CM). It includes learning activities, learning projects and learning solutions in the field of CM for both professionals and the general public. As such, it marks the start of Subproject 5 of DRIVER. The DRIVER project brings together researchers, developers and practitioners from across Europe and focuses on three key areas:

1. Improving civil society resilience so that local communities are better prepared to respond to, and recover from, a disaster;
2. Strengthening first responders in terms of the crisis management solutions they have available to them;
3. Training and learning solutions designed to enhance the capacities and capabilities of trainers and human resources professionals dealing with those involved in crisis management.

The aim of Subproject 5 is to improve and demonstrate the effectiveness of learning solutions, aimed at improving the Crisis-management (CM) competencies of both professionals and communities/citizens. Learning should contribute to improved effectiveness of CM: by individuals, teams, organisations and the system as a whole. Previous EU projects like ACRIMAS (Hamrin, 2012; Stolk et al., 2012) and CRYSYS (CRISYS, 2012) identified a broad range of CM needs, covering the whole range of CM capabilities and the entire crisis cycle. Learning was one of the subjects and often described at three different levels: individual, institutional and community. The individual level primarily aims at individual responder's competences, training and preparation. The institutional level aims at exercises and lessons learned within organisations. The Community level includes lessons learned from the perspective of cross-organisational (between organisations) and cross-border (between member states) collaboration. Based on what is known about these three levels of learning, it was decided that five specific topics should receive more attention in the DRIVER projects. These topics are covered by the following WPs of SP5:

WP52. Competences and a competence framework

WP53. Lessons learned and a lessons learned framework

WP54. Training for high level decision makers

WP55. Training for the CM professionals on the collaboration between professionals and the general public (the spontaneous volunteers)

In the next paragraph the outline of the report is given and links with WPs are explained.

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1.2 Outline of the report

Section 2, introduces the Learning context in CM, including the challenges for learning in the CM domain. Paragraph 2.1 discusses CM in general. In Paragraph 2.2 the consequences of cross-organisational and cross-border collaboration for learning are discussed. Paragraph 2.3 presents an overview of stakeholders in CM in relation to learning.

Next an overview is given of national and international learning developments, both within and outside of Europe. The learning developments were identified by desk research (literature study) and interviews with experts (workshop in Berlin). The method used for desk research and workshop is explained in Paragraph 1.3. The outcome of the findings are classified and evaluated and discussed in section 4 to 7. A short description of all selected learning developments is given in Appendix 1-4.

Section 4 covers the question What to learn for CM. To answer this question, it is helpful to look back on previous experiences recorded in lessons learned. Hence, this is the topic of WP53. Next to looking back to past experiences, one should look forward into the needs of unpredictable future crises. Section 5 covers the question How to learn for CM. It will discuss Instructional Design of learning interventions (e.g. training, education) and it describes tools and methods for evaluation of learning interventions. In section 6 the question How to implement learning for CM is answered by discussing Competences and Competence frameworks (related to WP52). The knowledge from this chapter could support training staff in designing and selecting the most adequate learning solutions, based on required competencies, identified organisational needs and characteristics of the target group. Section 7 pays special attention to two Special target groups: First, the professional high-level decision-makers (related to WP54), because they seem to lack training support at the individual level. Second, spontaneous volunteer from the general public (related to WP55) and their interaction with professionals. In section 8 the vision of SP5 on learning in CM is presented, based on the results of the other sections: Crises, stakeholders, tasks, roles, equipment, digital possibilities, political situations, they are all changing and will keep on changing. Learning in CM needs to take account of changes in CM. Two issues related to this vision are explored: Changing learning goals in CM and Learning for change in CM.

The results of this SP5 SOTA can contribute to the overall DRIVER SOTA as well as to planning of the work-packages of SP5 and to the other SPs. More important, its knowledge may inspire future developments on training and learning in CM, leading to the improvement of CM competencies of both professionals and communities/citizens.

1.3 Method

1.3.1 Literature study

The literature study aimed at finding recent learning developments, including learning activities, learning projects and learning solutions in the field of learning for CM for both professionals and the general public. The DRIVER demonstration project builds on the results of the preparatory projects ACRIMAS (Hamrin, 2012; Stolk et al., 2012) and CRYSYS (CRISYS, 2012). Therefore, the focus was on

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media published in print or electronically between 2012 (end of ACRIMAS) and 2014. If necessary, older publications were added to complete the picture.

1.3.1.1 Search procedure

A mixed-method search approach was used to collect relevant written media to gather information about each of the aforementioned subjects. Each search combined the use of internet search engines (Google, Google Scholar) and literature databases (Scopus, Ovid PsycINFO) with hand-picked additions from researchers' collections. The following sources were allowed: EU project reports (e.g. ACRIMAS), scientific publications (evidence based), practice reports (international, national and local) and solution descriptions.

To identify studies about learning, search terms like learning, training and education were used. To identify studies that may provide information relevant for CM, search terms like Crisis, Emergency and Disaster, in combination with terms like Management, Response, Readiness, Intervention, and Preparedness. Based on the topic of interest, terms like Lessons Learned, Competence Management, Instructional Design, Evaluation, Decision makers and Volunteers were added.

1.3.1.2 Limitation of the literature search

This search procedure has the limitation of all literature reviews: it cannot prevent that there are relevant projects that may have been missed. Logic suggests that there must come a cut-off point; otherwise the review would never be completed. This cut-off point comes when so much of the relevant literature is identified, that any missing studies will not significantly affect the reviews' conclusions. For instance, signalled gaps in literature can be artefacts of the search procedure. To decrease this possibility, all signalled gaps received extra attention in the search.

1.3.1.3 Content analysis

Definitions of important concepts that are not explained in the definition list are collected in Appendix 5 – Definitions used in SP5. The learning developments found in the selected sources were analysed and classified in terms of goal analysis (Topics and Gaps), target group analysis (Stakeholders and target groups), context analysis (Region, Cross-border), and intervention analysis (technology readiness classification) and collected in the Appendix 1 to 4.

Next, for each subject a qualitative meta-analysis was performed based on the collection of learning developments. This resulted in an overview with main results and a prognosis of the impact of these learning developments on the subject. The conclusions drawn from these analyses can be found in chapters 2 to 7. Finally, based on these conclusions, a vision on evolved learning was formulated, which is presented in chapter 8.

1.3.2 Workshop in Berlin

As part of the state of the art task in work package 51 a workshop was held on 14 October 2014 in Berlin, Germany. The aim of the workshop was twofold: (1) to collect input for SP5 in general and the SOTA subjects in particular and (2) to start a Community of Interest. The workshop started with presentations as an introduction to each subject. Next, a discussion was organised using the World

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café methodology. This methodology is a simple, effective, and flexible format for hosting large group dialogue (Brown, Isaacs, & World Café Community, 2001). It aims at sharing and increasing knowledge and learning while doing (See Figure 1).



Figure 1: Sketch of World Café format¹

¹ Source of Figure 1:
http://3.bp.blogspot.com/_SnGKYdtstRg/TR1owt021oI/AAAAAAAAAJs/TgIF5YbWMxE/s1600/2529629050_e4857ea176_o.jpg

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2 Learning context in CM

2.1 About Crisis-management

When things go wrong, there is no shortage of descriptors: accident, adverse event, catastrophe, crisis, critical event, deviance, disaster, error, failure, [...] serious incident, violation (Buchanan & Denyer, 2013). For the purposes of this SOTA, we use the term 'crisis' as the overarching category label. Chaotic circumstances, the absence of order, damaged or destroyed infrastructure and the requirement of rapid reaction respectively intervention (Hohfeld, 2007) In the Description of Work (DoW) report of DRIVER, a description is given of the 'ever evolving challenges in CM'(Project, Innovation, & Resilience, 2013):

"Hazards change, both for natural and man-made reasons – climate change being a well-known example of the latter. Vulnerabilities change, for reasons ranging from the establishment of settlements in new areas to societal evolution affecting people's ability to cope with crises. Interconnectedness changes because of increased connectivity in the technical domain, for example the power transmission system, and in the socio- cultural domain as cross-border communities become increasingly important. All these societal, technical and environmental changes interact to create new challenges for CM. These evolving challenges are not compensated by traditional challenges becoming obsolete. Instead, as societies become more complex, both the increasing scope and unpredictability of potential crises, and the rapid dynamics of the incidents to be managed demand CM of an ever higher level of complexity." (Dow of DRIVER Part B, page 2).

Crisis response management often involves dealing with 'wicked problems', as there is often a high degree of uncertainty, divergence in crisis perception, communication challenges, issues of public relations and politics, blame allocation and resentment, time pressure created by a sense of urgency, and the fact that 'action that is instrumental to understanding the crisis often intensifies the crisis' (Buchanan & Denyer, 2013). One may conclude that good CM may well be an impossible task and the challenges faced in learning for this task are many. Since disasters are infrequent and often unique in nature, learning from disasters and communicating the lessons learned to other organisations is hard and complex.

2.2 Cross-organisational and cross-border cooperation

During a crisis, different assistance units cooperate (e.g., fire department, police, and medical assistance unit) (Haar, Jehn, & Segers, 2013). However, a crisis cannot be managed by the regular emergency- and first responder-organisations alone (Heikkilä, Havlik, & Schlobinski, 2015a). CM requires involvement of other parties including nonprofit and for-profit sectors, and community and individuals like spontaneous volunteers (Beaton et al., 2010; Kapucu & Garayev, 2012). This concerns

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al four phases of emergency management: successful crisis collaboration involves multiple groups with a multidisciplinary character during mitigation, preparedness, response, and recovery (Beaton et al., 2010; de Koning, Kuijt-Evers, Theunissen, Van Rijk, & Huis In 't Veld, 2011; Haar et al., 2013; Heikkilä et al., 2015a; Kapucu, 2011a; Ren, Kiesler, & Fussell, 2008; J. M. C. Schraagen, Veld, & Koning, 2010).

Cross-organisational and cross-border collaboration in Crisis-management is challenging. It is characterised by synchronicity, non-collocation, unrelated organisations, and time-sensitivity (Beaton et al., 2010). This requires smooth coordination across multiple groups whose incentives, cultures, and routines can conflict (Ren et al., 2008). Groups can have widely varying goals and priorities and jurisdictional and regulation constraints (Beaton et al., 2010; Kapucu & Garayev, 2012). At the same time, there is a complex interdependence among group activities, a tight coupling between group activities and their consequences, and the great time pressure under which the multiple groups need to function and to respond to unexpected events (Ren et al., 2008). Multi group coalitions are often ad hoc assembled out of units that may never have worked together before, nor are they likely to see each other again after the crisis is managed (J. M. C. Schraagen et al., 2010). Rules and means for cooperation might be lacking (Heikkilä, Havlik, & Schlobinski, 2015b) and often central controlled coordination is absent, at least during the acute phase of a crisis (J. M. C. Schraagen et al., 2010).

Preferably, after a crisis the necessary actions are taken to learn from the experience to improve the effectiveness and safety of all units involved (Nato, 2011a). These lessons learned can result in an update to or creation of doctrine, Standing/Standard Operating Procedures (SOP), tactics, techniques and procedures, or technological tools (Nato, 2011a). CM support must address the technical as well as the cross organisational and cultural issues by providing a collection of procedures and practices for inter-organisational decision making, collaboration, and response coordination (Beaton et al., 2010).

Although the exact organisation of emergency management differs among countries in the world, the execution and coordination of CM is often performed by emergency management teams (Haar et al., 2013). However, not everything can be organised in procedures and many emergency situations have to be addressed by non-hierarchical and collaborative structures (Kapucu, 2011b). In CM one have to rely on teams that meet increased complexity in terms of team composition, degree of risk involved, and skills required (Baker, Day, & Salas, 2006). Agents in CM differ in educational background, tasks and experiences (Haar et al., 2013).

Success of cooperation relies heavily on the strength, quality, and nature of the relationships, and the ability to compromise multiple goals and expectations (Kapucu & Garayev, 2012). All this asks for competencies that exceed the competencies needed in monodisciplinary and regular 'cold' situations. For instance, CM agents face a burden of constantly monitoring their relationships to bring balance between internal organisational goals and network goals (Kapucu & Garayev, 2012). They need competences for effective communication within the multidisciplinary team (DH/Skills for Health, 2008).

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2.3 Stakeholders in CM

DRIVER targets a broad range of stakeholders in CM and not merely a relatively small group of crisis managers, managing society in times of crisis. DRIVER looks at European society and its resilience capabilities as actively contributing to the process of CM in all phases of the crisis cycle. Society is seen as the sum of its individual groups exhibiting different resilience capabilities and different needs to improve those. These groups, needing tailored and targeted approaches for developing higher resilience levels, are e.g. the single individual, different communities, and entities like the private and public sector as well as the media. Various groups of CM professionals can be distinguished in CM on operational, tactical, regional as well as international level. For instance, public authorities (e.g. ministries, regional or local governments), organisations (e.g. international relief and disaster management organisations), academic research institutions with a CM specialisation and the CM organisations (e.g. first responders, fire departments, hospitals etc.). However,

This report pays special attention to two Special target groups, because previous EU projects like ACRIMAS (Hamrin, 2012; Stolk et al., 2012) and CRISYS (CRISYS, 2012), showed that some extra attention is needed. First the professional high-level decision-makers (related to WP54), because they seem to lack training support at the individual level. Second, spontaneous volunteer from the general public (related to WP55) and their interaction with professionals.

In spite of this special attention to these groups, we consider all CM professionals, CM organisations and civil society (e.g. volunteers) as relevant actors in learning for CM.

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3 Reflections on the Berlin Workshop

3.1 The workshop

As described in the Method section, the aim of the workshop held on 14 October 2014 in Berlin, Germany was twofold: (1) to collect input for SP5 in general and the SOTA subjects in particular and (2) to start a Community of Interest. The workshop started with presentations as an introduction to each subject. Next, a discussion was organised using the World café methodology.

Four tables were formed during the workshop. One for each work package subject: Competence framework (WP52), Lessons Learned framework (WP53), Training for high level decision makers (WP54), and Training for collaboration between professionals and the general public (WP55). The work package leaders monitored the process at his/her own table. Every table could receive four to five persons per session. There were two rounds, consisting of four sessions each. After 15 minutes the groups moved to the next table. During the first round all participants delivered their input at each table on the respective subjects. For the second round new groups were formed. Again each group visited each table. This time the talk at the table was on the future learning developments for a given subject.

The workshop agenda is presented in Table 1 and in Table 2, a list of the participants is given. All of them have given their consent to use their input and to be named in the list of attendees of the workshop. The collected insights of the four tables are presented in the next paragraph.

Time	Topic	Speaker
09:15	Welcome and introduction	Josine van de Ven
09:45	Presentation DRIVER and SP5	Josine van de Ven
10:00	Presentations of the subjects in Subproject 5 'Training and learning'	Alexander Karapidis (WP52) Pär Eriksson (WP53) Chaim Rafalowski (WP54) Josine van de Ven (WP55)
11:05	DG Echo on Civil Protection	Alex Kopke
11:20	Learning Café – Round 1; state of the art	All
	Lunch Break	
14:00	Learning Café – Round 2; Future learning developments	All
16:00	Wrap up with 2 Statements from each table	All
16:30	Closing	

Table 1: Workshop program

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First Name	Last Name	Organisation	Country
Bruria	Adani	Ben-Gurion University	Israel
Dave	Bull	National Ambulance Resilience Unit (NARU)	England
Bernd*	Dworschak	Fraunhofer	Germany
Pär*	Eriksson	FOI, Swedish Defence Research Agency	Sweden
Anders*	Eriksson	FOI, Swedish Defence Research Agency	Sweden
Natasja	Hartzema	Nationale Academie Crisisbeheersing	Netherlands
Martin	Kaiser	Hamburg Consult	Germany
Alexander*	Karapidis	Fraunhofer	Germany
Alex	Kopke	DG ECHO	Belgium
Itamar*	Laist	MDA	Israel
Katherine	Lamb	Oxfordshire Fire & Rescue Service	England
Marcus	Moroff	PerEX Ltd.	Germany
Christian	Neitzer	Feuerwehr- und Katastrophenschutzschule Rheinland-Pfalz	Germany
Rolf	Nordengren	Swedish Civil Contingencies Agency (MSB) College Revinge	Sweden
Waldemar	Paternoga	Wielkopolska Voivodeship Office	Poland
Chaim*	Rafalowski	MDA	Israel
Vitor	Reis	Escola Nacional de Bombeiros	Portugal
Eric*	Rigaud	Mines-Paristech	France
Maciej	Szulejewski	ITTI Ltd.	Poland
Klaudia	Tani	European Organisation for Security	Belgium
Nicolet*	Theunissen	TNO	Netherlands
Josine*	Van de Ven	TNO	Netherlands

Table 2: Workshop Participants

* Participants in the DRIVER project

3.2 Results of the workshop in Berlin

At the workshop-table 'Competences framework' (lead WP52) two subjects were discussed. Firstly, there is different usage of the terms “competence”, “competence framework” and “competence management”. Based on this, working definitions for all three terms need to be developed and discussed within WP52. Another point of discussion is the heterogeneity in the scale and scope of competence frameworks. They address different levels which reach from a very basic understanding e.g. in form of “competence catalogues” for specific professions dealing with Crisis-management (e.g. fire fighters) up to technical frameworks which consist of structural, content-free blueprints to develop and roll out competence management activities for different Crisis-management

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professionals and/or different Crisis-management phases. This is also something that needs some work within WP52.

The workshop-table 'lessons learned framework' (WP53) highlighted a number of issues that have been further discussed in WP53. One is that few well-functioning lessons learned processes exist at the national or sub-national levels. Furthermore, in many cases there is little or no communication of observations/lesson between levels (local, regional, and national) or even within levels. Other challenges are the potential political sensitivities of lessons learned and the need for an organisational culture that encourages both the extraction of lessons and the learning in itself.

The option of creating one or several European web-sites regarding Crisis-management has been discussed. Such sites could include both discussion forums for experts and a document library, and could be used to build as well as disseminate knowledge. Such web-sites would however need to be closely managed to ensure the quality of the information.

The workshop-table "Training for high level decision makers" (WP54) in Berlin was followed up by a WP54 kick-off meeting. Here are the results of both meetings:

There were three conclusions on the subject 'Strategic decisions'. First, differences in the concept of what is a "strategic decision" and who is a "strategic decision maker" were identified. Second, it was agreed that Strategic decisions are decisions that have large impact (with regard to the number of persons, the economic aspect, reputation, public opinion, political – national and international – implications), that deal with competing values, that in many cases also have negative impacts, and that usually will have long-term effects (many hours – days and weeks). A final working definition is to be formulated. Third, the "strategic decision maker" varies greatly between member state. In Sweden only the political level is considered to be taking "strategic decisions" and their content is general aim and objectives with the budget allocations. All the other decisions are considered "operational". This is not the case for the other countries represented in the workshop where both elected officials as well as senior officers at the response organisations take strategic decisions.

The decision processes resulted in two conclusions. First, as "strategic decisions" are multi factorial by nature and have cross cutting effects, it is impossible to assess if the "right or wrong" decision have been taken by evaluating the results of the decision (many other factors, besides the decision taken impact the outcomes). Second, it was agreed to use the decision processes as the key factor to be analysed as a training concept. The "right decision" is considered as – "the decision taken by the right persons (decision makers), for the right persons (affected), for the right reasons, using the right information on the right time" (Jane Lamb, Davies, Bowley, & Williams, 2014).

Next, the building blocks of the training program on "strategic decision making" were agreed. A modular approach will be taken in order to allow maximum flexibility in the local adaptation. Several existing training programs, with the relevant theoretical background supporting them were presented. It was concluded that the availability of time and willingness to participate in training are key considerations in the planning of the training modules. Several tools were presented and discussed, along with their possible use. It is clear that in order to engage the participants, innovative tools should be used.

The workshop-table "Training for collaboration between professionals and the general public" (WP55) was present during the state of the art workshop on 14 October 2014. The ideas of this work package were presented to the partners and experts. Many new references came out of the

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workshop. Most of these references are in the local language, which is the reason why we did not find them in the first place. They were incorporated in the state of the art in paragraph 2.1.

To conclude with, the workshop-tables provided valuable insights on the four work-package subjects. Both experts in the fields and DRIVER project participants, combined their knowledge and experience and inspired each other. The workshop in Berlin appeared to be a very useful start of the state-of-the-art research.

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4 What to learn for CM: Lessons learned

4.1 Background

When deciding on what to learn, it is important to look at past crisis situations and to prepare individuals, institutions and communities for the next crisis. Processes promoting best practices and lessons learned are important features in any structure for training and learning. A lessons learned process is needed to evaluate past incidents and exercises. However, lessons learned from one organisation/country are difficult to implement into another organisation or country. One reason for this is that the evaluation processes often results in lessons that are ambiguous, highly contextual and fractional, and thus difficult to apply in new situations. Another reason is a lack of interest of the organisational leadership in the identification and analyses of lessons and other frequently occurring organisational inertia towards those. Consequently, lessons identified seldom become lessons learned. Therefore, it was decided that more attention should be paid to lessons learned procedures, resulting in WP53. Lessons learned and a lessons learned framework. This section presents the SOTA on the subject Lessons Learned. In Appendix 1 – What to learn for CM (section 4) 13 learning developments are listed. They are presented in such a way that reading them gives a good impression of the SOTA on this subject. However, to grasp the full meaning of the relevance of the learning developments the results of the SOTA analyses is discussed and conclusions are drawn in this section.

4.2 Lessons learned research projects

The literature as well as experience highlights a number of conceptual and practical challenges in the implementation of a Lessons learned process. These challenges range from the collection of relevant information to actually learning from the analysed lessons. Within DRIVER the concept for a lessons learned framework within the domain of CM will address the aspects of collection of lessons and learning across borders and/or sectors, building upon the results of relevant projects.

Many different types of processes and methods could be included in the broader context of experience-based learning: research, evaluations, after action reviews, gaming but also different approaches developed mainly for the improvement of production lines, such as the well-known Japanese concepts of Lean (Francis, 2014) and Kaizen (Wikipedia Community, 2014). In addition there are also a number of research areas that deal with different aspects of experience based learning such as organisational learning, project management, safety and resilience engineering.

However, in this SOTA research we will mainly limit ourselves to processes, systems and tools that are specifically aimed at producing lessons learned related to civil CM and civil protection and focus on actual learning developments in the area of Lessons learned in the last two years. We will not discuss different understandings of the concept of Lessons learned or the different schools of thought regarding the construction and function of lessons learned processes. We will however

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return to some of these issues in WP 53 Lessons Learned Framework for CM in Deliverable D53.1 “Lessons Learned Framework Concept”.

4.3 Lessons learned research projects

There are few research projects that explicitly deal with systems/processes regarding lessons learned for CM. However, starting in the 1980’s there have been active academic discourses in the areas of organisational learning (Argyris & Schön, 1996; Levinthal & March, 1993; Levitt & J., 1988; Schultz, 2001) and knowledge management (Weber, W., & Becerra-Fernandez, 2001) and Lessons learned in general. Related, and often with a somewhat more practical viewpoint, is research on lessons learned in project management, e.g. in the IT-sector or the construction sector (McKay & Ellis, 2014; Paranagama, Carrillo, & Ruikar, 2012). Furthermore, an area specifically mentioned in the ACRIMAS project are lessons learned in safety industry, dealing with learning from accidents and incidents especially within sectors such as construction, transportation and energy (Drupsteen & Guldenmund, 2014; Ramanujam & Goodman, 2011). Another area is resilience engineering, dealing with response to events and systems capability of coping with such events (Reich, Zautra, & Hall, 2010). Finally, there is a multitude of projects that have gathered and analysed actual lessons, sometimes also drawing conclusions regarding the lessons learned process itself (Alcantara, 2014; San-Miguel-Ayanz, Moreno, & Camia, 2013).

