Driving Innovation in Crisis Management for ***E***uropean ***R***esilience

D530.1 - Lessons Learned Framework Concept

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Lead Participant	TNO	Lead Author	Dirk Stolk
Contributors	Martijn van Emmerik, Pär Eriksson, and Dennis Andersson	Reviewers	Marcel van Berlo

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Document Information

List of Contributors	
Name	Partner
Pär Eriksson	FOI
Dennis Andersson	FOI
Karin Hamann	FHG-IAO
Alexander Karapidis	FHG-IAO
Bernd Dworschak	FHG-IAO
Richelle van Rijk	TNO
Josine van de Ven	TNO
Heather Griffioen-Young	TNO
Martijn van Emmerik	TNO
Dirk Stolk	TNO
Marianne Stålheim	MSB
Maciej Szulejewski	ITTI
António Chagas	EDI
Eric Rigaud	ARMINES
Chaim Rafalowski	MDA
Itamar Laist	MDA
Gracia Joyanes	EUSC

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List of Acronyms

Abbreviation / acronym	Description
CFSP	Common Foreign and Security Policy
CMPD	Crisis Management and Planning Directorate
CoP	Community of Practice
CRM	Crew Resource Management
CPM	Civil Protection Mechanism
CPCC	Civilian Planning and Conduct Capability
CSDP	Common Security and Defence Policy
DG ECHO	Directorate-General Humanitarian Aid and Civil Protection
DRIVER	DRIVing innovation in European cRisis management
EDA	European Defence Agency
EEAS	European External Action Service
ELMA	EUMS Lessons Learned Management Application
EUMS	European Union Military Staff
EUSD	European Union Satellite Centre
FEMA	(US) Federal Emergency Management Agence
IAEA	International Atomic Energy Agency
JALLC	(NATO) Joint Analysis and Lessons Learned Centre
JIT	Just In Time
LL	Lessons Learned
LLF	Lessons Learned Framework
LLP	Lessons Learned Process
MARS	Major Accident Reporting System
NLL	Naturalistic Lessons Learned
OECD/DAC	The Organisation for Economic Co-operation and Development/Development Assistance Committee
SOTA	State of the Art
STRADA	Swedish Traffic Accident Data Acquisition
X-BSP	Cross-border, cross-sector, cross-phase

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.

Executive Summary

This report investigates the outlined research questions and synthesises findings in the form of a proposed framework for lessons learned management in crisis management. In addition, the report also starts the development of methods for the collection, analysis and dissemination of lessons.[1]

The main objective of this deliverable is to design a harmonised Lessons Learned Framework (LLF), with the aim to increase the efficiency of crisis management in Europe. It furthermore starts the development of methods for the collection, analysis and dissemination of lessons. The deliverable represents the first step in addressing the ACRIMAS gap *sharing and implementing lessons and best practices*.

In this deliverable, the main motives for lessons learned in crisis management are analysed together with the main gaps and challenges, including the challenges to cross-border and cross-sector sharing of lessons. The results are used to outline a Lessons Learned Framework, meant to function as an architecture for the development of processes and systems for lessons learned in different types of organisations, acknowledging the differences in their roles, organisational structures and cultures. Furthermore, an example of how the LLF can be adapted to the context of crisis management in Europe is proposed (DRIVER+ LLF demonstrator or prototype).

The current work takes its starting point from previous research on organisational learning. *Lessons learned* are defined as the structured production and application of experience-based knowledge to develop and improve doctrine, organisation, training, materiel, leadership, personnel and facilities to achieve more efficient and effective operations. It is noted that there exists no common comprehensive understanding of, or approach to, the collection, analysis, dissemination and implementation of lessons learned.

More than 40 interviews and 35 questionnaire responses, together with desk research and workshops, are used to investigate the views of the end-users on lessons learned. This include the gaps and needs as well as requirements on lessons learned processes. The results show that most respondents do see a need for lessons learned processes, but that very few have such well-functioning processes in their organisations. In most cases the existing processes are incident reporting, often ad-hoc, and with hardly any structured analysis. Among the most important gaps identified, apart from the overall lack of lessons learned processes, were the lack of flows of cross-border and cross-sector lessons, weak implementation, and a lack of simple and easy-to-use lessons learned systems.