One of the few larger non-EU research projects concerning lessons learned in CM that has been identified in this SOTA is carried out by the Swedish National Defence College (Deverell & Hansén, 2009; Försvarshögskolan, 2010) Albeit academic in character, it has provided practically useful results regarding learning in and from a crisis. In the EU FP7 context there are three projects of specific interest regarding Lessons learned: ACRIMAS (Stolk et al., 2012), CRISYS (CRISYS, 2012) and ELITE (Grunnan & Maren, 2014; van Santen & Illing, 2014). While ACRIMAS and CRISYS were projects outlining conceptual ideas for more efficient and effective CM, including stressing the need for Lessons learned processes, the ELITE project had a much more practically oriented perspective, actually collecting and categorizing lessons from different types of emergencies as well as developing a wiki-solution for storing and presenting the information.

4.4 Lessons Learned tool and solutions

There exist a large number of solutions for collecting, analysing and managing observations/lessons. They range from simple tools using word- or PDF-documents to more complex databases with advanced functionalities regarding e.g. searching and the management of information from observation to implemented lesson. In some cases the solutions focus on the collection of information, in other cases on the analysis. A common challenge is that to be useful they need to contain large amounts of diverse information as well as be user-friendly and have the information easily accessible. These two features have generally proven difficult to combine.

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Collection tools such as the EDISOFT Observation Collection Program (EDISOFT, 2005) and the ITTI LIMA2 (ITTI, 2014) help gathering information in a structured way, often with an interface to a larger lessons learned database to which the information can be uploaded. Other tools for collection, such as the FOI F-REX (Andersson, 2009) and the ITTI PROCEED (ITTI, 2014) help in the sense-making of this information, through i.a. visualizing and replaying an event through the use of information from multiple sources. Another type of tool for analysis is the ITTI BESECURE, developed within the EU FP7 project “BESECURE” (Crabbe et al., 2015). Although not a lessons learned system as such, it presents a methodology with indicators to examine best practices.

Finally, the Lesson Learner Lessons Management Hub (LessonLearner, 2014) are examples of tools used not only to store lessons, but also to process them from the collection of information, through the analysis and up to the implementation. The SOTA research shows that there are many solutions readily available. However, given the diverse types of lessons learned, from different sectors and levels, needed in CM no single solution will fit all. The DRIVER Lessons learned framework will most probably have to include a collection of solutions that meet different needs and specifications.

4.5 Lessons Learned systems

Most, although far from all, organisations state that they have some kind of process for lessons learned. However, in practice few seem to have a well-functioning, systematic and continuous process, supported by analytical resources and adequate repositories. In many cases the process seems to be reduced to After Action Reviews and analysis of specific incidents. Some national CM agencies have internet resources for the dissemination of lessons learned/best practices and for encouraging exchange of experience. These resources may target the general public, the CM community or both (ARIA, 2014). Other examples of internet resources for dissemination of lessons exist in safety business such as aviation (Bureau d’Enquêtes et d’Analyses, 2014; Federal Aviation Administration, 2014) and energy (NASA, 2014).

Furthermore, at the sectorial level there are successful examples of initiatives regarding lessons learned, e.g. within areas such as health care and transportation. However, it seems that these successes seldom cross borders or and cross-over to other sectors.

While collecting information for this SOTA, a number of lessons learned processes have been identified within international organisations leading CM operations. The UN Department for Peacekeeping Operations (DPKO) (UN Department of Peacekeeping Operations, 2012) has had dedicated Lessons learned processes for at least two decades. The process is both bottom-up (a network of best practices officers in the mission reporting) and top-down (dedicated teams sent out on an ad-hoc basis to collect specific information) and the information gathered is analysed by subject matter experts. The UN DPKO process is less about technology and more about process and approach. The NATO Lessons Learned capability (Nato, 2011b) incorporates the structure, process and tools necessary to capture, analyse and take remedial action on any issue. The process is basically bottom-up where observations sent in are reviewed, turned into lessons identified and given an action plan.

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Within the European Union External Actions Service (EEAS) there exist several Lessons learned processes (Council of the European Union, 2012; Lindén, 2014; Quille, 2012). In the Military Staff (EUMS) the Lessons Learned Process (ELPRO) supports i.a. the planning and execution of CSDP activities, the EU Capability Development, the EU concept development and the development of EU Standard Operating Procedures with lessons from CSDP-activities. The EU EAAS Civilian Planning and Conduct Capability (CPCC) provides lesson based development/review of internal guidelines, standard operating procedures and other tools for planning, launching, conduct and termination of civilian CSDP missions. The EU EAAS CM Planning Directorate (CMPD) provides the main lessons learned reports at the political and strategic level, including Annual Reports and thematic reports (i.e. on Security Sector Reform or Gender Mainstreaming) and feed these lessons back into the strategic planning process. In the first two cases the member states are actively involved in the selection and validation of lessons, meaning that the process will have political overtones. The different processes are now included in a common web portal.

The Civil Protection Mechanism (CPM), within DG ECHO, has had a process for lessons learned since 2008, mainly storing large amounts of reports and other information in a database as a broad basis for learning processes and knowledge development (European Parliament, 2013)

Overall, the impression is that most of these systems are bottom up and have problems meeting the challenge of disseminating meaningful lessons to decision-makers and other end-users. A politicised system for validating lessons also increase the risk of watered down conclusions. The DRIVER Lessons learned framework needs to draw on the experiences from the existing LL processes within multinational and intergovernmental organisations. Furthermore, in the case of the processes within the EEAS and the DG ECHO, the LL framework also need to make sure that it is complementing and supporting, not duplicating.

At the national and regional levels there exist numerous processes for collecting and analysing lessons from CM. One example of a lessons learned system at the national level is from MSB (The Swedish Civil Contingencies Agency) which have both a statistical database (IDA – Indicators, Data and Analysis) which include both accident statistics and statistics on different kinds of preventive actions. This is an example of a passive, bottom-up process. In addition to this, MSB has observer teams which are sent out to both domestic and international crises to find information, including lessons, of interest. This is an active, top-down process (‘MSB – Swedish Civil Contingencies Agency’, n.d.). Another example, at the regional/local level, is found at the Municipal office in Poznan (Poland), which coordinates different services in CM situations. After each crisis situation, a lessons learned meeting, which is obligatory to attend for all services affected, is organised to identify and analyse relevant lessons. A lessons learned report, that includes recommendations to the different services, is compiled for the city mayor. This process is an example of an active and focused, top-down collection of lessons (‘Poznań City Hall’, 2014). Common for many of the national and regional processes/systems for lessons learned is that they are quite little flow of information horizontally, to bodies at the same level, or vertically, to sub-ordinate or super-ordinate bodies. The information collected basically stays within the organisation. Furthermore, the impression from several of the studies examples is that the processes are not seen as well functioning by the users. They are seen as cumbersome and/or as not containing the desired types of lessons.

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However, common for many, if not all, of the studied national and regional examples is that the collected information basically stays within the organisation and that the potential users do not see the processes as specifically useful.

The ability to move lessons from one context to another through a cross-border, cross-sector and cross-phase analysis has been identified as a core question for a Lessons Learned Framework for Crisis-management. It was generally agreed that there is a need to do common analysis, for instance through a group of national experts that analyses an incident and decides on what lessons are the important ones and adapts these to different national or sectorial contexts. It was also noticed that although there are great differences between the Crisis-management systems of the EU member states, most countries have training schools for rescue services as well as some kind of authority for national level Crisis-management development. These could form a basis for this type of common analysis.

4.6 Results

The SOTA shows that many of the organisations involved in CM at different levels (local, regional, national and multinational) have some form of explicit or implicit lessons learned process. However, the functionality of these processes often seems to be questioned and there are indications that the flows of information within and between organisations are generally weak. The reasons for this are not well understood, and little in-depth research, specifically dealing with lessons learned in CM, has been identified. An important step for WP53, when developing a Lesson Learned Framework, should hence be to further investigate the challenges to lessons learned in the CM context, with a specific focus on cross-border and cross-sector lessons learned. To do this, it is proposed to use the relatively mature research area of organisational learning as the main theoretical framework. An in-depth analysis of existing lessons learned processes in CM organisations in Europe, to survey gaps and needs, could then be paired with the well-developed theories on organisational knowledge and organisational learning to define the overall role and features for Lessons Learned Framework. These features must be broadly acceptable, as well as perceived as being able to produce tangible results for the involved organisations. The framework hence needs to be able to address common challenges to functioning lessons learned processes.

As organisations seem to have diverging perceptions of the motives for lessons learned, it is necessary to try to create a somewhat more unified opinion on what lessons learned are and why they are important for CM in Europe. A first step will be to further survey and analyse these perceptions and then to develop a lessons learned framework that fosters a more unified view.

The area of CM is complex. There are many different types of organisations involved, with different mandates, roles and characteristics. Although it is necessary to study how other related areas, such as safety industries, have handled lessons learned, it is also important to acknowledge that the specific nature of CM in disasters will make any transfer of methods and approaches from other areas challenging.

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The DRIVER WP53 “Lessons Learned Framework for CM” will use the results from the EU FP7 projects ACRIMAS, CRISYS and ELITE as well as other relevant research as starting points for the next steps in the development of a framework for lessons learned in CM. However, the results of these projects have been found to be quite abstract, underlining the importance of lessons learned rather than describing how it should be done or what the main challenges are. It is thought that much work is needed to describe the main challenges, not only to lessons learned as such, but also to important sub-areas of a lessons learned framework for CM in Europe (such as cross-border and cross-sector lessons learned or how to direct the lessons learned process). Furthermore, proposals for how to handle these challenges need to be developed.

The SOTA indicates that there seem to be no lack of solutions for lessons learned. However, the choice of solutions to be used in the DRIVER experiments need to be further analysed after the development of the Lessons Learned Framework. A preliminary conclusion from the SOTA is that although solutions are important, they are not as important as a clear idea of motives, mandates and resources for the collection and analysis of observations/lessons. We propose that the coming research focus on a top-down approach, where the need for knowledge will, to a large extent, control what information is collected and analysed. Thus resources can be focused on what is most important, at the same time as increasing the value of the output.

Furthermore, a lessons learned process for CM in Europe must, to be useful, allow for the transfer of lessons from one context to another, either from one country to another or from one sector to another. This will result in specific demands on not only the dissemination, but probably also the analysis and collection, not least to create trust in the identified experiences, and need to affect how the Lessons Learned Framework is constructed.

The Lessons Learned Framework needs to allow for the handling of a wide variety of lessons – from small, everyday lessons on a tactical level to large overarching lessons from seldom occurring events. In addition, several trends are influencing the causes and consequences of accidents and crises, including technological change; digital systems producing new hazards and failure modes; increasing complexity of human machine relationships; changing regulatory views of safety; and decreased public tolerance for accident losses (Buchanan & Denyer, 2013).

Hence the Framework needs to allow for a differentiated approach, recognising that there are lessons from different sources that are important at different levels and for different user groups and that handling these in exactly the same way would be unwise and bad resource management. The Framework must instead create a structure for understanding how different types of lessons could be differentiated. Related, a lessons learned framework needs to ensure that learning is based not only on the investigation of failures but also on the study of a daily, normal situation as well as of unusual positive events, even such learning developments that are the results of a serendipity.

Looking at existing processes and solutions, a conclusion is that any future process needs to be simple to be useful. This includes the guiding conceptual ideas as well as the supporting tools and their user interfaces. Another difficult but necessary issue, especially at the multinational level, is the need for a clear division of labour between the collection and analysis of factual circumstances (what

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happened, what did we do, what was the result) and the political considerations and decisions regarding future actions. Finally, the existing tools, both the EEAS portal with its databases and search functions and the evolving EU Civil Protection Mechanism database for lessons learned, may provide interesting experiences of value to the development of a lessons learned framework for CM. These should be taken into consideration in the work of WP53.

4.7 Recapitulation

This paragraph recapitulates 'What to learn for CM: lessons learned framework'. Crises occur almost every day in the EU, both small ones and big ones. Can organisations involved in Crisis-management in Portugal learn from a crisis that occurred in Sweden? Can the fire brigade learn from the police department? Innovation is not only based on new solutions and procedures. Innovation is also driven by experience. The ability to collect, share and learn from experience are important issues in the work package lessons learned framework.

The development of ICT has changed the reality also for lessons learned processes. It is no longer a technical challenge to store, combine/analyse and disseminate/make available large amounts of information. However, to turn information into usable knowledge, readily available for the end-user, is still a daunting task. While more and more organisations start up lessons learned processes, not in the least because it seems to be the right thing to do, the development of a policy and a conceptual framework for internalising the lessons learned process is still lagging behind.

In the next few years, as many organisations move from simplistic tools and processes where information is stored using word- and pdf-documents to more complex databases, there will be an increased need for a clear idea on what lessons we search for and for what reason. Without such an idea, the risk is imminent that we will have an abundance of information without knowing how to put it into proper use. Furthermore, since the flows of information will be increasingly cross-border and cross-sectorial, the ability to analyse an observation and decide its validity not only in the original context but also in other contexts, will need to be further developed.

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5 How to learn for CM: instructional design and evaluation

5.1 Preface

To decide on 'How to learn', one may consider both the development and the evaluation of training.

There is some confusion surrounding the terms 'training', 'education', 'development' and 'learning,' to the point where they are often used interchangeably (see figure 2). 'Learning' is often seen as the overarching concept under which formal 'education' (learning by thinking) and 'training' (learning by doing) take place, with 'development' as the resulting outcome of these pursuits. In this section we use the overarching concept 'Learning' and speak therefore of 'learning developments' throughout the report.

The first, development of learning developments, can draw from the field of instructional design which is the systematic process by which instructional materials are designed, developed, and delivered. Its aim is to create "instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing". Both the theoretical insights (scientific approaches) and the practical (formats and support tools) insights of this field may be of relevance for this SOTA.

Next, is also important to look at methods to evaluate the success of instructional design. The focus in this SOTA is on methods and tools that support trainers and participants to evaluate the learning developments. One might evaluate whether learning objectives were achieved (learning issues), or whether accomplishment of those objectives result in enhanced performance on the job (transfer issues).



Figure 2: Difference between Training, Education, Development and Learning

In the following sections Instructional design and evaluation learning developments are discussed separately and presented separately in Appendix 2 – How to learn for CM (section 5). The 50 learning developments in the list are presented in such a way that reading them gives a good impression of

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the SOTA on this subject. However, to grasp the full meaning of the relevance of the learning developments the results of the SOTA analyses is discussed and conclusions are drawn in this section.

5.2 Instructional design

When overseeing instructional design in CM, the collection of learning developments presented in Appendix 5, can be subdivided into three categories:

1. Instructional approaches, (research and scientific notions on instructional design),
2. Instructional formats (real formats for Education, Training and Exercises (ETE)),
3. Instructional support solutions (solutions to facilitate ETE formats).

Note that some learning developments can be placed in more than one category. For instance The CRISIS project (CRISIS, 2014) included two support solutions and one format. However, since the main aim of this project was providing support solutions, it was placed in that corresponding category.

On the whole this list of learning developments can be an inspiration for instructional design in CM and even be expanded to a European portfolio. However, analyses of the learning developments found show that there are some limitations in instructional possibilities used.

First, the instructional approaches found are mainly aimed at training for the response phase in CM, using simulation and action learning to create stressful circumstances (e.g. (Alison et al., 2013; Hsu et al., 2013; N C M Theunissen, Stubbé, Six, van Rijk, & van Schaik, 2010). A second, less prominent group of approaches aims at learning from lessons identified after a crisis, using on- or off line Communities of Practice (e.g. (Eckert, 2013a; Kowalski, 2014a, 2014b; Maal, Kowalski, & Grunnan, 2013; Taber & Taber, 2013). However, this second group of approaches is not reflected in the instructional formats and instructional support solutions, as can be seen in the annex. All include the first approach of training of the response phase in CM, while the preparation phase is not covered.

Second, in line with the previous finding, it is found that there has been much emphasis on training and exercises, but less on education. Training and exercises help to rehearse and strengthen the competences needed for CM, whereas education is about providing the basic competences (Masadeh, 2012). In Europe there are schools that provide education on CM (for instance the Institute for Physical Safety in the Netherlands), and of course they all have a well thought through educational curriculum. However, preferably all learning activities in school (education), and at the work related (training and exercises) are building upon each other. In the SOTA search we did not find proof of such learning curriculum.

Third, the learning of individuals is influenced by the context in which they operate and learn. Therefore, when planning interventions for learning, preferably, the whole ecology of learning should be addressed, this includes micro (individual), meso (organisational) and macro (society) levels. Within this ecology of learning, five levels of influence are identified: M1: learner, M2: group, M3: organisation, M4: collection of organisations, and M5: country or collection of countries (van Gool,

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Theunissen, Bierbooms, & Bongers, 2016)). It appeared that the learning developments found mainly aim at individual and team-learning (M1, M2), less on organisational (M3) or regional level (M4, M5). Moreover, The target groups covered in the learning developments discussed here represent possible groups involved in CM. However, within the focus on M1 and M2 level, there is an emphasis on target groups with an operational function, while target groups with a strategic function are not explicitly represented.

An example of an instructional format that did include more than the individual and team level was IMPACT, a prototype as main outcome of the L4S project (CORDIS service, 2011; Eckert, 2013b; L4s project, 2010) includes a set of simulations which can be deployed online, on-site or in blended mode combining the previous modes. Those simulations address training at different organisation levels, namely:

- Level 1 addresses crisis readiness at team-level through the simulation game EagleRacing L4S; (team level M2)
- Level 2 addresses crisis readiness at organisational-level through the simulation game MayDay- L4S; (organisational level M3)
- Level 3 addressed crisis readiness at the individual-level through the simulation game What a Day- L4S (individual level M1)

The L4S outcome tried to cover the needs of organisations to help their managers and personnel in order to develop key skills and competences in CM area through an innovative, highly involving, effective and easy deployable life-long learning service.

This SOTA includes many great support solutions that can be used to overcome aforementioned limitations. The use of a training environment to support the creation of realistic simulations of crisis scenarios, simulations, considering the inclusion of stressful factors of a real world crisis is the best known support solutions in the domain of CM. We found different categories of support solutions namely:

1. Systems to support the development of key skills and competences essential to crisis situations: In particular, we found solutions for the development of skills related to collaboration and management in crisis conditions (CORDIS service, 2011; Eckert, 2013b; L4s project, 2010). The conceptual definition of this type of solution and the results of further analysis of its effectiveness in practice considering the successful achievement of the required skills/competences in real training experiences in similar contexts to those where DRIVER WP54 training activities would be deployed. They can be used as reference for the definition of the component for competences development within the training solution to be created.
2. Crisis Simulation frameworks based on immersive environments: Such frameworks like the one provided by the Pandora Tool-Box (Cesta, G, De Benedictis, & Strickland, 2012; Pandora, 2007) are useful for defining training scenarios with the presence of stressful factors of real world crisis. Moreover, it provides support for the personalization of planned stimuli (contents) according to the different trainee profiles as well as dynamic adaption of the training activities. This type of framework could be used to define the training scenarios for WP54 and WP55 activities but first we will need to verify to which extend the scenarios

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obtained with this toolbox can be imported in the simulation tool that will created/ used for the training process deployed in WP54 and WP55.

3. Extensible simulation frameworks: Frameworks like Indigo SDK (INDIGO, 2010) or the XVR Toolkit (XVR, 2001) that will facilitate the extension of the existing simulation system (Indigo or XVR platform) by adding new modules to support the inclusion of new services and simulators when required. If within DRIVER settings, the requirements for the training activities to be conducted WP54 and WP55 have some levels of commonalities with those deployed in the Indigo project or those supported by the XVR platform, the mentioned extensible frameworks could be used for adding the needed simulators. The decision of choosing one or another will depend on their suitability and full availability for the training pilots we intend to conduct.
4. Tools for remote exploration of objects within an immersive 3D environment: Tools like 3DNsite (INDIGO, 2013) can be used to simplify the process of data acquisition and location recognition of stakeholders like first responders and crisis managers during emergency situations, let be in simulated conditions or training sessions. The use of this tool or its integration within the simulation tool to be used in WP54 and WP55 will depend on the results of the decisions taken in relation to the usage of frameworks listed in 3)
5. Development frameworks based on Learning Analytics: This category seems to be not much in use as learning support trends in CM although it is considered as cutting edge approach in other educational domains. Such type of frameworks like GLEANER (Arnab, 2014) facilitates the implementation of monitoring services within highly interactive systems like games or simulations which allow tracing trainers' interaction, show and check their progress towards the achievement of training goals and also the generation of recommendations to facilitate such attainment.
6. Tools for Serious Gaming: the TNO Serious Gaming Lab includes several serious gaming tools relevant for CM. In this lab-environment, Serious Gaming applications can be developed and tested (TNO, n.d.).

5.3 Evaluation of learning

When overseeing evaluation methods in CM, the collection of learning developments, presented in the Annex, can be subdivided in two categories:

- Evaluation models, (research and scientific notions on evaluation) (Buchanan & Denyer, 2013; Greller & Drachsler, 2012; Jenvald, Morin, & Kincaid, 2001; J. M. C. Schraagen et al., 2010).
- Evaluation instruments (to perform quantitative and qualitative measurements), (Adrot & Moriceau, 2013; Arnab, 2014; de Koning et al., 2011; Freberg, Saling, & Freberg, 2013; Haar et al., 2013; Kapucu & Garayev, 2012; Maal et al., 2013; METS, 2014; Porter, 2013; Salmon et al., 2009; N.C.M. Theunissen & Stubbé, 2014; Van Berlo, Hiemstra, & Hoekstra, 2003; Vidal & Roberts, 2014)

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The scientific world provides many useful evaluation methods to evaluate whether training/learning objectives were achieved (learning issues), and whether accomplishment of those objectives result in enhanced performance on the job (transfer issues) (Kraiger, Ford, & Salas, 1993)

They can be divided in two scientific approaches:

- Quantitative research, which involves analysis of numerical data (Hoenkamp-Bisschops, 1982; Strauss, 1987. Examples of this in the appendix are: (Freberg et al., 2013; Haar et al., 2013; Kapucu & Garayev, 2012).
- Qualitative research, which involves analysis of data such as words (e.g., from interviews), pictures (e.g., video), or objects (e.g., an artefact). Examples of this in the appendix are: (Porter, 2013; Van Berlo et al., 2003; Vidal & Roberts, 2014)

In the collection of evaluation learning developments in CM, two trends can be found: First, there are observational field studies using qualitative analyses (interviews, observations, text-analyses) and second, experiments (often with a simulator) using quantitative analyses (questionnaires). Some of the evaluation solutions can be used during these observational studies as they not only support evaluation of trainings, but also aid in the feedback on the learning results of participants. However, it is not necessarily true that an evaluation solution that can be used to evaluate a training, can also give feedback on the learning results of participants and vice versa. The previous paragraph provides an overview of instructional simulation tools that could be used for such experiments.

As defined in Appendix 5 – Definitions used in SP5, evaluation can be used to decide whether training/learning objectives were achieved (learning issues), and whether accomplishment of those objectives result in enhanced performance on the job (transfer issues). However, in the learning developments in Appendix 5 it can be seen that most are about performance evolution, of individuals or of teams. One was found that is explicitly about training evaluation: GLEANER (Arnab, 2014). Two instruments, the iSELF (de Koning et al., 2011; N.C.M. Theunissen & Stubbé, 2014) and, the ELITE (Adrot & Moriceau, 2013) are used for both performance and training evaluation.

All evaluation models and instruments can be used in DRIVER context, and for some the usefulness in European context has already been examined. In that context a special note is for the Entri project (ENTRi, 2011). This project focuses on the development of individual learners' capacity considering an international scope. In the past, 14 core and specialisation courses have been certified and given the C3MC label established by the European Group on Training (EGT). This set of courses or a subset of it can be used to establish jointly deployments of training programmes amongst different institutions participating in DRIVER and to take advantage of the previous experiences and expertise in the development of soft skills. Although the main site of the project includes information about the courses contents there are no data available on the criteria that are used to certify trainings. If there were, this would be useful.

In line with the findings on instructional design learning developments, most evaluation learning developments are evaluating individual level and team level. Less is available on organisational or regional and country level. And again, there is an emphasis on target groups with an operational function, target groups with a strategic function are not explicitly represented.

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5.4 Recapitulation

This paragraph recapitulates 'How to learn for CM: Instructional design and evaluation'. In general terms, the SOTA shows that most learning and training is aimed at action learning for the response phase. Although this is very helpful, it overlooks other possibilities. So it is important not to limit learning to the response phase, as the preparation and recovery phases need attention as well. This will give room to other (and more contemporary) instructional approaches than simulation exercises. One example is ubiquitous learning, using mobile phones and other gadgets that support self-directed learning, easily available anywhere. These forms of training can be important since it is unclear what crisis will happen at what moment, and thus what competence will be needed. In the world of instructional formats and support solutions we see a trend of the creation of frameworks to integrate gamified simulations, virtual reality, augmented reality and distributed systems. Complex and precise gamified simulations will be present in the training and experimentation, with diverse degrees of guidance, adjusted to the learner/trainee profile and according to the set of predefined or evolving training goals.

In terms of monitoring and evaluation, the use of profiling tools, the implementation of Learning Analytics approaches with the combination of neuro-physiological sensors, will allow a more effective monitoring of the learner, understanding of his behaviour and mental status but also will facilitate the adaptation in real time of the content, presentation, difficulty in interaction modes according to the learner profile. Another element of great importance is the availability of easy to use authoring solutions to support the inclusion of pedagogical and domain expertise in the design of such type of game based simulations.

Making this possible will make the application of games and simulations more valuable in trainings. This in turn will help to close the gap between the educational context (school) and the work context that we spoke of before. More attention is needed to a closed curriculum between Crisis-management education (at school) and training and exercises (in work context). A closed curriculum improves a robust learning output and will improve competence development. We live in a world that is changing faster than ever before and knowledge starts losing importance the moment it is learned. Professionals in Crisis-management have to be flexible and sufficiently equipped to be able to face the daily challenges. This implies also a need to be able to learn from the work context (lessons learned!) and use that (immediate) during the education at school.

Lastly we would like to plea for expansion of instructional possibilities beyond attention for individual professionals in Crisis-management. And certainly expand beyond the attention to operational functions. Success of learning programs is not only determined by the quality of the training but also by the interpersonal, social, and structural characteristics that reflect the relationship of the learner and learning program to the broader real life context. As a result, learning interventions may be directed to the level of individual learners and at the level of the context in which these learners operate (team, organisation, network of organisations, and countries).

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To reach this level of quality in learning and training some good evaluation methods and tools are available, but need to be tested in European context. We plea for the following learning developments in the coming years:

- Use a combination of quantitative and qualitative evaluation instruments to get a more balanced evaluation of both training and performance evaluation
- Get a better understanding of the differences and similarities between high-level decision makers and other Crisis-management staff to guide evaluation
- Develop new methods and tools to facilitate multilevel evaluations (micro-meso-macro levels)
- Develop measurement instruments in combination with frameworks, which makes tailor-made evaluation systems possible.

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6 How to implement learning for CM: Competence Framework

6.1 Preface

Learning solutions for CM that results from the questions 'What to learn' and 'How to learn', cannot be implemented without being properly embedded into their organisational, legal and political environment. A solution can only provide full benefit, if respecting the environment's requirements imposed by legacy structure and policy. On the other hand, there might be aspects of the environment that can be adjusted in order to get full benefit from technological and conceptual solutions. To our knowledge, there is often no systematic concept to align learning strategies to phases before, during and after crisis and to address all phases of learning (problem identification, gap analysis, successful closing of gap, and subsequent assessment of improvement). This will be addressed through a competence framework to be developed in WP52. This section presents the SOTA on the subject competences and competence framework. In Appendix 3 – How to implement learning for CM (section 6) 35 learning developments are listed. They are presented in such a way that reading them gives a good impression of the SOTA on this subject. However, to grasp the full meaning of the relevance of the learning developments the results of the SOTA analyses is discussed and conclusions are drawn in this section.

6.2 Competences

In the last decade, the concept 'competencies' has been considered a valuable one to match individual performance and career planning with organisational job needs (Marko & Savickas, 1998; Miller, Scully, & Winstead, 2003). In this SOTA, competences are defined as Competence is described as covering combinations of skills and knowledge, following the ISO 22301:2012 – Societal Security – Terminology 2.2.16 definition. However, there are different schools and approaches regarding the subject of competence or competences, and each use their own definitions. In some definitions, competences are described as covering combinations of skills and knowledge (ISO, 2012). In others definitions skills and knowledge are expanded with psychological constructs like conduct, attributes, motivation and notions (Boekaerts, 1991; Garavan & McGuire, 2001; Marko & Savickas, 1998). This has the result that "The lack of a generally accepted operational definition of competence is generally acknowledged" (Garavan & McGuire, 2001). The definition we use does not exclude the before mentioned psychological constructs. Competencies are essential for certain tasks or positions (Case, 2003; van Merriënboer, van der Klink, & Hendriks, 2002).

The competencies that are deemed to be the most essential for a certain task or position are sometimes called 'Core Competencies' (Case, 2003). One can find many examples of competence catalogues for specific CM functions or organisations in specific countries. For instance, (*Competence*

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Framework for Firefighters, 2014), or (DH/Skills for Health, 2008). However, it is difficult to compare or synchronize these lists, because they originate from multiple organisations and/or countries. Another problem is that it is unclear if the competences used by the CM institutions will be relevant in the nearby future. CM functions might include new tasks or new organisational concepts and may require new competences. In order to bring the CM institutions more together, and thus indirectly supporting future collaboration, a list of overarching competences could help. Such a list will form a shared understanding between CM institutions on needs for current and future skills and trainings.

6.3 Competence management and competences

This overview illustrates a choice of important learning developments in CM aligned with competence- and skill-oriented activities collected in different European countries and North America. The collection is clustered into two main categories:

- Scientific projects (Barbera et al., 2005; Burkle Jr., Lyznicki, & James, 2012; Daily, Padjen, & Birnbaum, 2010; Devitt, Holford, Pantaleev, & Sharma, 2012; Guerdan, 2009; Jensen & Baron, 2002; Kapucu, 2011a; MASTER, 2013; Neeley, 2006; Ross, Liston, & Cooke, 2010; SECUR-ED, 2014; Stolk et al., 2012; Stracke, 2009; Tulane University's Disaster, 2011; Ulezi & Jackson, 2012; Walsh et al., 2012).
- organisational projects and approaches (Beveridge, 2011; BFASC, n.d.; Bundesministerium für Inneres, n.d.; 'Competence Framework for Firefighters', 2014, 'Poznań City Hall', 2014, 'Wielkopolska Voivodship Office in Poznan', 2014; County of Louisa Department of Fire and EMS, 2014; DH/Skills for Health, 2008; J. Eriksson & Juhl, 2012; Faculty of Civil Safety Engineering (WIBC), 2014; Florida Department of Health, 2011; HCFDC- Convention simplifiée de formation professionnelle, 2013; OMH's Think Cultural Health, 2012; Roux-Dufort & Metals, 1999a; Skills for Fire & Rescue (SFJUK), 2012; Nicolet C.M. Theunissen, 2014; THW-Bundesschule, 2015; Warsaw Police Department, 2014; Zivile Sicherheit (KCCE), 2014).

The SOTA in this chapter identifies, classifies and specifies various on-going and recently finished activities in the field of competences, competence frameworks and competence management for CM. In this sense, it gives an overview for the first time about competence activities in CM.

In the next paragraphs the result of the content analyses will be presented.

6.3.1 Analyses of the findings

To start with, the findings were analysed according to different criteria: stakeholder, topic, country, gap addressed, target group, and technological readiness level. Within these criteria we found several activities related to competence management. Competence activities can include, for example, the development of early intervention skills, cultural competences, risk reduction competences, cross-disciplinary competences or operational competences with respect to different phases of preparedness, response and recovery from crisis and disasters.

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Competence activities in CM are developed for different target groups: These target groups include many groups of actors in CM such as, firefighters, policemen, physicians, healthcare providers, hospital personnel or representatives of ministries or regional and local governments responsible for CM.

Competence-activities in CM are not the domain of a single stakeholder group: As a first result it can be derived from the SOTA examples that there are four stakeholder groups which predominantly deal with the topics of competences and competence management in CM. These stakeholder groups are public authorities (e.g. ministries, regional or local governments), private organisations (e.g. consulting companies), academic research institutions and the CM organisations (e.g. fire departments, hospitals etc.).

Competence activities in CM can be found on various topics: The underlying topics of competence-based approaches in CM vary in a scope from addressing activities of competence development of quite specific competences needed in different phases of CM to more general overviews of competences and the provision of structures for modelling, developing or evaluating competences and the related activities in CM. More specific activities include, for example, the development of early intervention skills, cultural competences, risk reduction competences, cross-disciplinary competences or operational competences with respect to different phases of preparedness, response and recovery from crisis and disasters. More general activities are related to the identification of, for example, sets of core competences for groups of actors in CM (such as firefighters, policemen, physicians, healthcare providers, hospital personnel) or the provision of guidelines and frameworks for the identification, development and assessment of competences of these groups and methods and approaches for tackling the issue of competence management in CM in general.

Competence activities in CM can be found in different regions and countries: Although our overview on activities is far from being complete for Europe and the rest of the world, it might be concluded that in particular countries in which structures of vocational education and training are less state-dominated, a rich variety of activities can be identified. In this sense, many activities can be found in the UK and the US both with relation to specific and more general activities.

Competence activities focus at either very specific, practical gaps and needs in preparedness, response or recovery phases or at more general attempts to promote professionalisation:

As already indicated, the examples address quite specific competences and skills such as, the development of early intervention skills, cultural competences, risk reduction competences, cross-disciplinary competences or operational competences with respect to different phases of preparedness, response and recovery from crisis and disasters. On the other hand, competence-based solutions or approaches are selected for the general description or conception of the areas of deployment of whole groups or organisations. This kind of structural models or frameworks are also useful to promote professionalisation of different groups of actors in CM.

There is still a lack of competence activities in CM targeting cross-organisational and cross-border issues. Our analysis shows hardly any substantial approaches in cross-border competence activities. Cross-organisational approaches can be found in some organisations. Further analysis on these questions follows in the work of WP52.

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Competence-based approaches in CM that are more specific (tools and methods) reach a higher Technological Readiness Levels (TRL): Here the TLRs are used to indicate the maturity of a specific solution or approach. The lowest levels indicate a very basic and conceptual state of the solution or approach. The highest levels indicate a very operational state of solutions and approaches widely used in practice by or with different actors or organisations of CM. From our examples we can conclude that in particular the mentioned training programmes for a set of CM professionals and the activities for more specific competence activities show higher TRLs (7-9). Some activities dealing with core competences for CM professionals and others reach middle TRLs (4-6), whereas most of the activities dealing with conceptual, structural attempts on competences and the activities to provide competence frameworks of any kind show lower TRLs (1-3).

6.4 Recapitulation

This paragraph recapitulates 'How to implement learning for CM: competence framework'. The analysis of results shows that a set of stakeholders is active in the field of competence development, competence management and the construction of competence frameworks. Activities vary widely between very specific approaches dealing with single competences and more general framework activities. Many activities can be found in the US and in the UK. The activities focus at either very specific, practical gaps and needs in preparedness, response or recovery phases or at more general attempts to promote professionalisation by constructing frameworks. The target groups cover practically all groups of professionals in CM. Concerning the maturity of approaches it seems that the specific competence activities reach higher TLRs than more general, conceptual activities on structural models and frameworks. Crisis and disaster preparedness is viewed as a way to make response easier, more efficient, or better overall. Competences can aid in this. Competences indicate what can and should be addressed during the preparedness phase. Although organisations have come to recognise the need for preparedness as a robust development activity, organisational and individual competence-based approaches are not widely spread.

The analysis shows that competence activities play a central role in learning in CM. However, there is a lack of methods and approaches how to implement and develop competence management within and between organisations in CM.

So far, 35 examples have been identified and collected in Appendix 3 – How to implement learning for CM (section 6). Firstly, the examples show the different usage of the terms “competence”, “competence framework” and “competence management”. Based on this, working definitions for all three terms have been developed and discussed within WP52.

Another point of discussion has been the heterogeneity in the scale and scope of competence frameworks. They address different levels which reach from a very basic understanding e.g. in form of “competence catalogues” for specific professions dealing with CM (e.g. fire fighters) up to technical frameworks which consist of structural, content-free blueprints to develop and roll out competence management activities for different CM professionals and/or different CM phases.

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6.4.1 The competence framework

Based on these findings and questions raised in the SOTA analysis the discussion in WP52 focused at the level discussion: Is the competence framework a collection of tools, methods and approaches to initialise competence management activities, or is the competence framework a fully equipped competence catalogue? The pros and cons have been discussed and the participants agreed to pursue a two-stage approach: The first stage is the competence framework to be developed as a set of components that provide the foundations and conceptual arrangements for designing, implementing, monitoring, reviewing and continually improving competence management activities in a systematic way in CM. The second stage is to test the usage of the competence framework by using different real-life examples of CM including competences and solutions for the specific learning needs mainly provided by the end-user partners. As an interpretation of the results, the competence framework should:

- help to identify and to handle competence gaps and needs for staff involved in CM tasks and processes in a systematic and structured manner,
- be able to be used by experts in CM to enhance learning and training activities from a competence-based perspective,
- be able to be implemented in an entire organisation or be used to improve already existing learning and competence-building activities,
- be applicable by stakeholders of competence management such as representatives of HR departments and management dealing with crisis situations,
- help CM organisations to work systematically with competence management and support a continued monitoring of competence management activities.

Based on a generic understanding the competence framework has been designed as a modular system of different key elements (Module 1-6). The complete process model is only needed in case of the first implementation in a CM organisation. The modular kit includes steps and approaches (1.1, 1.2, ... , 6.1, 6.2). The competence framework, which will be further used in the DRIVER project, consists of six modules (see Figure 4). More detailed information about these modules can be found in Deliverable D52.1 “Harmonized competence framework version 1”.

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Figure 3: Overview DRIVER Competence Framework

To conclude with, work package 52 on the “Competence Framework for CM” will use the results from the scientific activities as well as from the organisational approaches as starting points for the development of a first version of the competence framework in CM. In this chapter the examples found are analysed and interpreted on an aggregated level to identify specific characteristics as a basis for the development of a harmonised competence framework. The analysis will give first hints for an interpretation of the necessity for additional R&D activities in the area of skill- and competence-oriented approaches in CM.

Competence Framework

Currently, in every country there exists some idea of the competences a professional in Crisis-management needs to possess. Training programs are developed and selected to create or strengthen these competences. However, countries hardly ever consult with each other either about such competences or about training or education regarding these competences. The work package on the competence framework lays out a structure that can be used across organisations and countries.

Competence-based and skill-based approaches are going to change the classic organisational way of learning in Crisis-management. Training activities and learning will be strongly focused on processes and on the tasks that the different stakeholders have to cope with in crisis situations. The objective of a satisfying result of learning activities can only be reached when the learning gap will be addressed properly.

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As an outcome of the SOTA activities we foresee increasing activities in the creation of competence frameworks in Crisis-management organisations in Europe and worldwide. Their objectives, scales and scope might differ, but they will be based on methodological similarities like competence models, competence catalogues, skill descriptions for different job roles or proficiency levels for competences. Based on these findings, an increasing amount of competence-based activities can be found in organisations. Furthermore, numerous organisations will be planning competence-based activities for the next years for the benefit of being better prepared for future crises and disasters. Moreover, general competence frameworks for Crisis-management will promote the professionalisation of actors in Crisis-management (Stolk et al., 2012).

In response operations where a large number of organisations, and possibly also volunteers are present, it will become important to guarantee that all individuals engaged have a sound background and training. Competence assessment is both a managerial problem as well as a problem of different training processes, cultural and social norms, perceptions on required competence, etc. Stolk et al., 2012 p.48, identifies "limited competence management" as a problem both from the managerial side but also concerning different training processes, cultural and social norms, perceptions on required competence. Also including law and insurance issues.

Therefore, there will also be learning developments to overcome the current limitations in competence management. Cross-border and cross-organisational interfaces between different stakeholders in Crisis-management can be bridged by competence management and competence frameworks in more efficient way than today.

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7 Special groups in CM

7.1 Preface

The thematic dimension of DRIVER is designed to considerably widen the traditional view of CM being an activity of a relatively small group of crisis managers, managing society in times of crisis. It rather looks at European society and its resilience capabilities as actively contributing to the process of CM in all phases of the crisis cycle. Society in the DRIVER context is seen as the sum of its individual groups exhibiting different resilience capabilities and different needs to improve those. These groups, needing tailored and targeted approaches for developing higher resilience levels, are e.g. the single individual, different communities, and entities like the private and public sector as well as the media.

This section pays special attention to two Special target groups, because previous EU projects like ACRIMAS (Hamrin, 2012; Stolk et al., 2012) and CRYSYS (CRISYS, 2012), showed that some extra attention is needed. First, the professional high-level decision-makers (related to WP54), because they seem to lack training support at the individual level. Second, spontaneous volunteer from the general public (related to WP55) and their interaction with professionals.

This section presents the SOTA on these Special groups in CM. In Appendix 4 – Special groups in CM (section 7) 21 learning developments are listed. Again, they are presented in such a way that reading them gives a good impression of the SOTA on this subject. However, to grasp the full meaning of the relevance of the learning developments the results of the SOTA analyses is discussed and conclusions are drawn in this section.

7.2 High level decision maker

When talking about cross boarder incident management and collaboration, usually the operational level is emphasized. This overlooks the strategic level; the level high-level decision makers contribute to. At that level decisions become more complex, require deciding on competing values, and situation where time is of essence, lack of information and ambiguity of the situation while the decisions have impact on human lives and suffering, economic losses and the eventual recovery from the crisis. With cross boarder incidents, decisions will affect neighbouring countries. Vast research has been conducted on decision making of politicians, this research focuses on retrospect, and not on the possibility of training towards better decision making in the future. WP54 will adapt the "usual" decision making processes to crises.

A large body of evidence exists on decision making in the political arena (mostly dating back to the "Cuban missiles crisis") and the military arena. This research deals mainly with the decision making dynamics and how they influence the processes (e.g. groupthink) (Klein, 2008; Mishra, Allen, & Pearman, 2014)

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The psychological sciences focus on personal traits and their influence on the processes of decision making. In the literature research we failed to find training programs that have been evaluated, aiming at training strategic decision makers.

Three essential building blocks were identified, during the workshop in Berlin, October 2014)

1. Knowledge,
2. Analytical and social skills,
3. Personal skills.

Here are some examples of components already identified as part of those building blocks (the complete list to be developed as part of WP54)

Knowledge:

- Professional knowledge in the area of expertise,
- Knowledge of the legal, administrative and normative framework,
- Knowledge of the roles, responsibilities, structures and modus operandi of the other organisations.

Analytical and social skills:

- Problem definition and solution,
- Analysing information,
- Prioritization,
- Communication (to peers, subordinates and hierarchies),
- Negotiation.

Personal skills:

- Identifying the personal style of decision making (advantages and disadvantages) and its impact on the processes,
- Reflecting,
- Ability to use advice,
- The impact of stress on the specific individual.

It is evident from these lists that different teaching methodologies will be required to effectively achieve all the above. More issues identified as important to the decision making training:

1. Large scale exercises are less effective in training decision makers, as these exercises usually don't allow enough time for the decision making processes, and the debriefing necessary for the learning,
2. The higher rank of the decision maker, the more likely that she / he will be reluctant to be exposed during the training session. It is essential to provide opportunities for personal learning,
3. The time high-level personnel can dedicate to the training is limited, the curriculum needs to be prioritized and scrutinized to ensure it focuses on the essential,
4. A balance between providing knowledge and giving opportunities for learning-by-doing (and reflecting) is critical, giving extra weight to learning by doing,

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5. Simulations, and the use of advanced tools as virtual reality, play a key role in the learning processes,
6. The trainers need to be a combination between highly appreciated commanders from the respective organisations, and experts in the field. It is essential that for the expert classes a commander will provide the framework and relevance (before and after).

7.2.1 The concept of 'Right decision'

It was identified that the scope of strategic decisions and the persons who take them differ greatly across systems. In Sweden for example, strategic decisions are taken only by the elected officials, and their aim is to provide the aims and ambitions of CM missions along with the resource allocation. These are by definition high level decisions. All the other decisions (taken by those tasked with the implementation of the ambitions) are considered operational. In other systems, this is not the case.

Based on the workshop in October in Berlin the idea is to replace the concept 'strategic decisions' with a definition of 'right decision'. The 'Right decision' is a decision taken by the right persons (decision makers who are tasked with the issue and have the power to take the decision), for the right people (beneficiaries), on the right time, for the right reasons (Jane Lamb et al., 2014). This definition allows analysing if the right decision has been taken, as the assessment of right or wrong decision based on the results is impossible in strategic decisions due to the many intervening factors that cannot be controlled.

7.2.2 Available learning developments

This paragraph contains a quick overview of training available in different countries. The list is not complete. This list will be researched further in WP54. The article of Eisenhardt and Zbaracki (Eisenhardt & Zbaracki, 1992) reviews 3 major decision making paradigms – rationality and bounded rationality, politics and power, and garbage can. Though different disadvantages of each paradigm are identified, no training for decision makers is suggested.

In a report issued by NEA (OECD – Nuclear energy Agency) Strategic Aspects of Nuclear and Radiological Emergency Management (Nuclear energy Agency (NEA), 2013) a set of recommendations on the strategic decision process are derived from a series of exercise (INEX). No recommendations are presented with regards to training of the strategic decision makers.

In Israel, strategic decision makers are the top officials of each organisation. In the health care system this is organised in the Supreme Health Authority (WHO Regional Office for Europe, 2012). No training is provided to the members of this forum, and the assumption is that being senior managers in their respective organisations they are good strategic decision makers. The civil protection (Home Front Command) provides training for senior officers, which is an operational training and focuses on the scene decision making.

The National Emergency Management Agency (NEMA) in Israel provides a multi organisational training that focuses on getting to know each other organisation. No session on strategic decision making is provided.

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In the Netherlands, ambulance services have no training on strategic decision making (source – AmbulanceZorg Netherlands). Mayors, by law part of the CM organisation, are trained by the Dutch Association for Mayors (Nederlands Genootschap voor Burgemeesters).

In Austria there is no training for the high-level decision-makers of the ambulance services according to the Austrian Red Cross.

In Madrid a new training module has been introduced by SAMUR Civil Protection on joint decision making during crisis situation. This module focuses on the key decision to be taken and their respective timing. No solutions are provided with regards to the processes and retrospective evaluation of the decision.

In Berlin, the Fire Service (that operates also the EMS) has a senior fire officers training, which includes a chapter on strategic decision making. No joint training program (with police, other EMS providers, other organisations involved in CM) is available.

Lükex is regarded as a proven model for strategic exercises. Over the years the exercise series has had a profound effect on the existing culture of cooperation, collaboration, and decision-making in strategic CM and CM structures. The next exercise will be held from 8 to 13 June 2015 in Hannover, Germany.

In Sweden, the elected officials are the strategic decision makers who provide the general aim of the operation and allocate the resources. All other decisions are considered operational according to MSB.

The training program – the “Multi Agency Gold Incident Commanders” (MAGIC) provided in the UK was discussed (MAGIC, 2015). Each training program uses a different set of theoretical training assumptions (This will be researched further in WP54).

In the EU, the European Community Civil Protection Mechanism offers the High Level Coordination course (HLC), a five-day course that focuses on emergencies outside the Community Mechanism’s geographical area and how to work within a wider international framework. Topics also focus on managerial and political aspects of civil protection assistance interventions such as mission management, negotiation, and international coordination policy and media relations. The course concludes with a one-and-a-half-day field exercise (EU Humanitarian Aid and Civil Protection, n.d.).