It is also noted from the interviews that few lessons seem to be shared through databases or written statements. Instead most respondents view lessons learned (collecting, analysing, disseminating and sharing) as a collaborative and interactive process, internally as well as externally, taking place in joint case studies, after action reviews, high-level meetings and seminars. The analysis also shows that few organisations had explicit processes for defining and prioritising their needs for lessons, meaning that there is little direction of the process.

The differences between countries, sectors and actors regarding culture, organisation, legal framework etc. mean that it is unlikely that a lesson's learned process that strives to handle all types

[1] T53.2 in the DRIVER project.

of lessons from all types of sectors, phases and crises, would be successful. However, most organisations (in most sectors and at all levels) are thought to need experiential learning and these needs are furthermore in many cases interdependent. This calls for a common approach to the collection, analysis and dissemination of lessons and means that a Lessons Learned Framework must be at once general enough to allow for the inclusion of all these different perspectives and specific enough to be of real, practical use. Such a common approach will not only support cross-sector and cross-border learning which would improve the efficiency of crisis management in Europe. It could also, in the long run, help the development of an increased communality within sectors, between sectors and between countries regarding procedures, technologies and terminologies for crisis management.

The needs and preconditions for cross-border and cross-sector lessons learned are analysed. It is noted that not all lessons need to be shared in the same way. The types of lessons of specific importance to share cross-border and cross-sector are identified together with several contextual and other factors that will complicate such sharing. Furthermore, the needs and preconditions for directing the lessons learned process are analysed and an approach such a directing process is proposed.

The resulting LLF consists of a definition of its role, an ontology, an overarching approach, with outlined sub-processes, and a specification of tools. It is proposed that the lessons learned process could both be as a system-of-systems process, in which different organisations at different levels (local, regional, national, multinational) collect, analyse and, on a voluntary basis, share lessons with each other, or a joint process in which several actors combine their resources to collect and analyse lessons from a specific incident. The latter is foreseen to be used primarily in large-scale incidents, when multiple perspectives are necessary for both lessons collection and analysis. Important for the functionality of a LLF is the existence of sponsors at different levels, with the responsibility for developing the framework as well as offering arenas (physical, digital and printed) for collaboration.

It is furthermore proposed that in a European context DG ECHO, with its Civil Protection Mechanism, should be the leading sponsor of the lessons learned process. It is furthermore suggested that there should be both a geographical perspective and a sectorial/branch perspective in the system-of-systems of processes for the collection, analysis, dissemination and implementation of lessons learned.

As the next step the LLF will be used as a basis for the identification and adaption of tools that will be tested, together with the methodologies proposed in this deliverable, in upcoming DRIVER experiments using a simulated crisis. The methodology and tools will then be included in the DRIVER portfolio of solutions, and included in the Joint Experiments and Final Demonstration. However, to further develop the LLF it is also proposed to go live with the methodology on one or several well-defined crisis management sectors, involving, apart from sectorial organisations, both the EU-level and two or more Member States. To support this activity also a demonstrator or prototype tool – the so-called DRIVER+ LLF – has been developed.

1 Introduction

An organisation that is incapable of learning from experience – be it its own or someone else's – is bound to repeat failure.[2] This is true also for crisis management, where the complexity of crisis and the diversity of crisis management systems introduce so many factors that people generally cannot oversee them all. Therefore, learning from past events is vital. In fact, lessons learned and best practices need to be integral parts of any structure for training and learning in crisis management.

The DRIVER[3] Work Package *Lessons Learned Framework for Crisis Management* (Work Package 530 or WP530) is tasked with developing *an overall concept for the application of Lessons Learned in crisis management in Europe* and will be based on three sources of information:

1. an analysis of needs and gaps in current systems
2. end-user input and
3. current research

The aim is to develop a framework that is useful to a wide variety of organisations, with different roles and characteristics, when developing internal and collaborative processes for the collection, analysis, dissemination and implementation of lessons (hereafter referred to as *lessons learned processes*). The framework should also help the development of a common view among crisis management organisations regarding the role and function of lessons learned in crisis management.

In the remainder of this chapter, the rationale for learning from experience is explained: why should we use lessons learned in crisis management and more specific, why do we need a harmonized framework at all? In the next chapter we demonstrate why current attempts to implement 'lessons learned' often fail by giving a state of the art overview of available frameworks. We continue by sketching the pitfalls and possible challenges for any framework in Chapter 3 before we move on to present our vision on the lessons learned framework: Chapter 4 contains an ontology and overarching approach on the basis of which we sketch the architecture of a system to support the process in Chapter 5. In the concluding chapter we share our thoughts on implementing and practical use.