With respect to evaluation of participants and training, one reference was found; the introspect model (Lamb, 2014). The solution is developed by the Incident Command team in Oxfordshire Fire & Rescue service 6 years ago (Jane Lamb et al., 2014). The introspect model for incident command training, was developed, tested, evaluated and is in extensive use in the training of fire commanders at different levels, including at the gold commander level. They define a Level four Award in Strategic Incident command (QCF level Seven) in Fire and Rescue Services, which covers the role of strategic command associated with commanding within a Strategic Coordination Group.

7.2.3 Serious games for high-level decision-makers

The use of serious games as a means during training increased the last few years. section 7 includes an (incomplete) overview of recently developed serious games and simulations recently developed (in EU projects) for CM Trainings. Use of these solutions for high-level decision-makers is limited.

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WP54 has identified two Dutch products that are successfully used to train mayors and other high-level decision-makers in crisis situations. Both these products will be used in the DRIVER-project:

- The dilemma trainer, developed by TNO, Thales and University of Arts Utrecht (J.G.M. Ven, Stubbé-Alberts, H, & van Rijk, 2013)
- XVR, developed by E-semble (XVR, 2001)

Use of serious games and simulations make trainings more lively and imaginative. Games make it possible to address different learning goals and to increase the effectiveness of a training; also for high-level decision-making (Stubbé, Ven, & Hrehovcsik, 2014).

Part of the work in WP54 is dedicated to develop a training for high-level decision-makers using these two serious gaming tools. The goal of this part of the work package is to make these new tools successfully available for the high-level decision-makers in the EU, learning from the already available knowledge and trainings in the EU.

Both products and trainings are not evaluated with the target audience in the Netherlands. WP54 will aim at making these solutions and training successfully available in the EU. WP54 also aims at an evaluation the applicability of the training with the target audience at EU-level. A suitable evaluation solution needs to be made available for this.

7.3 Spontaneous volunteers from the general public (collaborating with CM professionals)

The focus of this paragraph is on how professionals can improve their collaboration with spontaneous volunteers from the general public (WP55). According to previous EU programs this collaboration requires different didactics than learning of technical skills. Before elaborating on these needs, first a description is given of this special group of spontaneous volunteers.

Bystanders are the real ‘first’ responders. They are first on the scene. Not necessarily well-prepared or well-equipped. Spontaneous volunteers are people who volunteer in the immediate aftermath of a disaster or an emergency. They may be skilled or unskilled and may be from the affected area or from outside the area (FEMA, 2006). They are motivated by a sudden desire to help others in times of trouble.

From the perspective of the professional first responder these spontaneous volunteers can either become the next victim or a resource in incident management. The first responder will fear the former and this will direct his or her actions towards the volunteer. This will most likely result in ‘sending’ the spontaneous volunteer away to a safe area. Small incidents, high-risk incidents or when there are enough (professional) resources are typical examples of situations that are indicated by first responder organisations as situations where no (spontaneous) volunteers are necessary, needed or wanted.

From the perspective of the spontaneous volunteers the picture is rather different. They might not see the danger. What they see is a disaster taking place in their neighbourhood. They want to help, they need to help. This is often supported by resilience programs that are run in different countries

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(see Appendix 4). So when spontaneous volunteers provide their help it is considered necessary to make the most out of it. Depending on the type of incident and the capabilities of the volunteer there is room for his or her help in addition to the capabilities of the professional first responders in an incident. This collaboration should be effective for both the professional and the volunteer. Work package 55 puts the focus on training the professional first responder to contribute to an effective collaboration with the spontaneous volunteer.

The information in this chapter intended to be based on the input received from desk research. However, we noticed a lack of currently operational projects, trainings, and initiatives that address the issue of collaboration of CM professionals and the general public. Therefore, we additionally used the input from the SP5 workshop on 14 October 2014 in Berlin.

Since we found so little about the subject itself during our desk research, we concentrated on the following strategy to create an overview:

- Understand the current ways professionals and volunteer organisations interact
- Understand the current programs for increasing the resilience of the general public; better understanding what information ‘the general public’ is given (e.g. via public campaigns) helps to set up a training program for professionals on what they can expect from a resilient public.
- Related EU programs; what is currently developed, what we can use from these programs.
- Trainings for professionals that are already available (or will become available very soon) and touch upon the subject.

7.3.1 “Related EU/(inter)national/local projects

The EU projects COBRACORE, OPSIC and IFRC focus on the support of the general public. This is done by focussing on needs during the recovery phase, a platform to support the creation of an overview of needs (COBRACORE, 2015) or the focus on psychosocial needs (OPSIC, 2015; Psychosocial Support IFRC, 2015).

In Sweden, most projects found (CARER, 2013; DIVA, 2011; MID Sweden University, 2015), studied the interaction between different actors, including first responders, spontaneous volunteers, rescue services command centre, and volunteers. The results from the study on Collaboration in an Emergency – complex encounters between different actors (MID Sweden University, 2015) indicate that the first responders are at the centre of the incident and set the tone for how an incident is handled on-site. The study concludes that volunteers work in the periphery of a large incident, something that affects collaboration. In addition to this the results of a Dutch project 'Baseline experiment on collaboration of fire brigade and incident by-standers' (Veiligheidsregio IJsselmeer, 2015) indicate what happens when first responders and spontaneous volunteers meet in a small incident. An experiment was performed, which led to the idea that the motivation of first responders is based on their belief regarding what volunteers can or cannot do, based on the behaviour that they show and on the risk assessment of the situation by the first responders.

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Figure 4: Three actions; 7 steps

Two country specific initiatives were found that focused on informing the public. The Portuguese project ('A TERRA TREME - National exercise Portugal', 2015) promotes knowledge about what to do and not do in case of earthquake, through simple attitudes and affordable behaviours to most citizens, involving them, causing them to become active agents in the field of safety and security (See Figure 4). The exercise lasts for a minute, during which citizens, individually or in groups (families, schools, businesses, public and private organisations), were invited to participate through information disseminated by the media that also promoted the inscription in the website.

The project 'Role of On-the-Scene Bystanders and Survivors in Mass Casualties Incidents' explains to first responders sixteen functions that bystanders and survivors can perform: for instance, reporting an event, reconnaissance, assisting in the triage of casualties, caring for the walking wounded just to list a few. It is often underestimated what people are capable of doing in the moments of mass casualties emergencies (Cole & Connell, 2012). Six slides (see next page in Figure 5) from the presentation on the role of On-the-Scene Bystanders and Survivors in Mass Casualties Incidents (IL) at the NCRP conference.

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<p>What contributes to the CHAOS?</p> <ul style="list-style-type: none"> • Obstruction of accessibility • Disruption of reliable information flow • Rumors • Loud and unfamiliar noises • Irregular smells • Confusion of the public • Feeling of helplessness • Lack of leadership 	<p>Who do we consider as first responders?</p> <ul style="list-style-type: none"> • "Individuals responsible for protection and preservation of life, property, & environment" <i>Standard Security Presidential Directive - SSPD-8</i> • "Emergency public safety, law enforcement, emergency response, emergency medical and related personnel, agencies, and authorities" <i>Standard Security Act, 2002</i>
<p>Most frequent first responders = Bystanders</p> 	<p>Why integrate bystanders in the response?</p> <ul style="list-style-type: none"> • May prevent certified first responders from acting according to professional guidelines • Tax on limited resources • Obstruct evacuation routes • Under risk for secondary damage <p>How can we activate them effectively?</p>
<p>Reporting</p> <ul style="list-style-type: none"> • Size-up of the incident: <ul style="list-style-type: none"> • What happened? • What type of event? • How many ambulances do we need? • What are the best access and egress routes? 	<p>Reconnaissance</p> <ul style="list-style-type: none"> • Locate casualties • Collect evidence 

Figure 5: Part of presentation "Role of On-the-Scene Bystanders and Survivors in MCIs"

7.3.2 Country specific systems

Different countries have different systems to incorporate volunteer organisations in the CM structures. All of these relate to "unskilled volunteer"- and "affiliated volunteer"-organisations. These structures are important to understand for WP55 because these can be used to interact with spontaneous volunteers. At this moment we do not have any insights if one of these systems is better for involvement or motivation of spontaneous volunteers. It is clear however that these systems are based upon the regulations, needs and experiences of the specific countries.

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7.3.2.1 Fully integrated system

First responder organisations and “unskilled volunteer”- and “affiliated volunteer”-organisations make plans together and train together. This is for example done in the UK and Israel. The ACRIMAS results already showed such an approach in USA and Australia. See for example the “Community Resilience Toolkit, a project of the Torrens Resilience Institute”. Because these organisations already know each other they can collaborate more easily. Spontaneous volunteers are embedded in the already known volunteer organisations when they show up.

7.3.2.2 Regulated, not integrated, system

There are countries that regulate volunteers via registries or via official agreements with volunteer organisations. Greece for example has a registration system for this purpose managed by the General Secretariat for Civil Protection (GSCP) who is the national integration agency of Voluntary Organisations (VOs) and Expert Volunteers (EVs). The VOs and EVs are included in the human resources of civil protection to be in charge of supporting disaster prevention, response and recovery actions (GSCP, 2008). Poland for example cooperates with many rescue related organisations and NGOs in case of emergencies. Examples of these organisations are:

- The Mountain Volunteer Rescue Team
- The Water Volunteer Rescue Team
- The Polish Aero club
- The Polish Red Cross
- The Polish Humanitarian Action.

7.3.2.3 Parallel system

All countries have non-officials appointed by regulation organisations that prepare themselves for involvement in incidents. Well-known examples are the Red Cross organisation or scouts. Even in countries that have no official structure to embed these organisations in case of emergency there usually is a form of contact at the local level with official response organisations.

In the Netherlands and Belgium for example private organisations are sometimes invited to participate in local training exercises, especially if these private organisations deal with hazardous materials.

In Portugal for example according to the nature of the disaster, specific organisations may be called to act under civil protection authority (e.g. the Water Institute, the Forest Service’s etc.). This is applicable in more countries.

Another form can be found in Sweden, where a list of privately held resources is one of the functions made available through a system called 'Integrated decision support for civil protection – RIB'. The RIB merges various databases that when combined provide comprehensive information about how to deal with an emergency, how prevention work can be planned and about the risks involved once an emergency has happened and where to find resources for the emergency response.

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7.3.3 Psychosocial support

For the work on Task 55.3, the plan as outlined in the DoW is to develop a training solution and e-support tool that can be used to train first responders so that they can provide basic psychosocial support in the recovery phase/aftermath of crisis. Therefore, we looked into this subject during the SOTA. Psychosocial support can be defined as “a process of facilitating resilience within individuals, families and communities” (Hansen, 2008). Psychosocial support in disasters or emergencies includes a wide variety of interventions and support ranging from basic support and services to survivors to more specialised and focused individual or group support for those in more severe distress (Bisson et al., 2010; Interagency Standing Committee (IASC), 2007). The reasoning for focusing on psychosocial support in this task is that it can improve functioning and promote resilience in individuals, families and communities, and this can in turn facilitate their participation in relief and reconstruction efforts. With very basic skills in psychosocial support, first responders can improve their collaboration with the general public.

To research this subject three steps are needed:

1. to define components of psychosocial support to include in the training,
2. to select specific models to include,
3. to identify existing e-tools and to identify gaps and needs in existing tools.

The research into this area has been led by the International Federation of the Red Cross Reference Centre for Psychosocial Support (PS Centre), which is hosted by the Danish Red Cross and who also coordinates the FP7 funded project OPSIC (Operationalising Psychosocial Support in Crisis) (OPSIC, 2015). The results of the research and the selection criteria will be described in further detail in Deliverable 55.3.

7.3.4 Resilience

Lastly we looked at learning developments concerning resilience of the general public. Knowing how resilience of the general public is enhanced provides insight for the CM professionals what they might expect with respect to the attitude and capabilities of the resilient society.

An example of resilience support via Solutions is Community Resilience Scorecard in the Community Resilience Toolkit. A project of the Torrens Resilience Institute (Torrens Resilience Institute, 2015).

Two examples of Resilience support via Education are the London Resilience Forum and the Risk Factory. The idea behind the London Resilience Forum is to demonstrate that it's possible to organise proactively to increase the resilience of communities—and that such actions make much more sense than simply waiting for a crisis (Reos Partners, n.d.). Risk Factory (in Dutch) is a Dutch education centre for kids (till 12-year-old) and groups with increased risks (e.g. elderly, disabled, etc.). Their motto is “Safety is a necessity of life”. Won the Fire Brigade Innovation award in 2014 (Risk Factory Twente, 2015).

Four ways are presented to support resilient communities. All these manners to establish resilient communities are supported by national government. However, they are not mandated by the government. All actions and effort are local.

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- Swedish frivilliga resursgrupp (Volunteer Resource Group) – FRG ('Frivilliga Resursgrupp (Swedish Volunteer Resource Group)', 2015) (See Figure 6)
- UKs Local Resilience Forum –LRF (Cabinet Office UK, 2015)
- Israeli Community Emergency Resilience Teams – CERT (FEMA, 2015)
- American Community Resilience System ('Community & Regional Resilience Institute (CARRI)', n.d.)



Figure 6: Facebook page of a Swedish frivilliga resursgrupp (Volunteer Resource Group)

7.4 Recapitulation

7.4.1 Training for high-level decision-makers

As crises become more complex and involve more organisations and countries, the demands on the high-level decision-makers increase. Different EU member states have different structures for high-level decision-making in Crisis-management, with different responsibilities. What is common for all the member states is that high-level decision-makers are usually not selected or appointed for their Crisis-management skills. However, even if we assume that the exercise of authority and decision-making during periods of normalcy are operating properly, there will be problems during the emergency phases of disasters (Quarantelli, 1988)

Their lack of time for training is also a universal characteristic. The work package on training for high-level decision-makers addresses this issue by providing a selection of modules that can be offered to high-level decision-makers. This is important in order to increase the high-level decision-makers' awareness and knowledge of Crisis-management. Their involvement in a larger scale cross-border crisis is inevitable. Their shared understanding of the situation and their roles is important for effective crisis communication at the EU-level.

We foresee that trainings for the high-level decision-makers should include the following:

More focused on the processes of learning than on the content (providing generic solutions that will allow analysing the information, identifying the problem and analysing possible solutions, rather than focusing on the problem itself). For instance,

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1. More realistic (increased use of simulation tools)
2. Available everywhere (eLearning and remote learning, saving the time used for travel)
3. More interesting and challenging, adaptable to new scenarios and threats
4. Provides solutions to improve proficiency outside the classroom.

7.4.2 Collaboration between Crisis-management professionals and spontaneous volunteers

The results that we found during the state of the art research have an impact on the work in WP55.

Since there are no obvious ‘winning’ methods, initiatives and trainings at this moment more in-depth comparisons and discussion is needed in order to make the right selection for work package 55 to perform the work described in the Description of Work.

We identified three basic systems that are available in EU countries that can support professional – spontaneous volunteer collaboration. These systems will have an effect on what is already prepared with respect to collaboration in the response and after-math phase. And these systems will also affect the possibilities of new learning developments. We need to take these systems into account because they could also be based on law and legislation.

There are many different initiatives amongst civil groups of interest for training to professionals. By teaching professional first responders what civil groups might know and how they might act, professionals are better prepared to involve volunteers in incident response.

Collaboration in the response phase might be different than collaboration in the aftermath. Due to the nature of help the public needs, but also due to the different risk profiles of the phases (There is a higher risk during the response phase).

Volunteering is an altruistic activity and is intended to promote goodness or improve human quality of life. There is an emotional side to volunteering during a crisis. It is important for professional first responders to be able to deal with this side of spontaneous volunteering. It will contribute to the (successful) communication between the professional and the volunteer and thus to the mutual understanding and collaboration.

Spontaneous volunteers are often first at the scene of an accident or an incident. Traditionally these people have been seen mostly as victims. However, experience and research each point in a different direction. These spontaneous volunteers are actually very important in starting to help others at an early stage. They are often quite resilient, which is especially important in remote areas. Much emphasis was put on increasing the resilience of civilians. How can professionals in Crisis-management profit from the capabilities of these volunteers?

Communication with and informing of the public on the incident is at this moment in general the first thing that comes to mind when thinking about the collaboration of the professional with the general public. But there is more. During the recovery phase professional first responders focus mostly on restoring basic living conditions: water, housing, food, etc. Repairing damages to buildings and objects allows the affected area to go back to normal. In addition to this it is important to give psychosocial support to the affected people. These are people living in the area or present in the

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area at the moment of the incident, affected (direct or indirect) by the incident. Psychosocial support enables people to bounce back from the impact of critical events, and helps them to deal with such events in the future. Psychosocial support thus promotes the restoration of social cohesion and infrastructure.

Involvement of the general public seems unavoidable during the recovery phase. This is becoming a widely accepted idea, although making it work is still not easy. Involvement of the general public during the response phase still raises some questions, especially among the first responders. The main issue that is usually brought to the table is the safety of the public, and the impact on the safety of the professionals. This is of course a real issue and should not be taken lightly. However, it does not rule out collaboration with the general public during the response phase. Although in (some) countries this is forbidden by law. Making it more difficult to experiment with the learning developments in work package 55 in these countries.

It is known that people at the incident location already start helping others if this is possible and necessary. This can be a starting point for the collaboration with the professionals. At the same time, there is a (growing) focus on community resilience in many countries. Communities are to become resilient and stay resilient. This forces the professionals to interact with these communities and adjust the help based on the needs. The difficult part is; that in the beginning of a crisis there is chaos, and the professionals are sent there for their expertise to control the situation. There is hardly time to negotiate the level of service to be delivered. We foresee that professionals can use support in two different areas in order to successfully collaborate with the general public during the response phase:

- Being able to evaluate when the general public can be involved (safe) and what tasks they can perform (effective).
- To effectively communicate directly with the general public, to give instructions and retrieve information.

Professional first responders are trained to provide support on incident locations and usually this is done without the help of the (affected) community. However, it is beneficial for the resilience and (mental) well-being of these people to be involved in this work as well. To aid in this resilience and (psychosocial) well-being process it is not necessary for professionals to be trained as psychologists. We foresee that it will be necessary to perform two actions to increase the collaboration between the professional and the general public in during recovery:

(1) To create awareness among the professionals with respect to the common reactions to stress and crisis and the need (of the general public) for psychosocial support and to participate in the recovery process. We don't immediately foresee that first responders will provide this psychosocial support, but their awareness of this subject might be useful,

(2) To provide insights for the professionals into what the general public will generally do (based on previous incidents) and what they can do. It is also important for the professionals to realise that the actions of the general public not necessarily conflict with their work.

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8 Vision on training and learning for CM: keep change in mind!

8.1 Preface

The SOTA presented many theoretical concepts and practical solutions. Inspired by this work a trend analysis is made to formulate a vision on learning CM:

Crises, stakeholders, tasks, roles, equipment, digital possibilities, political situations, they are all changing and will keep on changing. Learning needs to take account of changes in CM.

Two issues emerge when change is taken into account in future learning for CM:

1. Changing learning goals in CM: learning goals will emerge and will change unpredictable
2. Learning for change in CM: CM professionals need to prepare for change.

In the next paragraphs these issues and their consequences will be discussed.

8.2 Changing learning goals in CM

Because of the changes in CM, learning goals will emerge and will change unpredictable. The only certainty is that change will happen. This causes dilemmas as put forward by THW (see Appendix 3) "Sometimes, when a new activity/task is added to the THW performance spectrum, there is either no industry standard available that THW can refer to, or it has to adjust private sector guidelines to its needs and applications. Either way, this process requires a significant amount of time, effort and funds. In conclusion: 1) There is a constant need for new training programs. 2) Training programs have to be adjusted to ever changing technologies and altered laws. 3) It would be beneficial if the time span of setting up, developing and establishing new guidelines could be reduced" (THW-Bundesschule, 2015)

The standpoint that learning goals change all the time, has five consequences as will be explained in the following.

(1) New learning goals need to be identified quickly. Usually when deciding on what to learn in professional situations, two approaches are used: hierarchical task analyses which aim at a decomposition of job functions into tasks, goals, necessary knowledge, skills and conduct (Annet, 2000; Carlisle, 1986; Goffin & Woycheshin, 2006) and cognitive task analyses, which primarily aim at revealing knowledge structures, cognitive processes and goals that underlie working behaviour (Annet, 2000; Williams & Pierce, 1999). But both identification methods are time consuming, which hinders a quick response of instructional developers to new CM needs. A workaround is collecting the available body of knowledge about the future functions. This may be information obtained from

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consultation of subject-matter experts or documents when available. The new lessons learned framework (WP53) has to take care of this need for quick identification of learning goals. The ability to collect, share and learn from experience using a lessons learned system is positively influenced by the new ICT developments as concluded in section 4. Information related to incidents and crisis can be handled and shared by using ubiquitous technology; modern technology that makes it possible to access information ‘anytime, anywhere’. As noticed in section 5, ubiquitous technology can also be used to support the learning process.

(2) Existing learning solutions need to be available across all CM organisations. In Appendix 1-4 there are many learning developments collected as a nice start of a collection of all developments available. We recommend EU partners to start a database with learning solutions. To be helpful in selection, the key is to forge educationally sound and logical links between learner needs, aims, learning outcomes, resources, learning and teaching strategies, assessment criteria and evaluation (Donnelly & Fitzmaurice, 2005). To increase the reuse of learning content even more a modular approach need to be followed. Learning content can be divided into small, modular chunks, often called “learning objects”. In this way, developers will be able to combine and recombine these objects to create new learning content (Boot, van Merriënboer, & Theunissen, 2008).

(3) Choose for rapid development of new learning solutions. The quickly changing requirements for people performing in CM imply that developers and instructors need to respond correspondingly. The learning environments will have to be scalable and generative and suitable for made-to-measure (customised) learning, (Gibbons, Nelson, & Richards, 2000). New development models, based on the rapid development approach from the software industry and lean production methods from the manufacturing industry are becoming more popular (Boot et al., 2008). Rapid development is based on iteration instead of linear development approaches. A feature of rapid development is iterative development in short cycles. Every cycle consists of a Problem analysis, Specification, Design, Development, Product evaluation and where possible Implementation. By ‘try outs’ in short and fast development cycles we get insight in how specialists learn in an optimum way (N C M Theunissen et al., 2010). The interim versions of the learning environment are being put to the test immediately, making it possible to start training and instructing at an early stage as well, thus saving precious time.

(4) Organise a quick implementation into CM organisations. A well designed Competence Framework is adaptive to future needs of all CM organisations in Europe. As put forward in section 6, the competence framework has been designed as a modular system of different key elements which provides flexibility in usage. For instance, a competence model can be chosen in a way that new competences can be added easily, existing competences can be neglected or erased, competence classes can be enlarged, new relationships between competences and activities can be drawn

(5) Choose rapid learning evaluation approaches. In line with the other consequences of changing learning goals, the process of evaluation needs to be speed up as well. Evaluation is not just a retrospective process, but can be an integral part of the module development, informing you before, during and after the process (Donnelly & Fitzmaurice, 2005) If we translate this to the Competence

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framework, it means that the module 'Competence Evaluation' is not necessarily the last module to practice but can be combined with 'Competence Development' in an iterative development cycle.

8.3 Learning for change in CM

Because of the changes in CM, CM professionals need to prepare for change. Job competences may become obsolete, but generic competences like, for instance, flexibility and stress management stay relevant in CM. The learning development 'Pandora project' (see Appendix 2) is a good example of taking this into account. PANDORA bridged the gap between table-top exercises and real world simulation exercises, providing a near-real training environment at affordable cost with a toolbox which facilitates the creation of a real-time, physics-based environment, to simulate all the dynamic elements of the entire disaster environment. It provides the facility to create affective ambience to impact the stress levels, and hence the emotional and behavioural performance of the trainees, through the use of information management and manipulation techniques, rule-based multimedia mashups and emotive character representations (Mackinnon, Bacon, Cortellessa, & Cesta, 2013).