Part of the research presented in this deliverable was presented in a paper (Andersson & Eriksson, 2015) at the TIEMS (*The International Emergency Management Society*) 2015 conference in Rome, where it won the best academic paper reward.

1.1 Lessons learned – concepts and definitions

In the report on the *State of the Art for Training and Learning* (DRIVER, 2014) it was noted that no single and comprehensive approach to lessons learned in crisis management exists. As a matter of fact, there does not even exist a common understanding of the meaning and role of lessons learned and the lessons learned processes.

[2] "Those who cannot remember the past are condemned to repeat it." (Santanyana, 1980).
[3] *Driving Innovation in crisis management for European Resilience*.

This lack of a common understanding has been further examined in the current work and can partly be seen as an effect of a non-agreement upon definitions of concepts such as *knowledge*, *knowledge management* and *organisational learning*. The comprehension of the term *knowledge* is divided with one view regarding it as almost tangible objects that can be distributed just-in-time, and another regarding knowledge and organisational learning as a process (Jonsson 2012, p. 52f).

In this report, based on the research of Argyris and Schön (1996), *knowledge* is seen as stored in internal documents, in policies and in social and physical structures, as well as in best practices, in organisational stories and in a common view on how things are done. When the reality no longer can be explained using this knowledge, a search for new knowledge and new models begins.

Knowledge can be created in a continuous exchange of impressions and observations between individuals and the organisation, described as *mutual learning* (March, 1991). While an organisation learns through its members, accumulating knowledge in norms, rules and forms, the members are in turn socialised into the knowledge context of the organisation.

Learning can be single-loop, static within the existing norms and values, or double-loop, involving a change of these norms and values (Argyris and Schön, 1996). Finally, *externalisation* and *socialisation* (Nonaka, 1991) are two important processes to make 'silent' knowledge available and to achieve both formal and informal sharing. This topic is elaborated on in Section 2.6.

The concepts of *lessons learned* and *best practices* are not well defined. Several processes and methods can be viewed as working with elements of lessons learned, or to be a part of a wider experience-based process, for example, research, evaluations, after-action reviews, or serious gaming. Different approaches developed mainly for the improvement of production processes and standardised services, such as the well-known Japanese concepts of Lean and Kaizen could also be methods for collecting and implementing experience.

In this deliverable, definitions of lessons learned and related terms, will mainly build on definitions used by EU and NATO.

Working with observations and lessons, characteristics such as their significance, validity and applicability are vital, together with an understanding of each observation's/lesson's contextual preconditions. The existence of several challenges (or *traps*, using the terminology of Levinthal and March, 1993, cf. Sections 2.5, 2.8) in the use of lessons, and the need to balance exploration and exploitation in knowledge development, furthermore means that lessons learned are not always the answer. For instance, when addressing completely new challenges, it is not always evident that the remedies are to be found in the pool of existing experiences.

The *lessons learned process* is in this report defined as the structured production and application of experience based knowledge to develop and/or improve doctrine, organisation, training, materiel, leadership, personnel and facilities in order to achieve more efficient and effective operations. The process consists of several steps: Direction of the process (deciding what types of lessons to look for and what resources to use), collection, processing, analysis, validation, sharing/disseminating and implementation (cf. Section 2.8).

Each organisation must identify its own unique needs for lessons and experiential learning, which in turn will affect what types of lessons it will be searching for and even what can be regarded as a lessons

learned. For instance, an organisation with a strong focus on production may emphasise continuous and incremental improvement of the production process. This will in many cases lead to the search for tangible experiences such as changes in the production sequence. A knowledge-based organisation, on the other hand, may emphasise improvement of the learning processes rather than the explicit accumulation of factual knowledge. Furthermore, a private company, such as a telecom operator, may have a different set of incentives for lessons learned than a public agency, including for instance profit maximisation and brand management.

In some organisations, the lessons learned process is basically bottom-up, like the classic *suggestion box* where all employees are encouraged to submit their observations. In other organisations, lessons learned is a top-down process, driven by needs defined by decision-makers. However, already in the definition of the DRIVER project (Seventh Framework Programme, 2013) it was decided to use a top-down perspective, without ruling out a bottom-up flow of observations. The main motive was that this would be a more cost-efficient way to go about lessons learned, focusing on those lessons that are needed. The price to pay is that some of the breadth in the observations and lessons reported will be lost. The answers will primarily relate to known questions, and to a lesser extent to those questions not yet asked.