The standpoint that CM professionals need learning for change in CM, has six consequences as will be explained in the following.

(1) CM professionals need competences for coping with change. Several authors discussed the adaptability as an important competence in relation to a wide variety of unpredictable and uncertain work situations. Key aspects of performance that relate to crisis and other changes are how easily workers adjust to and deal with the unpredictable nature of these situations, how efficiently and smoothly they can shift their orientation or focus when necessary, and to what extent they take reasonable action, in spite of inherent uncertainty and ambiguity in the situation (Pulakos, Arad, Donovan, & Plamondon, 2000). Competences identified are for instance flexibility, adaptability, creativity, situational awareness, stress coping, resilience and social competences for ad hoc teaming.

(2) Evaluate the competences for coping with change. Often evaluations of learning output primarily concentrate on procedures and job competences, special attention is needed for competences for coping with change. For instance, the Competences for multidisciplinary cooperation in a Network Centric Organisation Questionnaire (NCOQ) that measures contemporary ad hoc teaming collaborations (de Koning et al., 2011).

(3) Training has to incorporate realistic CM situations. Training exercises include many of the conditions present in operational settings in order to prepare trainees for later work in the real-world, and they provide an opportunity to assess cognitive performance under realistic conditions (Mackinnon et al., 2013; Stanton, 2007). Contemporary theories of learning and instruction promote a form of learning through experience, "by doing", such as discovery learning (Veermans, de Jong, & van Joolingen, 2000), action learning (i.e. (Smith & O'Neil, 2003) Smith & O'Neil, 2003), and experiential learning ((Maal et al., 2013)). Experiential learning, for instance, is when one has experienced direct

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exposure to a crisis and has subsequently developed insight about what caused the crisis and how the Crisis-management worked (Maal et al., 2013). Such learning approaches advocate an active, central role for the learner and use authentic (realistic, practical, job-related) learning environments (Reeves, Herrington, & Oliver, 2002).

(4) Training has to invoke the physical and psychological stresses of a real crisis situation. The superlative of a realistic CM situation is physical and psychological immersion. This is a training situation that evokes the subjective experience of being in one place or environment when one is physically situated in another (Alison et al., 2013) Developing a simulated environment that encourages participants to immerse themselves (both cognitively and socially) as they would in a real incident therefore increases the validity of the method (Alison et al., 2013)

(5) Use immersive learning methods like serious gaming and simulation. Gaming and simulation can be used to conduct near-real, immersive and engaging training and exercises. The synthetic world of should resemble the real working environment on key physical and psychological aspects of the specific task and competencies to be trained (Korteling et al., 2013). The limitations of live exercises can be overcome to a large extent through use of integrated gaming and simulation models that allow emergency response personnel across multiple levels in multiple agencies to get exposed to the same scenario (Stolk et al., 2012). According to Korteling et al (Korteling et al., 2013), serious gaming is not only suitable for knowledge transfer (e.g. procedures, job-specific facts and cognitive skills (problem solving, planning, self-reflection), but also for Social skills (e.g. communication, collaboration), Emotional skills (e.g. stress coping, resilience) and Attitudes (e.g. Integrity, Courage). Serious gaming is less suitable for perceptual-motor and physical skills (e.g. perception, detection).

(6) Choose an evaluation suitable for serious gaming and simulation. Often used are Observer-rating techniques (commonly used by Subject Matter Experts). Other suitable techniques are for instance: Freeze probe techniques (measures performance during 'freezes' in a simulation of the task under analysis); Real-time probe techniques (measurement in simulation by Subject Matter Experts (SME) with no freeze of the task under analysis); Self-rating techniques (administered post-trial and involve participants providing a subjective rating of their perceived performance using a rating scale); (Salmon et al., 2009)

8.4 Epilogue

This SOTA can be seen as a milestone in CM research about training and learning. The field of interest is as complex as all CM research: First, crisis researchers have been unable to agree definitions or typologies or on categories of incident. Second, crisis research is fragmented by 'a myriad of disciplinary approaches' The result of this fragmentation is the lack of integrating frameworks, core concepts, agreed typologies of coherent models to bind different perspectives together. Third, researchers have been required to adopt designs and methods considered unconventional in other areas and to use data from sources normally considered unreliable and biased (Buchanan & Denyer, 2013). Nevertheless, in this report many bits and pieces on training and learning for CM have been

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combined and inspired the vision presented in this chapter: Learning in CM needs to take account of changes in CM. Two issues related to this statement were explored and consequences for future work in training and learning for CM were given.

This vision may be the end-point of this report, but it is not. It is the start of the work that will be performed in the work-packages of SP5 Training and Learning. With this future work, training and learning of CM professionals in European countries can be improved to increase safety for European citizens.

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Appendix 1 – What to learn for CM (section 4)

CH4.D1. – Swedish Defence College research on lessons learned in Crisis-management

Source: (Deverell & Hansén, 2009; Försvarshögskolan, 2010)

Short description:

The Swedish National Defence College carries out one of the few larger non-EU research project concerning lessons learned in Crisis-management that has been identified in this SOTA. Albeit academic in character, it has provided practically useful results regarding learning in and from a crisis. Examples of such results are the need for organisations to allocate proper resources and mandates to have a functioning lessons learned process and the risk that symbolic change, in order to show initiative, hinders change based on actual experience.

CH4.D2. – The EU FP7 project ACRIMAS (“Aftermath Crisis-management”, ended in 2011),

Source: (Stolk et al., 2012)

Short description:

ACRIMAS outlined some challenges and aspects regarding learning. The project concluded that the development of an ability to share and implement lessons has a high priority. Furthermore, the challenges in cross-border sharing were underlined, and the need for “translating” the lessons to fit into new contexts was stressed. The ACRIMAS project also noted that there seemed to be little real learning taking place in the field of multi-national, cross-border, cross-agency Crisis-management. ACRIMAS pointed at external evaluation teams as well as the tools and methodologies for best practices in “high reliability systems”, such as avionics or nuclear industries, as possible starting points for developing lessons learned for Crisis-management.

CH4.D3. – The EU FP7 project CRISYS (“Critical Response In Security and Safety Emergencies”, ended in 2012)

Source: (CRISYS, 2012)

Short description:

CRISYS aimed at developing a strategic roadmap for full implementation of an integrated and scalable Crisis-management system and at providing a solid basis for the description of a full user driven demonstration programme. The CRISYS operating model (COM) “serves as a guide for classification of capabilities, identification and demonstration of available practices and technology solutions”. To be able to realise the COM, CRISYS identified a number of necessary actions and priorities. Among the actions for “Learning and Public Awareness” was noted the need for a Lessons learnt capture and dissemination system. It was also suggested to, in support of learning/quality management, exploit virtual learning technologies and online networking for sharing Lessons learnt, and introduce desk based joint operational training.

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CH4.D4. – The ELITE project (“Elicit to Learn Crucial Post-Crisis Lessons”, ended in 2014)

Source: (Grunnan & Maren, 2014; van Santen & Illing, 2014)

Short description:

The main purpose of the ELITE project was to collect and categorise lessons from different types of emergencies, using a developed framework for lessons learned, as well as developing and testing a WIKI-solution for presenting the information, a so called “living document”. The project was successful in developing and testing the WIKI-model, as well as in collecting a number of lessons. However, although this project reached a higher technology readiness through validating the model in experiments, it was also noted that “the ELITE living document so far does not compete well with common search engines (e. g. Google, Yahoo, Bing) and information systems (e. g. GDACS, VOSOCC)”.

CH4.D5. – The EDISOFT OCP (Observation Collection Program)

Source: (EDISOFT, 2005)

Short description:

OCP is an analysis tool which allows observers to work on a project, as individuals or in teams, noting observations in a systematic and easily-recoverable manner. Additionally, the software allows the observer to input data directly into the NATO Lessons Learned Database without the need to re-format fields or text. The tool is already in use by NATO.

CH4.D6. – The ITTI LIMA2

Source: (ITTI, 2014)

Short description:

LIMA2 is a tool that supports gathering, analysis and exploitation of experiences gathered during in-field missions. LIMA2 was originally developed for analysing lessons learned during patrol duties of small military units, however it can be as well used for any activity that follows the classic three-stages schema: planning, execution (in CM response) and post mission analysis (in CM recovery).

CH4.D7. – The FOI F-REX

Source: (Andersson, 2009)

Short description:

F-REX is a tool for analysis that can be used to reconstruct, visualise and explore an event, based on multiple sources of information, to support an elicitation of lessons learned and post-mission evaluation. F-REX has been used to document and evaluate joint emergency response operations, full-scale battalion-level exercises and international cyber defence experiments.

CH4.D8. – The ITTI PROCEED

Source: (ITTI, 2014)

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PROCEED is a tool that can be used for simulating different situations for training decision-making in Crisis-management situations. However, it can also be used as a toolbox for “what-if” analysis, for instance testing a method or approach in a slightly different context.

CH4.D9. – The ITTI BESECURE

Source: (Crabbe et al., 2015)

Short description:

BESECURE is a tool developed within the ongoing EU FP7 project “BESECURE” with the purpose to collect and analyse best practices within the area of urban security. It uses a comprehensive set of indicators for urban security, along with best practices from different urban areas, to highlight factors as social makeup, economic state, crime numbers, and public perception of security. Although not a lessons learned system as such, the methodology may lend important ideas to a lessons learned framework for EU Crisis-management.

CH4.D10. – The Lesson Learner Lessons Management Hub

Source: (LessonLearner, 2014)

Short description:

Lessons Management Hub is an example of a tool used not only to store lessons, but also to process the lessons from the collection of information, through the analysis and up to the implementation. The basic idea of this type of tool is that it demands that groups or individuals carry out a number of activities leading to either changes in behaviour or changes in steering documents/rules.

CH4.D11. - The UN Department for Peacekeeping Operations (DPKO) Lessons learned process

Source: (UN Department of Peacekeeping Operations, 2012)

Short description:

The UN Department for Peacekeeping Operations (DPKO) has had dedicated Lessons learned processes for at least two decades. The main objective has been to make the peacekeeping missions as efficient and effective as possible. The process is both bottom-up (a network of best practices officers in the mission reporting) and top-down (on an ad-hoc basis send out dedicated teams to collect specific information). However, senior management or an ongoing internal development project may trigger the collection of lessons. The information gathered is analysed by subject matter experts. Information deemed useful is tagged and uploaded to a database. In parallel the DPKO also arrange for communities of practice which are thematic networks where practitioners come together to share experiences and learn from each other. The UN internet as well as intranet resources functions as tools for disseminating and making available the information. The UN DPKO process is less about technology and more about process and approach. The technology used is fairly basic, and it has been said that there is a need to find a better technical platform.

CH4.D11.b – The NATO Lessons Learned capability handbook

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Source: (Nato, 2011b)

Short description:

The NATO Lessons Learned capability incorporates the structure, process and tools necessary to capture, analyse and take remedial action on any issue. It is supported by a Handbook for Lessons Learned that describes how to in a systemic way to make observations, turn them into identified lessons and subsequently achieve learning in organisations. NATO maintains a Lessons learned database built on various sources. The JALLC (Joint Analysis and Lessons Learned Centre) is the focal point for NATO LL analysis, tasked with analysis projects on a biannual programme of work and with emergent analysis requirements for immediate execution as necessary. However, the process is basically bottom-up where sent in observations are reviewed, turned into lessons identified and given an action plan.

CH4.D12. - The EU External Actions Service (EEAS) Lessons learned processes

Source: (Council of the European Union, 2012; Lindén, 2014; Quille, 2012) 

Short description:

The European Union External Actions Service includes several different processes related to lessons learned. The Military Staff (EUMS) Lessons Learned Process (ELPRO) supports i.a. the planning and execution of CSDP activities, the EU Capability Development, the EU concept development and the development of EU Standard Operating Procedures with lessons from CSDP-activities. Reported observations are first verified by the EUMS and then by the EU Military Committee Working Group (i.e. representatives from the Member States) before they are accepted. At the heart of the continued process lies the European Union Military Staff Lessons Management Application (ELMA) which is a database that supports the collection, analysis and dissemination of lessons. The EU LL process is to a large extent bottom-up and dependent on reported lessons from the member states. The system has proven functional, although the involvement of the EU Military Committee means that lessons observations risk being subjected to political negotiations.

The EU EAAS Civilian Planning and Conduct Capability (CPCC) provides lesson based development/review of internal guidelines, standard operating procedures and other tools for planning, launching, conduct and termination of civilian CSDP missions. Lessons learned from civilian CSDP missions are collected after the planning phase as well as after the end of the mission, but also from the 6-months reports from the Heads of Mission. These lessons are negotiated in the Civil Committee and sent to the Political and Security Committee (PSC). A database, CiLMA has been developed.

The EU EAAS CM Planning Directorate (CMPD) provides the main lessons learned reports at the political and strategic level, including Annual Reports and thematic reports (i.e. on Security Sector Reform or Gender Mainstreaming) and feed these lessons back into the strategic planning process. The CMPD lessons learned process is top-down, and builds on informal meetings with all relevant EEAS bodies, a questionnaire to all missions, visits to the missions etc. Lessons are i.a. used in the training of new and current mission staff. The process does not seem to use any database or similar repository function.

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In 2012 a web-portal (at the classified EU OPSWAN network) was developed to include both the ELMA and the CiLMA databases. Moreover, the portal also included a document library, a chat-forum for discussions and a WIKI feature. To oversee the process, an EEAS Lessons Management Group with representatives from both the EEAS (i.a. EUMS, CPCC, CMPD) and the Commission (i.a. DG ECHO and DG EuropeAid) has been set up.

CH4.D13. – The Civil Protection Mechanism (CPM)

Source: (European Parliament, 2013)

Short description:

The Civil Protection Mechanism (CPM) within DG ECHO has had a process for lessons learned since 2008, mainly storing large amounts of reports and other information in a database as a broad basis for learning processes and knowledge development. This database works with PDF-documents and has limited search capabilities. The information is collected in hot-wash-ups, in meetings with the Member States, in different meeting covering more technical as well as more strategic lessons etc. The information is to be moved to a new database and the work with this database is currently ongoing. The database is to be able to collect and share data, disseminate lessons and maintain an overview of the implementation of lessons. The lessons are i.a. used to support the development of training programme, calls for projects regarding prevention and preparedness and priorities for planning.

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Appendix 2 – How to learn for CM (section 5)

Instructional approaches

CH5.D1. – Exploring emergency response: theories of communities of practice, safety cultures, situation awareness and tacit knowledge

Source: (Taber & Taber, 2013)

Short description:

This paper discusses theoretical constructs from various domains to explore emergency response management based on empirical data (Piper Alpha Disaster). The authors explaining the effective contribution of a communities of practice, shared situational awareness and tacit knowledge with a critical analysis of how it can be applied to emergency response events with respect to safety cultures. Their didactical methods are most suitable for organisational levels.

CH5.D2. – Elicit to learn crucial post-crisis lessons: learning processes

Source: (Kowalski, 2014a, 2014b; Maal et al., 2013)

Short description:

The Elicit to Learn Crucial Post-Crisis Lessons (ELITE) project created a living document containing lessons learned from disasters such as forest fires, earthquakes and floods, and lessons learned that are common across these disaster types. Three reports are produced so far: D5.1 Identify relevant learning processes”, D5.2 is an analysis of the learning process in CM identified in deliverable D5.1, and provides a summary of learning processes during the holistic tabletop exercise on January 27th 2014. D5.3: Evaluation of learning processes in CM, describes the evaluation criteria for the transfer of knowledge, experiences within the learning processes of the learning community from a socio-technical modelling perspective. The ELITE CoP consists of the main stakeholders in CM, in addition to a large group of end-users: International level, national level, sector and organisational level and individual level.

CH5.D3. – Collaboration dynamics and competences development on CM in the transportation industries

Source: (Eckert, 2013a)

Short description:

CRISISTUBE targets top managers and decision makers in the Transportation sector EU-wide. It provides collaborative inter-organisational (M3) Knowledge Exchange and development of enhanced quality standards & learning approaches related to CM through state-of-the-art Web 2.0 based Learning Networks technology to support effective exchange of Best Practices & experiences.

CH5.D4. – Learning concepts for parties involved in flood control.

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Source: (N C M Theunissen et al., 2010)

Short description:

The objective was the development of learning concepts, learning technology and demonstrators of learning/training solutions, to raise preparedness among first responders (M1) involved in flood control. It should help them to develop a self-directed learning attitude. As a result they will take more initiative in the obtaining and sharing of information related to safety critical situations. Furthermore, they will become flexible and self-directed in adopting the newest innovations on safety critical management.

CH5.D5. – Recommendations for training of crisis responders

Source: (Adrot & Moriceau, 2013)

Short description:

This theory enriches the CM literature by proposing performativity as a potential analytical lens for collective action during crisis response. Second, it is proposed in some practical recommendations to improve CM training through the application of the concept of performativity. Finally they proposed a critical perspective on tacitly held assumptions in CM. The theory is based on individual competences (M1).

CH5.D6. – Immersive simulated learning environments

Source: (Alison et al., 2013)

Short description:

This article provides an integration and synthesis of the strengths and weaknesses of utilizing simulation-based training environments for research. It provides information for researchers interested in exploring complex, dynamic, and high-stakes individual decision making in critical incidents (M1). The article proposes that immersive simulated learning environments (ISLEs) are an effective naturalistic decision making tool for examining strategic and tactical multi-team decision making. Specifically, they are useful for researching environments whereby decision characteristics of anticipation, preparation, mitigation, adaptation, and coping are treated as interconnected elements. The article presents the simulation tool Hydra as an example of an ISLE by describing a worked example known as Operation Pandora. It demonstrates how the use of ISLEs can assist research on expert, high-stakes, and high-consequence critical incident decisions.

CH5.D7. – Didactic instruction, case studies for role-play, exercises, computer games and simulations

Source: (Deitchman, 2013)

Short description:

Reviews of public health emergency responses have identified a need for crisis leadership skills (M1) in health leaders, but these skills are not routinely taught in public health curricula. To develop criteria for crisis leadership in public health, published sources were reviewed to identify attributes of successful crisis leadership in aviation, public safety, military operations, and mining. These

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sources were abstracted to identify crisis leadership attributes associated with those disciplines and compare those attributes with crisis leadership challenges in public health. The following attributes are proposed for crisis leadership in public health: competence in public health science; decisiveness with flexibility; ability to maintain situational awareness and provide situational assessment; ability to coordinate diverse participants across very different disciplines; communication skills; and the ability to inspire trust.

CH5.D8. – State of Virtual Reality Based Disaster Preparedness and Response Training.

Source: (Hsu et al., 2013)

Short description:

The advent of technologically-based approaches to disaster response training through Virtual Reality (VR) environments appears promising in its ability to bridge the gaps of other commonly established training formats. Specifically, the immersive and participatory nature of VR training offers a unique realistic quality that is not generally present in classroom-based or web-based training, yet retains considerable cost advantages over large-scale real-life exercises and other modalities and is gaining increasing acceptance. Currently, numerous government departments and agencies including the U.S. Department of Homeland Security (DHS), the Centres for Disease Control and Prevention (CDC) as well as academic institutions are exploring the unique advantages of VR-based training for disaster preparedness and response.

Growing implementation of VR-based training for disaster preparedness and response, conducted either independently or combined with other training formats, is anticipated. This paper reviews several applications of VR-based training in the United States, and reveals advantages as well as potential drawbacks and challenges associated with the implementation of such training platform.

Instructional format

CH5.D9. – Serious game for Forensic Awareness

Source: (Kurpershoek, 2013)

Short description:

The Netherlands Forensic Institute (NFI) is training Emergency organisations for awareness on crime scenes. First responders have to be aware that an incident site can change into a crime scene. "It's not a workout, but a game to be aware of the importance of tracks." This training is intended for professionals working in the public emergency services, such as primary care, defence, security and CM.

CH5.D10. – CRISMA Modelling CM for improved action and preparedness

Source: (Heikkilä et al., 2015a)

Short description:

CRISMA is a tool for mass-casualty incidents and specifically targets resource and capacity planning and the training of civil protection units. CRISMA is an EU-funded security research project that focuses to developing solutions to complex crisis scenarios. All activities under the project are

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divided into five pilots. The German pilot aims to address mass-casualty incidents and specifically targets resource and capacity planning and the training of civil protection units. The objective of the CRISMA-system in this pilot is to simulate different response patterns for better resource management, in order to evaluate response plans and to improve and modify trainings as well as resource and capacity planning.

CH5.D11. – Teamwork in High-reliability organisations in health care

Source: (Baker et al., 2006)

Short description:

Organisations are increasingly becoming dynamic and unstable. This evolution has given rise to greater reliance on teams and increased complexity in terms of team (M2) composition, skills required, and degree of risk involved. High-reliability organisations (M3) are those that exist in such hazardous environments where the consequences of errors are high, but the occurrence of error is extremely low. Team training is defined as applying a set of instructional strategies that rely on well-tested tools (e.g., simulators, lectures, videos). In this article it is argued that teamwork is an essential component of achieving high reliability particularly in health care organisations.

CH5.D12. – Serious game to make citizens more aware of risks

Source: (Cremers, Stubbé, van der Beek, Roelofs, & Kerstholt, 2015)

Short description:

The goal of the present study was to investigate whether playing a serious game concerning natural and man-made risks leads to increased risk awareness and additional information search. A serious board game was developed. Participants (M1) who had played the game were more aware of risks in their own environment. Furthermore, playing the serious game counterbalanced the decline in self-efficacy and participants gathered more information on natural risks.

CH5.D13. – OWL4S: an online workshop tool to support and integrate the different phases, components and contents of a learning experience.

Source: (Albertini, 2013)

Short description:

OWL4S: an online workshop tool to support and integrate the different phases, components and contents of a learning experience. It provides CM related documentation to the learners before the workshop, supports workshop's brainstorming, briefing and debriefing and integrates different media (e.g. micro games, dilemma-based simulation games, integrating videos, presentations and dilemmas in a pre-defined flow). As such it encourages collaboration and ideas' sharing. collecting feedback and questionnaires. The OWL4S target users are: Learning experiences' developers/designers (M2/3), Facilitators/Trainers (from both academic or corporate sector, M2) and Learners/students/participants of the L4S learning experiences (M1).

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CH5.D14. – Adventure based learning for medical responders

Source: (N C M Theunissen et al., 2007)

Short description:

Physicians (M1) participating in military expeditions will increasingly be confronted with smaller and simpler medical facilities (for instance field hospitals) in a variety of settings. Physicians have to cope with extreme climates, with contradicting and incomplete information, or have to endure physical discomfort due to military transportation. This requires specific skills and practice levels that cannot be acquired in regular civilian hospitals. Adventure based learning (also known as experiential learning or action learning) has been used in this context. A life adventure game is developed in which military physicians experience a military expedition. For about 2 hours they are at the mercy of expeditional circumstances. When after about 1 hour they have to perform their medical skills, again, they will be taken by surprises and distractions. This adventure is build around a Human Patient Simulator (HPS), climate rooms with low or high temperatures, and a transportation simulator. Effects on self-efficacy, perceived mental and physical effort and medical skills is monitored.

CH5.D15. – A 2-day scenario involved a joint military-civilian C2 exercise relating to the (crisis) management of a large event held in a metropolitan area.

Source; (Rousseau, Tremblay, Banbury, Breton, & Guitouni, 2010)

Short description:

A 2-day scenario involved a joint military-civilian C2 exercise relating to the (crisis) management of a large event held in a metropolitan area. The role of participants (M1) comprised both the acquisition and maintenance of SA of each crisis event and the coordination of an appropriate course of action. The relationship between subjective and objective SA measures was examined within the context of a realistic C2 scenario. Conclude that subjective SA plays a strategic role in the acquisition of SA in general.

CH5.D16. – STEAM, assessment and training for ad hoc teams in a comprehensive approach

Source: (Sassen-van Meer, 2012)

Short description:

The STEAM method is a one day “pressure cooker” training. Designed to prepare AD HOC teams for a common task or mission. During training individual participants are learning each other strengths and weaknesses and learning how to handle and overcome difficulties.

The training is designed especially for Ad Hoc combined teams. STEAM is focusing on individual competences and on M2, Team capabilities. The training has its focus on Operation, Reflection, Openness to Experience & information exchange.

CH5.D17. – Zero Hour: America’s Medic video game

Source: (National Research Council (US). Committee on Modelling Simulation and Games, 2010)

Short description:

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Zero Hour: America's Medic is a first person video game that is designed to train and exercise first responders to respond to mass casualty incidents such as earthquakes and terrorist attacks. Its focusses on individual training (M1) and exercising competences in the field of Emergency Medical Service (EMS).

CH5.D18. – De crisiscommunicatieGame. Board-game for crisis-management without the use of large response cells.

Source: (J.G.M. Ven et al., 2013)

Short description:

The Crisis Communication Game (Dé CrisisCommunicatieGame) from The Hague Security Delta (HSD) has its focus on networking aspects. This serious game is designed to train and improve personnel crisis communication competences (M1). During gameplay participants are learning to recognise their networks, how to retrieve and share information.

CH5.D19. – Serious gaming for policy makers

Source: (Stubbé et al., 2014; Josine G M Van De Ven, Stubbé, & Hrehovcsik, 2012)

Short description:

De Burgemeestergame – The Mayor Game – The game provides strategic dilemma training for CM scenarios using a serious game format. The Mayor Game is available on internet and designed to be used for training policy makers (M1). The learning goals are based on an expert group while the didactic background is based on self- directed learning, developing a self – directed learning attitude handling strategic dilemma's.

CH5.D20. – Disaster exercises as learning tools

Source:

Short description:

Using human potential in rural hospitals is vital to successful outcomes when handling disasters. Nursing professional development educators (M1) provide leadership and guiding vision during a time when few educational research studies demonstrate how to do so. This article explains the role of the rural nursing professional development educator as a disaster preparedness educator, facilitator, collaborator, researcher, and leader, using the American Nurses Association's Nursing Professional Development: Scope and Standards of Practice.

CH5.D21. – 3DiTEAMS

Source: (Taekman, Segall, Hobbs, & Wright, 2007; Virtual Heroes, 2014)

Short description:

3DiTeams (also known as 3Di TEAMS) is a first person video game developed by the Duke University Medical Centre and Virtual Heroes, Inc. and used for medical education and team training (M2). The game is intended for training and exercising of medical teams of practitioners of many levels of

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clinical expertise by creating an interactive method for learning and application of information in a clinical context. The scope of practice of the tools in the game is focused towards care of a trauma patient and the interpersonal communications that surround the patient's care.

CH5.D22.a – Simx Virtual Learning environment, Medical Team-based Training

Source: (Virtual Heroes, 2014)

Short description:

Virtual Heroes created a 3D multiplayer training application for the South Australia Ministry of Health. The application's objective is to train and evaluate participants on individual level in medical protocols, as well as emphasise teamwork and effective communication in an immersive, fail-safe environment. During the scenario, participants can perform a variety of actions to assess and treat patients. Meanwhile, the instructor manipulates patient vitals and introduces additional challenges for the participants.

CH5.22.b- The Entri project ("Europe's New Training Initiative for Civilian CM", will end in 2016)

Source: (ENTRI, 2011)

Short description:

This project was initiated in 2011 and it is led by the Zentrum für Internationale Friedenseinsätze (ZIF) gGmbH – Centre for International Peace Operations. The Entry project aims to prepare and train civilians (individually) that are either going to, or already working in, CM missions worldwide. Such missions include those of the European Union (EU), the United Nations (UN), the organisation for Security and Co-operation in Europe (OSCE), and the African Union (AU). The project has been created to foster the harmonisation of European and international approaches to capacity-building. The added value for training organisations is that ENTRi seeks to facilitate and strengthen the opportunities for institutions to implement training together as well as to share experiences, trainers, and expertise.

CH5.D23.- The L4S ("Learning for Security", ended in 2011)

Source: (CORDIS service, 2011; Eckert, 2013b; L4s project, 2010)

Short description:

Learning for security was a project funded by EC under FP7 programme (FP7-SECURITY 225634). It created an Innovative framework for addressing the development of collaboration competences of crisis managers in transportation sector. Such framework was implemented through a set of interactive and experiential learning solutions that enabled the effective understanding and management of challenges in crisis situation. It was validated within piloting experiences involving practitioners in the field.

The set of challenges addressed are:

- acting under extreme time pressure,
- facing lack, ambiguity and/or asymmetries in the information,

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- deal with human factors like attitudes and emotions,
- addressing interpersonal relationships: fast relationship building, activation for the mobilization of social resources, trust building, cohesion, role definition and handling diversity and conflicts

As result of the project a prototype called IMPACT was created with set of game simulations with the title of The Crisis Readiness Simulations to tackle crisis readiness competences and self-diagnostic skills at individual, team and organisational level. More precisely, L4S simulation-based learning experiences on CM reflect in a very realistic way CM and collaboration dynamics in modelled disastrous situations in air and sea transportations During the L4S project lifetime, the IMPACT prototype was tested in different maritime settings and airports CM situations which could serve as reference for the implementation of some of the DRIVER training scenarios. The provider of such simulation is Alpha-Simulations (www.alpha-simulations.com) and its main target audience is key manager and decision makers in Air and Maritime Transportation in EU.

CH5.D24. – XVR Virtual Reality training software for safety and security

Source: (XVR, 2001)

XVR is an All Hazard Simulation Platform to teach, train, exercise, assess and (de)brief safety and security professionals in all organisations and agencies involved in CM and emergency response. E-Semble has over 200 customers in 21 countries worldwide.

XVR contains several modules: XVR On Scene; XVR Resource Management; XVR Crisis Media;

XVR Toolkit. It is developed to create a flexible, reliable & user-friendly simulation tools where learning is key and the instructor is in control. XVR contains several modules that can be used separately but they can also be linked together and run simultaneously. The XVR platform is used in both single- and multi-agency settings. E-Semble, the developer of XVR is a DRIVER Partner.

Instructional support tools

CH5.D25. – Crisis simulator for Incident Management Teams (IMTs)

Source: (Vidal & Roberts, 2014)

Short description:

With the help of a set of experiments on a virtual reality-based simulation platform, France and American Incident Management Teams (IMTs) are exposed to resolve incidents. The simulation platform was used for simulating specific crisis situations. This platform is intended measuring the team performances between (M2, team) and within teams (M1, individuals).

CH5.D26. – Advanced disaster management simulator

Source: (ETC, 2014)

Short description:

Advanced disaster management simulator (ADMS) is a true-to-life virtual environments for training incident command and disaster management teams at all levels (M1,M2 & M3). In the event of an

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emergency or disaster, multiple emergency response agencies will be required to work together towards the common goal of mitigating the damage to life and property. Without proper training in command, control, coordination and communication, incident commanders may lack the necessary skills needed to ensure cohesion of efforts across multi-agency lines. The

CH5.D27. – SNOWBALL

Source: (SNOWBALL, 2014)

Short description:

SnowBall consists in a deep analysis of cascading effects and development of methods to anticipate them; and in a Decision Support System able to display current crisis monitoring and results of simulated decisions integrating cascading effects, thanks to a data collection system, an Events Log Database, Simulators and a Dashboard. SnowBall innovates in its modular approach to crises, its modelling techniques, its agent-supported coupled grid simulations, its generic Events Log Database and tools to follow public behaviour (Emergency Alert, social networks, mobile application).

CH5.D28. – Simulation task environment for improving team performance

Source: (Hellar & Hall, 2009)

Short description:

NeoCITIES was developed to study the effectiveness of cognitive artefacts within a simulated command and control environment. The NeoCITIES Simulation task environment simulates a crisis and allows artefacts to be introduced to improve team performance (M2) and measure quantities such as inference accuracy as a function of crisis tempo, data rate, decision complexity and individual factors (M1) such as induced stress. Also introduction of cognitive aids to support improved team coordination and understanding of team-member interactions were simulated.

CH5.D29. – A tool to improve team situation awareness

Source: (de Koning et al., 2011)

Short description:

When a crisis occurs, people from different organisations, on different hierarchical levels have to deal with unexpected situations that require coordinated effort. The goal of this research is to improve multidisciplinary cooperation for CM teams. We developed a tool, the Multi-mono guide, which helps individual team members (M1) to share information at the right time, with the right person, in the right way. Effect of the tool were measured on individual competences (M1), team situation awareness (M2) and process satisfaction. Participants did find the Multi-mono guide useful for trainees.

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CH5.D30. The CRISIS project (“CRITICAL Incident management training System using an Interactive Simulation environment” ended in 2013)

Source: (CRISIS, 2014)

Short description:

The CRISIS project (FP7- SECURITY 242474) had as main goals to research and develop an advanced critical incident management, interactive simulation environment for training security and emergency personnel in airport operational security. The 4C/ID Training approach that was used in the project to develop the training plans based on the training requirements, which includes the understanding of tasks to be performed, their complexity and variability’s, as well as the identification of competences and training gaps) which allow to create a set of exercise design that led to scenario generation.

As result of the project the following tools were created:

Training on-demand simulation platform that facilitated the creation of challenging training scenarios to be used in interactive virtual worlds developed using Unit3D game engine.

A Competence based training to develop a set of important skills in the critical incident management such as real-time cue recognition, diagnosis, planning under uncertainty and stress, decision making, information handling, team coordination and human interoperability.

CH5.D31.- The PANDORA project (“Advanced training environment for crisis scenarios”, ended in 2012)

Source: (Cesta et al., 2012; Pandora, 2007)

Short description:

It addresses CM as a major issue to prevent emergency situations from turning into disasters and training plays an important function to the preparation of the crisis manager. There are two main modalities for training purpose tabletop exercise and real world simulation exercise.

PANDORA bridged the gap between table-top exercises and real world simulation exercises, providing a near-real training environment at affordable cost with a toolbox which facilitates the creation of a real-time, physics-based environment, to simulate all the dynamic elements of the entire disaster environment. In addition, it emulates a complete crisis room: realistic 3D visuals and audio create a truly immersive, chaotic and stressful environment. PANDORA realistically responds to actions taken to enable real individual training value and the development of complete skill sets. Pandora trains at all levels of response, from management and control to all the on-scene activities for emergency organisations. Furthermore, different crisis room are able to interact, thus recreating a near-real interconnected cross-borders environment. The personalisation of planned stimuli according to the different trainees’ profiles and the dynamic adaptation of different lesson plans during the time of training are interesting elements.

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CH5.D32.- The *INDIGO project* (*“Innovative Training & Decision Support for Emergency operations”*, ended in 2013)

Source: (INDIGO, 2010)

Short description:

The INDIGO project was funded by EC under the F7 framework (FP7-SECURITY 242341) and it aimed at researching, developing and validating an innovative system with the integration of the latest advances in Virtual Reality, Simulation and Artificial Intelligence in order to homogenise and enhance both the operational preparedness and the management of an actual complex crisis.

The main project outcomes included:

- A3D interactive and realistic visualisation of the complete crisis environment, including data coming from the field, simulation results, and building interiors.
- The simulation of different evolving scenarios for planning, training, and anticipating future states and impending learning developments during operations, and the support for analysing events after the crisis.
- The simultaneous training of decision makers, crisis managers as well as first responders and emergency field units that will be influenced by the simulated scenario and that will reciprocally influence its evolution.
- The simultaneous involvement of multiple participants, thanks to its distributed architecture, while offering a unique pictorial way of sharing and communicating complex knowledge across organisation boundaries.

The combination in INDIGO of Decision Support System with different modes can be used for managing a real crisis situation that can also consider units sent to the field, or training the personnel involved in crisis decision making.

The INDIGO project (INDIGO, 2010) contains several products that could be interesting for experiments and demonstrations in the DRIVER project.

The INDIGO Software Developer Kit – allows third-parties to open and extend the existing system by implementing additional modules or gateways to other services and simulators required. It provides interoperability modules in order to support systems and services such as third-party simulators (using DIS/HLA standards), radio-communication (e.g. UMTS, Tetra) and geo-localisation (GPS) servers, Geographic Information System (using OGC’s standards, KML) or Computer Aided Design system (CAD).

In addition, the 3DNsite (INDIGO, 2010) is a tool for remote exploration of images immersed in a 3D environment and aligned to a given reference model. This system has been developed in order to simplify location recognition for crisis managers and first responders during emergency operations, both for simulation and training. Moreover, some further testing of this tool could be done since the 3DNsite viewer and generator installing bundles, source code and documentation are available for downloading and testing at <http://vcg.isti.cnr.it/indigo/download.php>.

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Evaluation

CH5.D33. – MIND: A visualization framework for web-based dissemination of models and lessons learned

Source: (Jenvald et al., 2001)

Short description:

Emerging web-based technologies enable information sharing within and among rescue agencies and organisations. This development can facilitate education, training and development through effective distribution of documentation, models and lessons learned from training exercises and rescue operations. The paper discuss central aspects of this enterprise (M3) such as the need for domain-specific data models, methodologies for detailed exercise documentation, and the design of presentation and visualization tools. Based on this investigation a framework is presented that supports modelling, documentation and visualization of rescue operations for web-based distribution. The paper briefly describes the implementation of the components of the framework. Finally, it is discussed how to apply the methodology and framework to training of first responders (M1) and university-level education of emergency managers and officials (M1).

CH5.D34. – A Generic Framework for Learning Analytics

Source: (Greller & Drachsler, 2012)

Short description:

This paper explores the key dimensions of Learning Analytics (LA), the critical problem zones, and some potential dangers to the beneficial exploitation of educational data. The paper proposes and discuss a generic design framework that can act as a useful guide for setting up Learning Analytics services in support of educational practice and learner guidance, in quality assurance, curriculum development, and in improving teacher effectiveness and efficiency. Furthermore, the presented article intends to inform about soft barriers and limitations of Learning Analytics. The required skills and competences are identified that make meaningful use of Learning Analytics data possible to overcome gaps in interpretation literacy among educational stakeholders. It also discuss privacy and ethical issues and suggests ways in which these issues can be addressed through policy guidelines and best practice examples. Learning Analytics will become a powerful means to inform and support learners (M1), teachers (M2) and their institutions (M3) in better understanding and predicting personal learning needs and performance.

CH5.D35. – Methodological innovations in CM

Source: (Buchanan & Denyer, 2013)

Short description:

This article presents a bounded, temporally bracketed overview of the literatures exploring extreme events, structured around an 'ideal type' event sequence with six phases: incubation period, incident, CM, investigation, organisational learning and implementation of 'lessons learned'. While not a traditional review, this approach serves to overcome problems associated with phenomena resistant

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to precise definition, and maps the structure of a field characterised by fragmentation, insular traditions and epistemological pluralism, generating a template against which crises can be explored.

CH5.D36. – Evaluating differences between hierarchical and network teams in emergency management.

Source: (J. M. C. Schraagen et al., 2010)

Short description:

This study examines the differences between hierarchical and network teams (M2) in emergency management. A controlled experimental environment was created in which we could study teams that differed in decision rights, availability of information, information sharing, and task division. Thirty-two teams of either two (network) or three (hierarchy) participants (N=80 in total) received messages about an incident in a tunnel with high-ranking politicians possibly being present. Based on experimentally induced knowledge, teams had to decide as quickly and as accurately as possible what the likely cause of the incident was: an attack by Al Qaeda, by anti-globalists, or an accident. The results showed that network teams were overall faster and more accurate in difficult scenarios than hierarchical teams. Network teams also shared more knowledge in the difficult scenarios, compared with the easier scenarios. The advantage of being able to share information that is inherent in network teams is thus contingent upon the type of situation encountered.

Evaluation instruments

CH5.D37. – MOPED, a hand held device for mobile Team Evaluation.

Source: (Van Berlo et al., 2003)

Short description:

Distributed team training, often in joint settings, is becoming more and more important in the military training today. As the teams (M2) and training staff (M2) 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 the training staff should be supported in doing this. This paper describes a mobile performance measurement and evaluation tool, specifically developed for distributed team training (MOPED). The MOPED tool helps the evaluator in observing team performance and in quickly generating, sending and receiving data to support his evaluation.

CH5.D38. – Observing Elite Firefighting Teams: The Triad Effect

Source: (Vidal & Roberts, 2014)

Short description:

In the US, Incident Management Teams (IMTs) like to define their role as 'bringing order to chaos'. Conversely, French firefighters tend to describe their jobs as 'organizing chaos'. Through a set of experiments on a virtual reality-based simulation platform, it is research what accounts for this difference in the way the Incident Command System (ICS) is enacted and how does it relates to success. Team performance evaluation methods: dialogue/interaction analyses (coupling, density,

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centrality, structural holes), simulation outcome, team reports, role players opinions, expert opinions, self-assessments (debriefings). This platform is intended to measure team performance between (M2, team) and within teams (M1, individuals).

CH5.D39. – Self-administered survey to measure network relationships, network-complexity and information-communication technology utilization

Source: (Kapucu & Garayev, 2012)

Short description:

The networked governance performance in emergency management is dependent on structural, spatial, and temporal issues embedded into inter organisational relationships (M4). This article examines, using a self-administered survey, how network sustainability, namely, the extent to which network relationships are maintained and nurtured over time, is affected by interdependent network relationships, network complexity, and information-communication technology (ICT) utilization at the local level. This study provides a multiple linear regression analysis. Using UCINET social network analysis software, additional analysis of the network structure and relationships in four counties is provided for further insight. This study contributes to the literature on networked governance applied to the field of emergency management.

CH5.D40. – Riverside Situational Q-sort

Source: (Freberg et al., 2013)

Short description:

Behaviour in response to a crisis will result from a combination of individual and situational variables. In spite of the increased recognition of the importance of situational variables, a literature and methodological toolkit for the study of situational influences that is comparable with those available for individual variables has not yet emerged. However, the recently developed Riverside Situational Q-sort provides a novel method for quantifying subjective impressions of any situation. This proof-of-concept demonstration asked participants to complete the RSQ in response to an imaginary food crisis situation communicated via one of three message sources (social media, organisational website and traditional media). Results illustrate the potential of this method to provide quantitative evaluations of subjective responses to crisis situations.

CH5.D41. – Method to study the emergence of organisation and technology at a shelter during Hurricane Katrina.

Source: (Porter, 2013)

Short description:

This study is about the articulation and employment of a situational boundary-making approach to study the emergence of organisation and technology at a shelter (M3) during Hurricane Katrina. Conclusions are draw using triangulation with constant comparative method of qualitative research, using interview transcripts, field notes from participant observations, and messages from the list-serv (email server).. The analysis of qualitative data shows how emergent organisation occurred at the

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shelter as situational entanglements consisting of three main elements: a salient moment in time, key actors, and boundary-making practices. Implications are also discussed for disaster managers (M1) to assess the success and failure of technology during a response.

CH5.D42. – Measure of the effectiveness of multidisciplinary emergency management teams

Source: (Haar et al., 2013)

Short description:

This paper is about the development and validity testing of a context-sensitive measure of the effectiveness of multidisciplinary emergency management teams that coordinate the multidisciplinary assistance on an incident scene. The scale can assist in future research, and serve as an instrument to evaluate team effectiveness during not only actual incidents but also emergency management exercises and training programs. After developing the scale, we validated it in a study with a field sample of 50 teams executing realistic emergency management exercises. Results indicate that the scale is internally consistent. They showed construct validity by an assessment of both convergent and discriminant validity. The scale indicates participant-external rater invariance and can be aggregated to a team score. Suggestions are offered for improving the scale, future validity testing, and practical use of the measure.

CH5.D43. – Measuring Situation Awareness in complex systems

Source: (Salmon et al., 2009)

Short description:

Assessing operator situation awareness is a key component of socio technical system design and evaluation. This article describes a study that was undertaken in order to compare two different situation awareness measures (a freeze probe recall approach and a post-trial subjective rating approach) when used to assess participant situation awareness during a military planning task.

CH5.D44. – i-SELF: An Internet-Tool for Self-Evaluation and Learner Feedback

Source: (N.C.M. Theunissen & Stubbé, 2014)

Short description:

The iSELF: An Internet-tool for Self-Evaluation and Learner Feedback stimulate self-directed learning in ubiquitous learning environments. Ubiquitous learning solutions include on- and off-line, formal and informal learning. To benefit from its possibilities, learners need to develop competences for self-directed learning. To do so, a self-evaluation tool can help the learner to get insight in his/her own development, to manage and monitor his/her own learning process, to collaborate in learning, to relate the learning to 'real life' needs, and to take control over educational decisions. The online tool contained a card-sort module to assess commence statements, a profile module to evaluate core competences, and a feedback module to suggest learning possibilities in a ubiquitous learning environment. With this instrument one can determine the profile of the trainees. This profile can be used as reference for the personalization of the training experience and also for monitoring trainees progress towards the achievement of their learning goals.

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CH5.D45. – Text analysis to information transmission

Source: (Adrot & Moriceau, 2013)

Short description:

This paper highlights the predominating influence of crisis responders performances on information transmission. Based on an exploratory interpretive analysis (document analyses on facts and emotions) of the 2003 French heat wave crisis response. The findings reveal that performances can support immediate reaction and involvement, but can also generate conflicts or misunderstandings that may burden coordination. The writers enrich the CM literature by proposing performativity as a potential analytical lens for collective action at team-level during crisis response and propose some practical recommendations to improve CM training for individuals.

CH5.D46. – Elicit to learn crucial post-crisis lessons: a learning style questionnaire

Source: (Maal et al., 2013)

Short description:

The Elicit to Learn Crucial Post-Crisis Lessons (ELITE) project will create a living document containing lessons learned from disasters such as forest fires, earthquakes and floods, and lessons learned that are common across these disaster types. In the first report: D5.1 Identify relevant learning processes” a questionnaire is presented, assessing learning style. The ELITE CoP consists of the main stakeholders in CM, in addition to a large group of end-users: International level (M5), national level (M4), sector and organisational level (M3) and individual level (M1).

CH5.D47. – Competences for multidisciplinary cooperation in a Network Centric organisation (NCOQ)

Source: (de Koning et al., 2011; N.C.M. Theunissen & Stubbé, 2014)

Short description:

The organisational structure of CM organisations is changing from a hierarchical organisation to a so-called Network Centric organisation (NCO): when there is a crisis or calamity, people from different organisations, on different hierarchical levels have to work together. An instrument is provided that can be used to implement Network Centric organisation in Safety and Security domains. It is a questionnaire with 71 items in 7 scales (Leadership skills, Working in ad hoc teams, Open mind for ICT tools, Own role in behalf of the team, Information processing, Social skills, Communication skills) using a 7-point Likert scale ranging from 1 (totally applicable) to 7 (totally not applicable). Assessment can be performed thru the iSELF: an Internet-tool for Self-Evaluation and Learner Feedback to stimulate self-directed learning in ubiquitous learning environments. All parties involved in CM, for example, the police force, the fire departments, the paramedics, the military or officers of a dike-reeve.

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CH5.D48. – Competence measurements for health care professionals.

Source: (METS, 2014)

Short description:

The Dutch METS Centre develops and conducts tailor made assessment scenario's for paramedics (M1), emergency centre operators (M1), and SEH- IC teams (M2).

CH5.D49.- The GLEANER framework (“Game LEarning ANalytics for Educational Research”)

Source: (Arnab, 2014)

Short description:

GLEANER is a Learning Analytics framework focused on improving the data analysis processes over educational data, with a special focus on highly interactive contents. Such framework has been developed by the UCM (University Complutense of Madrid) team as part of the GALA Network of Excellence funded by the EC under the ICT-2009.4. Grant2258169.

This framework eases the analysis and interpretation of the data generated by highly interactive contents (including, but not limited to educational games). It resolves significant challenges in deciding which data should be captured, how this data should be clustered and analysed and which analysis models can yield adequate and trustworthy assessment results. There are still, however, some outstanding questions regarding how to find out which visualization models are more effective.