As will become clear, from the 45 interviews in Chapter 2, it is obvious that many organisations involved in crisis management primarily see lessons learned as a process focused on *incident management*. In some cases, such as the telecom sector and the rescue services, this is partly a result of existing laws and regulations. In other cases, such as the food sector, product quality and brand management also play considerable roles (cf. Section 2.2).

1.2 Why lessons learned in crisis management?

Crisis management can be divided into five main phases: risk assessment, mitigation and prevention, preparedness, response and recovery (Boin et al, 2010). A *crisis* is defined as a situation with high level of uncertainty that disrupts the core activities and/or credibility of an organisation and requires urgent action.[4] In these situations the decision-making, dealing with this high level of uncertainty, is furthermore often carried out under severe time constraints (Sundelius et al, 1997).

Failure to learn from experience may result in costs, in economic terms as well as in loss of lives. If this does not provide sufficient motivation, the accountability of decision makers can further increase the interest in learning from experience (Stern, 2002; Popper & Lipshitz, 2005, p. 45). Inability to make use of available lessons could literally end careers and may even lead to imprisonment as demonstrated by the trial against six Italian scientists failing to predict the 2009 L'Aquila earthquake. They were only cleared from a six-year prison sentence before an appeal court in 2014[5].

Lessons in the crisis management context can be categorised as strategic, tactical and operational (ELITE, 2013)[6]. Nevertheless, a particular lesson may have operational as well as strategical relevance. This will partly depend on what the organisation wants to learn. Lessons may be focussed externally

[4] ISO 22300, www.iso.org/obp/ui/#iso:std:56199:en

[5] https://www.nature.com/news/italian-seismologists-cleared-of-manslaughter-1.16313

[6] These are the business world terms which will be used in the rest of this deliverable. In the military world the order would be strategic, operational and tactical/technical.

(i.e. on types of crises, risks, threats and antagonists that the organisation may have to face). Lessons may also be focussed on the internal processes of the organisations such as approaches, methods, organisation and technology used to deal with a crisis situation.

Crisis management operations, especially large-scale crisis management operations, are also complex endeavours, involving several different, but interdependent actors, active at different levels (local, regional, national, and multinational) in the crisis management system and distributed over various locations. During a crisis, these actors often must handle rare events. The importance in sharing and using available lessons from rare events in a pan-European arena is therefore underlined.

Crisis management organisations routinely operate in dynamic and uncertain environments. In this context, decision making is known to rely more on prior experience (Klein, 2008; Weick, 1993), and less on analytical expertise. Lessons learned can therefore be crucial to such organisations in order to facilitate and speed up the decision making process.

Learning from rare, extraordinary events in these types of organisations is not necessarily about repetitive training; it is also about situation assessment, recognition, and sense making (Deverell, 2012; Endsley, 1997; Weick, 1988). Such learning is typically simulation-based, scenario-based or field-based and aimed specifically at increasing the learners' experience pool, for example through apprenticeship and observation of stereotypical events (Andersson, 2014).

1.3 Why a harmonised Lessons Learned Framework for crisis management?

Many organisations, public and private, involved in crisis management have some process(es) and system(s) for handling experiences (observations and lessons). The purpose of these processes varies: fulfilling regulatory demands, protecting business interests and improving the crisis management capability. However, few of these processes are well-functioning. However, the exchange of lessons between organisations, across sectors, and across national borders, was considered as being quite weak (cf. Section 3.3).

Crisis management is often conducted simultaneously, and interdependently, by several organisations active in different societal sectors and at different levels (local, regional, national and multinational). These interdependencies mean that lessons collected and analysed in one organisation may be of interest to others. To be able to exchange lessons between organisations from different sectors and at different levels calls for a comprehensive Lessons Learned Framework that supports sharing these lessons between different contexts.

Existing examples of well-functioning systems and processes are in many cases customised systems designed for a specific task and with a narrow focus: a safety reporting system in a high-risk production sector (Rossignol, 2015) or an incident handling system within an air force (Renborg et al, 2007). Although it would be wrong to say that the narrow scope is the sole explanation for their relative successes[7], it is safe to say that it generates some advantages. For instance, a narrow scope combined

[7] For instance, both examples deal with issues that have potentially grave consequences creating strong incentives for using them. Furthermore, tradition and internal culture may be other important factors increasing

with a homogenous group of individuals that reports observations, and a dedicated group of experts that analyse the information will likely improve the chances of high-quality and relevant lessons.