It provided the basis on which to build a future infrastructure to generate and collect data through different serious games, exploring different perspectives of how this data can be leveraged. The exploration has covered the different possible application scopes, the technical challenges involved and the different measurements that can be performed with objectives ranging from detecting gameplay issues to identifying poorly performing students, as well as how the aggregation of data at different scopes can help policymakers in making informed decisions. The open source GLEANER API is available for download at <http://e-ucm.github.io/gleaner/>.

CH5.D50.- Serious Gaming Lab (NL)

Source: (TNO, n.d.)

Short description:

The Serious Gaming Lab is one of the facilities of TNO. It is a lab-environment in which Serious Gaming applications can be developed and tested. Several advanced laptops, software (like XVR and VBS) and a touch-table are part of this facility. TNO brings in various tools developed in other related research projects:

- Mayor-game: for training mayors in CM.
- Self-reliance game: learning high school pupils to be self-reliant in crisis situations.
- Crisis communication game: training professional crisis communication personnel
- ISELF Competence assessment tool: an electronic card-sort like tool for assessing crisis-management competencies
- Twitcident: a tool for gathering, mining and analysing social media messages

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Appendix 3 – How to implement learning for CM (section 6)

Scientific projects and approaches with CM aspects aligned with competences

CH6.D1. – Training programs for building competences in early intervention skills (2002), Denmark
Source: (Jensen & Baron, 2002)

Short description:

This concept outlines a skill and competence based approach for training groups of helpers to integrate this perspective into early interventions following trauma for different scenarios. Training curricula should consist of building skills for needs assessment and emergency response, preventive brief interventions and clinical interventions. The approach has been validated in different disaster situations.

CH6.D2. – Emergency Response and Recovery Competences in Health Care Administration: Competence Survey, Analysis, and Report (2005), US

Source: (Barbera et al., 2005)

Short description:

The academic approach developed peer-reviewed emergency response and recovery competences for selected Veterans Health Administration job categories. The competences primarily describe knowledge and skills essential for adequate job performance during the emergency response and recovery phases of an incident. The competences will be used to guide the development of learning objectives for the instructional curriculum.

CH6.D3. – Core competences and the Kansas City, Missouri fire department (2006), US

Source: (Neeley, 2006)

Short description:

The purpose of this approach is to identify key components of the Kansas City, Missouri Fire Department's skills training program, examine current processes for evaluating the acquisition and maintenance of core skills and competences, compare processes to those of other similarly situated fire service agencies, and identify any departmental processes, either formal or informal, that may impact the successful implementation of the strategic initiatives related to defining and maintaining core competences and skills. The activities also sought to recommend specific objectives towards the implementation of a skills training program in accordance with NFPA 1001.

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CH6.D4. – DIN PAS 1093 Human Resource Development with special consideration of Learning, Education and Training – Competence Modelling in Human Resource Development (2009), Germany

Source: (Stracke, 2009)

Short description:

The Reference Framework for Competence Modelling (RFCM) comprises all existing competence models, constitutes an abstract standardised description format for future competence models and the comparison of existing competence models. It was developed, refined and approved in a consensual process within the working group by experts from business and research. The analysis, the inclusion, and the integration of numerous competence models from theory and practice ensure that all existing competence models can be mapped and described by the RFCM.

CH6.D5. – Disaster Preparedness and Disaster Management: Self-Assessment Survey to Judge the Adequacy of Community-Based Physician Knowledge, Skills and Competences (2009), US

Source: (Guerdan, 2009)

Short description:

Survey results to reveal lack of competences and skills in disaster preparedness. Disaster preparedness and disaster management have received a high level of attention in the aftermath of the United States' recent experience with both natural and manmade events. Primary care physicians are often forced to respond with little or no formal training. Physicians in training receive little to no education on this subject. There are several organisations and academic institutions that have made inroads into training on this subject. There is no standardised assessment solution to judge these clinicians' competence and skills. Currently available training and some of the major response organisations are reviewed. A format for the development of an assessment solution and a pilot survey completed at two community hospitals are both discussed.

CH6.D6. – Cultural Competence in Crisis Intervention (2010), US

Source: (Ulezi & Jackson, 2012)

Short description:

Cultural competence is a value that must be embraced by both professionals and the agencies they work within in order to effectively manifest at a level that will be meaningful to clients during crisis intervention. Effective crisis intervention practiced with cultural competence results in positive outcomes for all involved in the crisis intervention. If professionals are willing to engage in the necessary work required in practicing from a culturally competent framework, such as developing self-awareness of their own cultural biases, they assist clients in feeling validated and respected during crisis situations.

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CH6.D7. – Competences Developed for Disaster Healthcare Providers: Limitations of Current Processes and Applicability (2010), US

Source: (Daily et al., 2010)

Short description:

Hundreds of competences for disaster healthcare personnel have been developed and endorsed by governmental and professional organisations and societies. Imprecise and inconsistent terminology and structure are evident throughout the reviewed competence sets. Universal acceptance and application of these competences are lacking and none have been validated. Further efforts must be directed to developing a framework and standardised terminology for the articulation of competence sets for disaster health professionals that can be accepted and adapted universally.

CH6.D8. – Understanding Competence Development and Management and Personnel Development Systems in European Fire and Rescue Services (2010), EU project (Ireland)

Source: (Ross et al., 2010)

Short description:

A key objective of this EC Leonardo research project is the shared exploration and development of training concepts and benchmarking methods for competence development and management with an aim to improve systems for all European Fire and Rescue Service organisations.

CH6.D9. – The Validation of Non-Technical Behavioural Markers (skills and competences) for Merchant Navy Officers (2012), UK

Source: (Devitt et al., 2012)

Short description:

The specific objectives of this project were to:

- Identify whether the behavioural markers proposed by Devitt and Holfrod (2010) were appropriate for use within the industry to measure effective competence in resource management skills laid out in the STCW Manila amendments of 2010.
- Compare the selected categories and elements and check for overlapping.
- Identify the appropriate number of behavioural markers that could be partially observed in each category

CH6.D10. – Disaster risk reduction/disaster risk management – Competences tailored for the Haiti earthquake disaster (2012), US

Source: (Tulane University's Disaster, 2011)

Short description:

Disaster risk reduction is an increasingly multi-disciplinary field and can mean many competences in various domains. It is important that scopes of work are clearly defined with specific competences tailored to each role and responsibility. This is crucial not only to the disaster risk reduction professional but is also needed in the measurement of curricula success. In order to understand the

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current competence level addressed by existing DRR/DRM tools and training documents, the Haiti SLDRP team used the competence categories to catalogue each curriculum in the Haiti SLDRP curriculum database.

CH6.D11. – Core Competences for Disaster Medicine and Public Health (DMPH) (2012), US

Source: (Walsh et al., 2012)

Short description:

Effective preparedness, response, and recovery from disasters require a well-planned, integrated effort with experienced professionals who can apply specialised knowledge and skills in critical situations. While some professionals are trained for this, others may lack the critical knowledge and experience needed to effectively perform under stressful disaster conditions. A set of clear, concise, and precise training standards that may be used to ensure workforce competences in such situations has been developed. The competences set has been defined by a broad and diverse set of leaders in the field and like-minded professionals through a series of Web-based surveys and expert working group meetings. The results may provide a useful starting point for delineating expected competences levels of health professionals in disaster medicine and public health.

CH6.D12. – Competence-Based Emergency Management Degree Programs for Public Affairs and Administration (2012), US

Source: (Kapucu, 2011a)

Short description:

Emergency management competences can be summarised in two categories: intra-organisational and inter-organisational. While the former includes important issues as organisational management, technological competency, and comprehensive and supported decision making, the latter incorporates issues relating to leadership, networking, coordination, and collaboration.

CH6.D13. – Cross-Disciplinary Competence and Professionalisation in Disaster Medicine and Public Health (2012), US

Source: (Burkle Jr. et al., 2012)

Short description:

The principles discussed have the starting point that response to humanitarian crises and large-scale natural disasters worldwide have shown consistent failures in coordination, intervention and documentation of impact outcomes. The response to the Haitian earthquake of 2010 catalysed the international community to address these shortcomings and requirements for greater accountability, stringent quality performance oversights, documentation and reporting, and a recognised process leading to professionalisation of the humanitarian community. Evidenced-based studies indicate the need to use a cross/multi-disciplinary approach to developing competences leading to curricula and course development, and eventual certification and registry of providers.

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CH6.D14. – SECUR-ED – Competence Framework for mass transportation (2013), EU project

Source: (SECUR-ED, 2014)

Short description:

The SECUR-ED competence framework is a holistic concept to support CM activities by a systematic approach to find out needed competences, to bridge competence gaps and to measure the success of learning and training activities. It is not a step by step manual to set-up activities but a report of the concept, its scale and scope including examples of its usage and recommendations for the implementation of the concept.

CH6.D15. – ACRIMAS – Aftermath CM System-of-systems Demonstration (2012), EU project

Source: (Stolk et al., 2012)

Short description:

ACRIMAS was a 15 months Support Action with 15 partners from 10 European countries, dedicated to provide comprehensive advice to the European Commission DG ENTR in preparation of the call for a Demonstration Project on Aftermath CM and to develop a roadmap for the execution of this demonstration. This roadmap elaborated a systematic development process for CM systems, procedures and technologies in Europe, to be implemented within the demonstration project. The proposed process aims for gradual evolvement of CM capabilities through demonstration and experimentation (DE) activities, transfer of related knowledge between stakeholders and at promoting an environment for co-development of CM technology and methodology where users, providers and researchers can work together. ACRIMAS also dealt with topics such as “harmonization” and “training and exercises” with results for the discussion of competence frameworks and competence development.

CH6.D16. – Master programs on safety and CM (2014), France

Source: (MASTER, 2013)

Short description:

Engineering schools and universities offer training programs dedicated to safety and CM. Mines ParisTech offers a specialised master on industrial safety control, a one-year training program aiming at students learning basis of risk and CM. Six topics structure the master: regulations and norms, risk analysis, safety management system, human and organisational dimensions of safety management, emergency and business continuity management and leadership. Sorbonne University offers a master on risks and crisis global management, a one-year training program aiming at students learning basis of risk and CM. Twelve topics structure the master: risk management in enterprise, quality and risk management, risk analysis, economical intelligence, risks territories, public actions and risk management, law, geographical information systems, safety management tools, statistics and probabilities, English and accountability.

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CH6.D34. – Competences for multidisciplinary cooperation in a Network Centric organisation (NCOQ) (2014), Netherlands

Source: (N.C.M. Theunissen & Stubbé, 2014)

Short description:

The organisational structure of CM organisations is changing from a hierarchical organisation to a so-called Network Centric organisation (NCO): when there is a crisis or calamity, people from different organisations, on different hierarchical levels have to work together. This questionnaire makes it possible to measure competences needed for this new way of cooperating.

Organisational projects and approaches

CH6.D17. – Competence Framework for Firefighters (1990 updates until 2014), Sweden

Source: (*‘Competence Framework for Firefighters’*, 2014)

Short description:

The Swedish system for fire and rescue services is decentralised. This means that every local fire chief is responsible for ensuring that his /her personnel have the necessary competences for handling potential incidents and contingencies within their geographical area. MSB provide the necessary training for fire fighters and their commanding officers. The courses and training programmes are developed incrementally. Input from research, incidents, learning developments of technology and techniques as well as from experts within MSB is used as a basis for this development. Hence, the course plan in itself represents a framework describing the needed competences and skills. There exists no tool for helping fire brigade commanders to match needs for competences with existing courses and training programmes.

CH6.D18. – Building Core Competences in CM through organisational Learning: The Case of the French Nuclear Power Producer (1999), France

Source: (Roux-Dufort & Metais, 1999b)

Short description:

In this approach, the authors take the case of the French nuclear industry to illustrate how the most powerful French electricity producer and supplier, EDF, had succeeded, for 20 years, in building a core competence in nuclear risk and CM.

CH6.D19. – IBERO – Instrument for assessment of preparedness with regard to geographic area responsibility (2006), Sweden

Source: (J. Eriksson & Juhl, 2012)

Short description:

IBERO is based on a database of stylised scenarios. The users select scenarios relevant for them and are supported by the tool in assessing their consequences in the particular area of responsibility and – more importantly in this context – the available CM capability in ten categories (seen as a mix of

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organisational and individual competences): detect, create situation picture, decide and lead, inform, communicate and collaborate, rescue/protect directly threatened individuals and objects, prevent further spread, care for those in need of help (beyond rescue/protection), take care of the deceased, recover.

CH6.20. – The National Education and Competence Framework for Advanced Critical Care Practitioners (2008), UK

Source: (DH/Skills for Health, 2008)

Short description:

This document describes: The role of an Advanced Critical Care Practitioner, how the role should function within the critical care team, the benefits of introducing the role in clinical practice and National Framework of Education and Competence for the role within recognised standards of practice. According to these descriptions competences are aligned to different career pathways and job activities in a systematic way.

CH6.D21. – Core Competences Framework (2011), UK

Source: (Beveridge, 2011)

Short description:

It has been the long term vision of the Emergency Planning Society to establish a documented set of competences for practitioners working in Emergency Management. The launch of this framework is the culmination of over 4 years work which has not only seen the development of the Emergency Planning Society Core Competences Framework but also the development of National Occupational Standards for Civil Protection.

CH6.D22. – Disaster Core Competences and guidelines for Hospital Personnel (2011), US

Source: (Florida Department of Health, 2011)

Short description:

This third version of Florida's Recommended Disaster Core Competences, reflects the latest in federal and state guidance and the current state of the art preparedness for Chemical, Biological, Radiological, Nuclear, and high-yield Explosive events (CBRNE). These guidelines support hospitals with planning for response to all hazards, determining job specific competences and training personnel. The disaster core competences are intended to establish a baseline of knowledge for all levels of hospital personnel.

CH6.D23. – Operational Competence – Preventing loss of life and injuries from emergency incidents while reducing risks within local communities (2012), UK

Source: (Skills for Fire & Rescue (SFJUK), 2012)

Short description:

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The solution first defines operational competence, and then looks at how National Occupational Standards (NOS) can be used to assess competence thereby reducing risk. Finally it explains how this approach could fit into a Quality Assurance (QA) framework for FRS.

CH6.D24 – Cultural Competences Curriculum for Disaster Preparedness and Crisis Response (2013), US

Source: (OMH's Think Cultural Health, 2012)

Short description:

A broad range of skills and competences are introduced in the curricula. The four courses provided are designed to equip disaster and crisis volunteers and personnel with the awareness, knowledge, and skills needed to provide culturally and linguistically appropriate services to diverse communities during all phases of disaster. This set of courses is designed to integrate knowledge, attitudes and skills related to cultural competences in order to help decrease racial and ethnic health care disparities brought on by disaster situations.

CH6.D25. – Firefighter/EMT Core Competences – County of Louisa, Department of Emergency Services, Virginia (2014), US

Source: (County of Louisa Department of Fire and EMS, 2014)

Short description:

The approach consists of a competence catalogue as a basis to identify, which competences are necessary to cope with different work tasks. Competences has been divided into distinct skill-sets including physical/technical expertise, public service, communication, teamwork and professionalism.

CH6.D26. – Civil Security and Competence Management for the fire brigades (2014), Belgium

Source:(Zivile Sicherheit (KCCE), 2014)

Short description:

Solution is a competence catalogue as a basis to identify, which competences are necessary to cope with different work tasks. Functional descriptions of work tasks included. Outcome: competence lexicon for firefighters.

CH6.D27. – CM Training Programs for Firefighters (2014), France

Source: (BFASC, n.d.)

Short description:

French firefighters training programs are described in different national reference guidelines. Each guideline describes the legislative framework, professions concerned by the training program and the different trainings units. Fourteen specialities and five technical guidelines are available. The guidelines are released by the Ministry of interior (direction defence and civil security) and target firefighters and HR units to educate firefighters. The guidelines focus at needs or competence gaps in

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terms of prevention, recognition and intervention in hazardous environment, intervention into underground sites, canyons, cynotechnic, forest fires, radiological risks, rescuing and clearing, water rescue, underwater rescue, chemical and biological risks, mountain rescue, rescue and protection from falling or manoeuvre during forest fires.

CH6.D28. – CM Training Programs for local government representatives (2014), France

Source: (HCFDC- Convention simplefíee de formation professionnelle, 2013)

Short description:

Organisations such as French Academy for Fire, Rescue and Civil Protection Officers (ENSOSP) or French High Committee for Civil Defence (HCFDC) organise training for local government representatives. These training programs focus, for example, at local government representatives understanding crisis situations, lead crisis with the application of communal backup plan (PCS) and to organise institutional communication during crisis situations. Another training program deals with local government representatives understanding French organisation of CM, how to develop a communal backup plan (PCS), local government representative responsibility, communal continuity of activity, communication during sensitive and crisis situation, human factors of CM and how to participate in a CM exercises.

CH6.D29. – Training programs at THW “Bundesschule” (2014), Germany (example provided by THW)

Source: (THW-Bundesschule, 2015)

Short description:

One of THW’s (Federal Agency for Technical Relief) most important tasks is to train its volunteers, preparing them as much as possible for all scenarios that they might face. That includes soft skills such as leadership, resolving interpersonal conflicts as well as hard skills such as handling equipment like chain saws, welding equipment, explosive agents or driving boats and vehicles in general. In order to ensure an agency-wide quality of education (standard operating procedures), THW established the “THW Federal School” (THW Bundesschule) with two branches (one in Hoya near Bremen and one in Neuhausen near Stuttgart) as well a training and education department (Referat E3). Sometimes, when a new activity/task is added to the THW performance spectrum, there is either no industry standard available that THW can refer to, or it has to adjust private sector guidelines to its needs and applications. Either way, this process requires a significant amount of time, effort and funds. In conclusion: 1) There is a constant need for new training programs. 2) Training programs have to be adjusted to ever changing technologies and altered laws. 3) It would be beneficial if the time span of setting up, developing and establishing new guidelines could be reduced. The THW Federal School also operates an e-learning portal.

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CH6.D30. – Training program for crisis managers (2014), Austria

Source: (Bundesministerium für Inneres, n.d.)

Short description:

Due to the structure of the SKKM (“Staatliches Krisen- und Katastrophenschutzmanagement” - “State Crisis and Disaster Management”) guidelines, there is a training program for crisis managers. This is split into three levels. This education covers a wide range of knowledge about communication (especially in crisis situations), leadership, relevant laws, humanitarian aid in disasters and catastrophes, psychosocial support in disasters, strategic planning, cartography, and conflict management. After completing the third level, the participants can choose between two specialisations: business management (organisational) or disaster management (operational).

CH6.D31. – Guidelines for the management of disaster operations (2007), Austria (example provided by ARC)

Source: (SKKM – Republik Österreich, 2006)

Short description:

The main part of the SKKM Guidelines is the “Management in disaster operations”. This chapter describes the frame of general remarks and the principles of management. The management organisation, procedure and several tools are integrated. One of the core principles – decision-making – is also explained. The chapter “Staff Work” includes the standardised collaboration of a group of persons, organised along division of labour principles and designated as staff, whose purpose is to assist and counsel the head of operations in the fulfilment of management tasks. To fulfil these tasks there is a command structure, which is guided by the head of operations. For working in this, structure and procedures there are standardised templates for documentation, information, decision-making and communication.

CH6.D32. – The Main School of Fire Service, Warsaw (2014), Poland

Source: (Faculty of Civil Safety Engineering (WIBC), 2014)

Short description:

The Main School of Fire Service (MSFS) is an academic facility of state services subordinate to the Minister of Internal Affairs. It educates the firefighters of the State Fire Service, officers of other services and guards, subordinate to the Minister of the Internal Affairs. MSFS also trains civilians. At the same time MSFS also enjoys the status of organisational unit of the State Fire Service operating on the basis of the Act on the State Fire Service of 24 August 1991. According to the act, the School provides cadet officers with the opportunity to serve as trainees in the School Rescue and Firefighting Unit. The School's mission is to train the most highly qualified staff in the following areas: natural disasters and social threats assessment, as well as life, health, property, and other values protection against those hazards. MSFS also aims at focusing on patriotic values, dedication to public service and respect for discipline in work and duties.

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CH6.D33. – Police Headquarters, Warsaw (2014), Poland

Source: (Warsaw Police Department, 2014)

Short description:

The Police is one of the most active entity within the field of both preparation and training dedicated to CM and providing security. It is also one of the unique bodies which provides its officers with comprehensive training strategy consisting of International exchanges of experiences; International internships; Pan-European training courses; Training session regarding operational skills, acquiring knowledge derived from Lessons learnt (LL) and psychology.

During the recent two years there was a significant number of international internships dedicated for Polish police officers. Especially active was the Anticrime Department, which participated in bilateral internships and mutual activities. There were also a number of internal courses and training sessions which were directed towards police officers from across the country.

CH6.D34. – Voivodeship Office, Poznan (2014), Poland

Source: ('Wielkopolska Voivodship Office in Poznan', 2014)

Short description:

The Voivodeship Office in Poznan fulfils the role of a regional government. One of its departments, Security and CM Department SCMD, is responsible for providing and maintaining security in case of emergency or crisis situations. They conduct training, evaluation and simulation sessions, mostly organised in prompt – after some need emerges. SCMD is obliged to enhance capabilities of the personnel, which includes training sessions, not provided with any guidelines, imposed by central government. An example is the Defence workout "KROKUS 2014" – organisation and functioning of the defence system at local and regional level, with special attention paid to mail and exchange information system. The scope of the workout was to enhance procedures, check out stored equipment and personnel knowledge, and prepare the CM personnel to properly react in case of emergency or crisis situation.

CH6.D35. – City Hall, Poznan (2014), Poland

Source: ('Poznań City Hall', 2014)

Short description:

Similarly to the Voivodeship Office, there is a Security and CM Department in Poznan City Hall. As they are independent entity, they set up their own CM strategies along with training and evaluation sessions. There is plenty of activities which are organised regularly and should be taken into account when considering CM training sessions. Those are:

- Detection and Alarm System Tests – based on launching sirens.
- CM simulation games dedicated towards the personnel of Security and CM Department (both man-made and natural disasters);
- Training session in the field with participation of Fires Brigades, Emergency Services and CM Centre.

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- Defence workouts to conduct proper actions and make best decisions in case of crisis situations regarding vital critical infrastructure;

CH6.D35. – Dutch competence profiles of functions in CM (2014), Netherlands

Source: (Nicolet C.M. Theunissen, 2014)

Short description:

The competences are based on information from the national programme GROOT/GROOTER. In this programme the IFV (Dutch Institute for Physical Safety) together with the Dutch Safety Regions, developed qualification profiles, training frameworks and models for the aptitude tests of prototypical functions in Population Care and Crisis Communication. To use this information for training purposes, competences were formulated and validated in three workshops with stakeholders in CM. The result is a Competency framework of 14 functions with about 12 core competences each. Competences have been divided into job oriented competences, social competences and personal competences.

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Appendix 4 – Special groups in CM (section 7)

Special group: high-level decision-makers

CH7.D1. – Multi Agency Gold Incident Command (MAGIC) Training – UK

Source: (MAGIC, 2015)

Short description:

MAGIC is created for strategic level participants from multi-agencies. It meets the requirement under the Civil Contingencies Act 2004 (Contingency Planning) Regulations 2005 for the carrying out of exercises and training of appropriate Category 1 staff with a role in dealing with major incidents at a strategic (Gold) level.

Learning goals:

MAGIC will assist delegates in developing their performance by providing an opportunity for them to be able to:

- Define the roles and responsibilities of different agencies during a major incident/ civil emergency
- Take strategic 'Gold' command of a major incident/ civil emergency
- Plan, implement and review civil contingency plans and multi-agency communication strategies

CH7.D2. – The Mayor Game – NL

Source: (Josine G M Van De Ven et al., 2012)

Short description:

De Burgemeestergame – The Mayor Game – The game provides strategic dilemma training for CM scenarios using a serious game format. The Mayor Game is available on internet and designed to be used for training policy makers. The learning goals are based on an expert group while the didactic background is based on self- directed learning, developing a self-directed learning attitude handling strategic dilemma's.

CH7.D5. – XVR Crisis Media – NL

Source: (XVR, 2001)

Short description:

It is crucial to properly cope with the (new) media. Evaluations of various disasters and crises show time and again that the information and communication in CM and disaster relief fails. The XVR Crisis Media module is an online platform that simulates not only the different media in a realistic way but also the reactions of citizens during incidents. By combining training with XVR Crisis Media with other XVR modules for operational, tactical and strategic levels, it is possible to exercise in an effective and innovative way when preparing for crises and incidents.

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Special group: collaboration of CM professionals and the general public

CH7.D6 - COMMUNITY-BASED COMPREHENSIVE RECOVERY - COBRACORE (EU)

Source: (COBRACORE, 2015)

Short description: To close the collaboration gaps between stakeholders involved in post-crisis recovery. A tool is designed to get information from the general public about the needed help.

Reason: When professionals and spontaneous volunteers work together, they focus on support of the casualties. This will help both groups to get grip on their needs, and thus will facilitate the collaboration.

CH7.D7 – Operationalising Psychosocial Support in Crisis - OPSIC (EU)

Source: (OPSIC, 2015)

Short description: Emergencies brought about by natural or man-made disasters can seriously affect entire populations with long-term psychosocial consequences impacting the survivors as well as the helpers for years to come. Providing psychosocial support to the affected population can alleviate suffering and help the process of healing and recovery.

To translate and apply evidence based guidelines on psychosocial support a guidance system for crisis managers via the internet is developed.

CH7.D8 – Psychosocial Centre of the Danish Red Cross (DK)

Source: (Psychosocial Support IFRC, 2015)

Short description:

The aim is to enable National Societies to understand, respond and utilize evidence based practice in meeting the psychosocial needs of vulnerable groups. Technical support, including assessment, training, support, monitoring and evaluations is key to integrating psychosocial care in (a) disaster preparedness and response (b) complex emergencies and refugee situations, (c) areas of community health, social welfare and youth. The strategic framework for the activities of the IFRC psychosocial programme for the coming five years (2016-20) is based on the May 2003 Federation Psychological Support Policy. This policy underlines the need for mainstreaming psychosocial support in the core programmes of the Federation and its National Societies and establishes the basis of Red Cross and Red Crescent interventions both in emergency response operations and in the implementation of long-term development programs.

CH7.D9 – Collaboration in an Emergency – complex encounters between different actors (SE)

Source: (MID Sweden University, 2015)

Short description:

A Swedish research project headed by Erna Danielsson at the Risk and Crisis centre, Mid Sweden University. Funded by the Swedish civil contingencies agency between 2008 and 2010. In this project,

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the interaction between four actors were studied: first responders, spontaneous volunteers, rescue services command centre, and volunteers. The results from this study indicate that the first responders and unaffiliated volunteers are always at the centre of the incident and sets the tone for how an incident is handled on-site. The study concludes that the two latter actors work in the periphery of a large incident, something that affects collaboration.

CH7.D10 – First response actors at emergencies (SE)

Source: (DIVA, 2011)

Short description:

The project is currently a pilot project for future studies in the field "New actors within response and rescue" project consists of a small initial theoretical and practical survey of the area. Participating actors are Swedish Larm Assistans AB, the Swedish Climbing Federation and Rescue Service in Söderköping. The project results are documented in CARER report no. 1.

CH7.D11 – Collaboration practices for safety, rescue and societal response (SE)

Source: (CARER, 2013)

Short description:

Collaboration practices in different settings are studied in order to find efficient and cost effective designs for cooperation in safety and security production. Case studies are carried out in the Södertörn Fire and Rescue Service, The Swedish Sea Rescue Society and The Swedish Maritime Administration, The Rescue services in Medelpad and Jämtlands Police Department in cooperation with Customs, County Council, Mountain Rescue and The Church of Sweden. The research project will be completed in the fall of 2013. For information please contact Rebecca Stenberg and Sofie Pilemalm.

CH7.D12 – Training for ice rescue in collaboration between the rescue services, the Swedish sea rescue society and voluntary leaders in an outdoor organisation (SE)

Source: (CARER, 2013)

Short description:

The project was carried out as an action learning development project, with the aim of training and evaluating cooperation; Detecting needs for development and develop collaborative training methods. The evaluation showed that collaborative practice functions well but also can be further developed by training, by knowledge sharing and by familiarity with the other actors' routines and work methods for ice rescue. The results of the evaluation will be used in further practice activities and in recommendations for collaborative training. The project was carried out in February 2013 and will have a follow up session in February 2014.

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CH7.D13 - INKA - Professionelle Integration von freiwilligen Helfern in Krisenmanagement und Katastrophenschutz (DE)

Source: (Vöge, Böttche, & Kühn, 2015)

Short description:

Aims to develop optimised solutions for the professional integration of volunteers in disaster prevention and CM. The expected results are guidelines which give specific action recommendations. And solutions for IT-supported coordination will be developed.

CH7.D14 – Baseline experiment on collaboration of fire brigade and incident by-standers (NL)

Source: (Veiligheidsregio IJsselland, 2015)

Short description:

Safety Region IJsselland: expert region with respect to self-help, self-reliance, and self-responsibility. Researches together with TNO the current state of the collaboration between professionals and bystanders. The expected results are “Gaps” in collaboration, focus areas for training of professionals.

CH7.D15 – National exercise Portugal (PT)

Source: (‘A TERRA TREME – National exercise Portugal’, 2015)

Short description: The awareness action promotes knowledge about what to do and not do in case of earthquake, through simple attitudes and affordable behaviours to most citizens, involving them, causing them to become active agents in the field of safety and security. A TERRA TREME (The Earth Shakes) is an exercise of preparation for the seismic risk to promote the information and the mobilization of civil society to adopt appropriate behaviours for self-protection in the event of an earthquake.

CH7.D16 – Role of On-the-Scene Bystanders and Survivors in Mass Casualties Incidents (IL)

Source: (Cole & Connell, 2012)

Short description: An idea develop by the Ben-Gurion University of the Negev and the Israeli Ministry of Health. The presentation was given at the NCRP conference. Bruria Adini developed sixteen functions that bystanders and survivors can perform: reporting an event, reconnaissance, assisting in the triage of casualties, caring for the walking wound just to list a few. We often underestimate what we are capable of doing in the moments of Mass Casualties Emergencies. She wrote a chapter about this in the book: Local Planning for Terror and Disaster. From Bioterrorism to Earthquakes from Leonard A. Cole, Nancy D. Connell.

CH7.D17 – Community Action for Disaster Response (CADRE) (Asian)

Source: (ADPC, 2014)

Short description: CADRE is developed by the Asian Disaster Preparedness Centre. The courses aims to enhance existing community response training by giving additional technical inputs on managing

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community multi-casualty incidents, Triage, and mitigation measures, community Incident command system, Light Search and rescue focusing on specific hazards of a specific community. Community First Responders in every event plays an important role in the Rescue chain. As in any chain, the strength and reliability of the system depends on that of each link; if one fails, the entire system will be compromised.

Resilience

CH7.D18 – Swedish frivilliga resursgrupp (Volunteer Resource Group) - FRG

Source: ('Frivilliga Resursgrupp (Swedish Volunteer Resource Group)', 2015)

Short description: A FRG consists of people from various NGOs. They have been recruited for their experience, education and personal capacities to cope with the tasks that the group may face.

The FRG is called in at the request of the City Council when something extraordinary happens, for example to help with evacuations, information, administrative and other practical information.

There are many different FRG's in Sweden.

CH7.D19. - UKs Local Resilience Forum –LRF

Source: (Cabinet Office UK, 2015)

Short description: Local resilience forums (LRFs) are multi-agency partnerships made up of representatives from local public services, including the emergency services, local authorities, the NHS, the Environment Agency and others. These agencies are known as Category 1 Responders, as defined by the Civil Contingencies Act.

CH7.D20. - Israeli Community Emergency Resilience Teams – CERT

Source: (FEMA, 2015)

Short description: The Community Emergency Response Team (CERT) concept was developed and implemented by the City of Los Angeles Fire Department (LAFD) in 1985. They recognised that citizens would very likely be on their own during the early stages of a catastrophic disaster. Building on this development, in 1994 the Federal Emergency Management Agency (FEMA) expanded the CERT materials to make them applicable to all hazards and made the program available to communities nationwide. The handbook can be downloaded from the FEMA-website. The idea of CERT is used in many different countries, for example in Israel, where a cross-border CERT-project is launched.

CH7.D21. - American Community Resilience System

Source: ('Community & Regional Resilience Institute (CARRI)', n.d.)

Short description: Community and Regional Resilience Institute (CARRI): strengthen any community or region's ability to prepare for, respond to, and rapidly recover from significant human caused or natural disaster with minimal downtime for the community.

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Appendix 5 – Definitions used in SP5

This Glossary contains the definitions of terminology used in this document. These terms are based on scientific literature from the domains relevant for the reports subject. A reference to the literature is given in the Comments column. Some of the definitions are also included in the D13.2 - Milestone Report 1: Subproject Experiment 2 Design (E. A. Eriksson, 2015) If not, they are labelled accordingly with not yet-D13.2. Some definitions are supplemented by a short discussion to provide the reader with some interesting background knowledge from the field. This discussion is put in italic.

DRIVER research terminology	CM	Definition	Comment
Affiliated volunteer		These volunteers are attached to a recognised voluntary agency that have trained them for disaster response and has a mechanism in place to address their use in an emergency.	(FEMA, 2006)
Best Practice		This encompasses the preferred actions in a specific type of situation to efficiently and effectively achieve a certain objective. Best Practice may be formalised in internal policy documents such as handbooks and standard operation procedures and could be based on one or several Lesson Identified/Lessons Learned approved by decision-makers.	(Nato, 2011b)
Competence		Competence is described as covering combinations of skills and knowledge.	(ISO, 2012)
Competence framework		A set of components that provide the foundations and conceptual arrangements for designing, implementing, monitoring, reviewing and continually improving competence management activities in a systematic way.	DRIVER SP5 working definition agreed by all partners during WP meeting

DRIVER research terminology	CM	Definition	Comment
Competence Management		Competence management means to relate competences to activities in certain tasks and situations and to differentiate by competence levels as well as to enable measurements on target and actual performance and according means for development whereas the organisation context has to be reflected.	(Stracke, 2009)
Content Management System (CMS)		CMS is an application (more likely web-based), that provides capabilities for multiple users with different permission levels to manage (all or a section of) content, data or information of a website project, or internet/intranet application. Managing content refers to creating, editing, archiving, publishing; collaborating on, reporting, distributing website content, data and information.	(Kohan, 2010)
Crisis		Situation with high level of uncertainty that disrupts the core activities and/or credibility of an organisation and requires urgent action. A crisis entails undesirable circumstances that perceived being characterised by substantial uncertainty, time pressure and threat to core values (variable, but for example health, safety, and in more severe circumstances death, etc.). A crisis can come out of any type of emergency and disaster and affords a substantial amount of discourse between crisis managers and community members as well as stakeholders.	(ISO, 2012) <i>See also "disaster" and "emergency"</i>
Crisis-management		Overall approach preventing crises that might occur, and managing challenges arising from a crisis. Often used in parallel with emergency or disaster management.	<i>See also "Emergency management"</i>

DRIVER research terminology	CM	Definition	Comment
Crisis- management professionals		Crisis-management professionals are considered people that received specialised educational training with the goal to deal with a major event that threatens to harm the general public.	
Crisis- management professional volunteers		Crisis-management professional volunteers are licensed or have a specialised skill. Professional volunteers include medical service providers such as physicians, nurses, emergency medical technicians, mental health professionals, lawyers, building contractors and inspectors, computer technicians, clergy, accountants, etc. These people may volunteer individually or as a group at a crisis scene.	(FEMA, 2006)
Crisis Readiness		Refers to the willingness of crisis managers' organisations, their teams as well as themselves as individuals/leaders when it comes to handling crisis situations.	not yet-D13.2 (Eckert, 2013b)
C3MC- label		The European Group on Training (EGT) provides certification of training courses in the field of civilian Crisis-management. A C3MC-label is awarded to courses that meet established standards and criteria for training civilian personnel to be deployed in Crisis-management missions.	not yet-D13.2 (European Group on Training, 2014)

DRIVER research terminology	CM	Definition	Comment
Disaster		Situation where widespread human, material, economic or environmental losses have occurred which exceeded the ability of the affected organisation, community or society to respond and recover using its own resources. Also, a disaster is a “serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources”.	<i>See also “crisis” & “emergency”</i> (ISO, 2012; UN-ISDR, 2009)
Ecology learning	of	Ecology of learning addresses micro (individual), meso (organisational) and macro (society) levels. Within this ecology of learning, five levels of influence are identified: M1: learner, M2: group, M3: organisation, M4: collection of organisations, and M5: country or collection of countries. – Interventions for learning should address the whole ecology of learning, which includes micro (individual), meso (organisational) and macro (society) levels, also called Multi-level interventions on learning.	not yet-D13.2 (van Gool et al., 2016)
Emergency		A crisis or emergency is a threatening condition that requires urgent action. Effective emergency action can avoid the escalation of an event into a disaster.	<i>See also “Crisis” and “Disaster”.</i> (ISO, 2012)

DRIVER research terminology	CM	Definition	Comment
Emergency management		The organisation and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps. Emergency management involves plans and institutional arrangements to engage and guide the efforts of government, non-government, voluntary and private agencies in comprehensive and coordinated ways to respond to the entire spectrum of emergency needs.	(UN-ISDR, 2009) <i>The expression “disaster management” is sometimes used instead of emergency management.</i>
Emergency management, The Four Phases of		<p><u>Prevention</u> – Preventing future emergencies or minimizing their effects. This includes all activities that prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable.</p> <p><u>Preparedness</u> – Preparing to handle an emergency includes plans made to save lives and to help response and rescue operations. Evacuation plans and stocking food and water are both examples of preparedness.</p> <p><u>Response</u> – Responding to an emergency includes actions taken to save lives and prevent further damage in an emergency. Response is putting the preparedness plans into action.</p> <p><u>Recovery</u> – Recovering after an emergency includes actions taken to return to a normal or an even safer situation following an emergency. Recovery includes getting financial assistance to help pay for the repairs.</p>	(UN-ISDR, 2009)

DRIVER research terminology	CM	Definition	Comment
Evaluation		<ul style="list-style-type: none"> (in common usage) <p>The process of determining the performance and/or impacts of a candidate application, usually in comparison to a reference case (existing situation or alternative applications), and usually including an experimental process based on real-life or other trials, often involving users. In the DRIVER context, it means a limited analysis on an emerging solution from the outcome of a single experimentation activity (related to assessment)".</p> <ul style="list-style-type: none"> (within the field of training and learning, in SP5) <p>To decide whether training/learning objectives were achieved (learning issues), and whether accomplishment of those objectives result in enhanced performance on the job (transfer issues).</p>	(Kraiger et al., 1993; 'Oxford Dictionaries Web', n.d.)
Exercise		An activity carried out for a specific purpose or a task set to practice or test a skill.	('Oxford Dictionaries Web', n.d.)
Gamification		the use of game thinking and game mechanics in non-game contexts to engage users in solving problems and increase users' self-contributions.	(Wikipedia Community, 2015)
High-level decision-makers			See Strategic decision-makers.
Instructional Design		<p>is the systematic process by which instructional materials are designed, developed, and delivered, creating "instructional experiences, which make the acquisition of knowledge and skill more efficient, effective, and appealing."</p> <p>Also called Instructional Systems Design (ISD), Educational Technology, or Curriculum Design</p>	<p>not yet-D13.2</p> <p>(Instructional Design Central, 2012; Merrill, Drake, Lacy, & Pratt, 1966)</p>

DRIVER research terminology	CM	Definition	Comment
Learning Analytics		Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs	not yet-D13.2 (LAK, 2011)
Learning Management System		refers to an integrated system that supports learners and teachers to deliver, use, manage, and track online trainings and education results. This type of system is used to plan, implement, and assess specific learning processes and courses. It provides context for giving collaborative learning particular meaning by offering a collection of communication and collaborative tools (including Web 2.0), which learners can use to assist, or be assisted by others. Its use can contribute directly or indirectly to learning and to the management of that learning	not yet-D13.2 (Mayes & De Freitas, 2004; TEL thesaurus, n.d.)
Lesson Identified		One or several Observation(s) that has/have been analysed and validated, i.e. the character, scope and importance of the observation has been determined together with suggestions for future actions regarding doctrine, organisation, training, materiel, leadership, personnel and/or facilities.	(Nato, 2011b)
Lesson Learned		A Lessons Identified that has been endorsed by appropriate people and implemented with verifiable results.	(Nato, 2011b)
Measurement		Consists of assigning numbers or labels to the units of analysis that accurately represent their position on the variables under study.	(Korb, 2012)

DRIVER research terminology	CM	Definition	Comment
Measurement instrument		A mechanism utilised to directly or indirectly measure, indicate, and/or monitor the value of an observed and/or controlled quantity. Such an instrument may also record these variations.	(Dictionary-of-Engineering, 2014)
Observation		An observed effect of an action (or inaction) in a specific situation. The observation could be both positive (a successful action) or negative (the action fails to achieve the intended objective). A preliminary observation may need to be developed further, e.g. through the collection of more information on the context.	Adapted from (Nato, 2011b)
Organisation		Person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives.	(ISO, 2012)
Preparation phase			See “Emergency management, The Four Phases of”.
Public		When a disaster strikes the public consists of the affected population, but also of persons who carry out significant relief efforts, both independently (helping themselves, relatives, neighbours and friends) and in support of relief agencies (as volunteers and upon request). Furthermore, the public plays a major role in crisis preparedness, for example as a source of funding and personnel, and – even more important – the public determines the legitimacy of official relief agencies.	(Stolk et al., 2012)

DRIVER research terminology	CM	Definition	Comment
Research Design		<p>In general, three basic designs are distinguished: Observational, Quasi-experimental and Experimental. There are two decision rules for separating these designs: (1) are the subjects randomly assigned to conditions? And (2) has the experimenter functional control over independent variable(s).</p> <p>1 yes+ 2 yes = experimental; 1 no + 2 yes = quasi experimental, 1 no + 2 no = observational.</p>	not yet-D13.2 (Campbell & Stanley, 1963)
Resilience		The ability of individuals, communities, organisations, or countries exposed to disasters [...] to: a) anticipate b) reduce the impact of, c) cope with d) and recover from the effects of adversity without compromising their long-term prospects.	(International Federation of Red Cross and Red Crescent Societies IFRC, 2012)
Response phase			See “Emergency management, The Four Phases of”.
Simulation Games		<p>Games used for the acquisition or exercise of different skills, to teach effective behaviour in the context of simulated conditions or situations.</p> <p>A simulation game is a learning method that helps to gain experience without any negative impact on reality. It enables the learner to carry out actions without fears or risk, that he could not carry out in reality, because their analysis will be too slow, too fast, too expensive, too complex or too dangerous. Its use is suitable where tasks with many factors and variable have to be trained, especially in emergency and business management</p>	(Korteling et al., 2013; Ruohmäki, 1995)
Skill		Ability to apply knowledge and use know-how to complete tasks and solve problems.	(Cedefop: Terminology of European education and training policy. A selection of 130 key terms., 2014)

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DRIVER research terminology	CM	Definition	Comment
Spontaneous volunteer		These are people who volunteer in the immediate aftermath of a disaster or an emergency. They may be skilled or unskilled and may be from the affected area or from outside the area. Channelling spontaneous volunteers presents special management challenges.	(FEMA, 2006)
Strategic decision		A decision that has a societal cross – cutting impact, with wide impact on large parts of the society and its activities, deals with important values, sometimes when the values compete one with the other. Decisions that have important impact on the society, some of them are adverse, and that deal with a time frame of many hours to weeks (usually when it comes to the impact of the decision).	(Eisenhardt & Zbaracki, 1992)
Strategic decision maker		The individual who has the power and is tasked to take a strategic decision. These are elected officials, and high ranking personnel in response organisations / relevant authorities / agencies tasked with the response to the crisis.	DRIVER SP5 working definition agreed by all partners during WP meeting. Sometimes also mentioned as “ <i>High-level decision maker</i> ”. It was identified that the scope of “ <i>strategic decisions</i> ” and the persons who take them differ greatly across systems. In Sweden, “ <i>strategic decisions</i> ” are taken only by the elected officials, and their aim is to provide the “ <i>aims and ambitions</i> ” (“ <i>direction</i> ”) along with the resource allocation. These are by definition very “ <i>high level</i> ” decisions. All the other decisions (taken by those tasked with the implementation of the ambitions are considered “ <i>operational</i> ”. In other systems, this is not the case.

DRIVER research terminology	CM	Definition	Comment																				
Table exercises	top	Definition: A tabletop exercise is an activity in which key personnel assigned emergency management roles and responsibilities are gathered to discuss, in a non-threatening environment, various simulated emergency situations.	(Police university of Wisconsin, 2012)																				
Technology Readiness Level		Technology readiness levels (TRLs) are measures used to assess the maturity of evolving technologies (devices, materials, components, software, work processes, etc.) during their development and in some cases during early operations. Generally speaking, when a new technology is first invented or conceptualised, it is not suitable for immediate application. Instead, new technologies are usually subjected to experimentation, refinement, and increasingly realistic testing. Once the technology is sufficiently proven, it can be incorporated into a system/subsystem.	(European Commission, 2014)																				
		<table><tr><th>TRL</th><th>Description</th></tr><tr><td>TRL 1.</td><td>basic principles observed</td></tr><tr><td>TRL 2.</td><td>technology concept formulated</td></tr><tr><td>TRL 3.</td><td>experimental proof of concept</td></tr><tr><td>TRL 4.</td><td>technology validated in lab</td></tr><tr><td>TRL 5.</td><td>technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)</td></tr><tr><td>TRL 6.</td><td>technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)</td></tr><tr><td>TRL 7.</td><td>system prototype demonstration in operational environment</td></tr><tr><td>TRL 8.</td><td>system complete and qualified</td></tr><tr><td>TRL 9.</td><td>actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)</td></tr></table> <p>Table 3: Workshop Participants</p>		TRL	Description	TRL 1.	basic principles observed	TRL 2.	technology concept formulated	TRL 3.	experimental proof of concept	TRL 4.	technology validated in lab	TRL 5.	technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)	TRL 6.	technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)	TRL 7.	system prototype demonstration in operational environment	TRL 8.	system complete and qualified	TRL 9.	actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)
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Transfer Gaming	of	The degree to which knowledge, skills and attitudes that are acquired by playing a game can be used effectively in the real workplace	(Korteling et al., 2013)																				

DRIVER research terminology	CM	Definition	Comment
Transfer Training	of	The degree to which trainees effectively apply the knowledge, skills and attitudes gained in a training context to the job	(Baldwin & Ford, 1988)
Training		Activities designed to facilitate the learning and development of knowledge, skills, and abilities, and to improve the performance of specific tasks or roles.	(ISO, 2012)
Volunteer		A person who willingly provides, at all stages of a crisis, services, without concern for financial gain which are for the benefit of others.	
Volunteering		Volunteering is generally considered an altruistic activity and is intended to promote goodness or improve human quality of life. In return, this activity can produce a feeling of self-worth and respect. There is no financial gain involved for the individual. Volunteering is also renowned for skill development, socialization, and fun. Volunteering may have positive benefits for the volunteer as well as for the person or community served. It is also intended to make contacts for possible employment. It is helping, assisting, or serving another person or persons without pay. Many volunteers are specifically trained in the areas they work, such as medicine, education, or emergency rescue. Others serve on an as-needed basis, such as in response to a natural disaster.	Volunteers, Professional – See Professional volunteers Volunteers, Spontaneous – See Spontaneous volunteers (European Commission, 2014; Wikipedia Community, n.d.)

Table 4: Definitions used in SP5 and in this report

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