It seems unlikely that a lessons learned process which strives to handle all types of lessons from all types of sectors, phases and crises, would be successful. Although this means that there could be no *one size fits all solution*, most organisations (in most sectors and at all levels) are thought to need experiential learning. These needs are furthermore not independent from each other (cf. Chapter 3).

This calls for a common approach to the collection, analysis and dissemination of lessons and implies that a Lessons Learned Framework must be both general enough to allow for the inclusion of all these different perspectives as well as specific enough to be of real, practical use. The approach of the LLF must ensure some level of generalisability and transferability.

Such a common approach could not only support cross-sector and cross-border learning which would improve the efficiency of crisis management in Europe. It could also, in the long run, help the development of an increased communality within sectors, between sectors and between countries regarding procedures, technologies and terminologies for crisis management. This could increase the ability to carry out joint crisis management operations.

1.4 Objectives and research questions

The overall objective of this deliverable[8] therefore, is to design a generic harmonised Lessons Learned Framework (LLF) where inter-organisational Lessons Learned are collected and categorised. Such a framework should be able to accommodate for differences between national crisis management systems, organisational cultures, organisational types et cetera (Chapter 4) in order to increase the efficiency of crisis management in Europe.

The LLF is a *conceptual* framework, meant to help unifying efforts between organisations, member states and sectors in the development and application of processes and methods for the description of lessons learned. Such a common ground would then increase the ability to cooperate on lessons learned across organisational, geographical, and sectorial borders. The LLF is not in itself a ready to use process or system for lessons learned, although parts of it could be used as such; rather it is an architecture to be used in the development of processes and systems for lessons learned management, specific to organisations and member states.

In DRIVER+, the conceptual LLF will be further operationalized as part of the Guidance methodology to be developed in SP92 (Test-bed). This Guidance methodology will support crisis management practitioners in designing, developing, conducting and evaluating trials. This methodology will be implemented in the Portfolio of Solutions. Following a CD&E approach, the collection of lessons learned and defining the next step (which may be a next trial, but also the implementation of a lesson learned) is of crucial importance. During the course of DRIVER+, four trials and a final demonstration will be organized during which the Guidance methodology will be applied, evaluated, and updated.

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the willingness both to fill the systems with information and to use this information, in spite of potentially challenging factors such as confidentiality, information sensitivity, politics, etc.

[8] T53.1 in the DRIVER project.

A full-scale test of the LLF, however, would require full adaptation of the LLF for at least one, preferably several, complete crisis management sector(s). Such an adaptation is a grand task that lies outside of the scope of DRIVER+.

To arrive at an LLF the current report identified four sub-tasks from the DRIVER Description of Work (DRIVER, 2013, p. 118). These are given below and specified in terms of research questions.

The first sub-task and its research questions are addressed in **Chapter 2** (*User needs for a Lessons Learned Framework*).

1) identify the gaps in current LL systems/processes and scope the needs,
    a) what needs for lessons learned, and lessons learned processes, do users identify?
    b) what processes/systems for lessons learned in crisis management already exist?
    c) what are the gaps in the existing systems/processes for lessons learned (within organisations and in the crisis management system holistically)?

The second sub-task and its research questions are addressed in **Chapter 3** (*From challenges to perspective*), supported by the research presented in **Annex 2** (*Cross-border, Cross-sector and Cross-phase Lessons learned in Crisis Management*).

2) determine the main obstructions to learning from others in a cross-border, cross-sector and cross-phase (X-BSP) EU context,
    a) what are the main characteristics of cross-border, cross-sector and cross-phase lessons learned in the EU civilian crisis management context?
    b) what challenges do cross-border, cross-sector and cross-phase lessons learned present to the LLF?

The third sub-task and its research questions are mainly addressed in **Chapter 4** (*Features of an LLF for Crisis Management*) and **Annex 3** (*Functional User Interface*), and the conclusions are used in the design of the LLF in **Chapter 4** and **Chapter 5** (*DRIVE+ LLF*).

3) design and develop an interface and interaction method for the LLF based on the above and on an analysis of the needs of different user groups, helping different groups find relevant lessons,
    a) what meta-information must be included in the lessons?
    b) how can you stimulate information sharing?
    c) what role do humans play in the lessons learned process?

The fourth sub-task and its research questions are mainly addressed in **Annex 4** (*Processes for Defining and Prioritising Needs for Lessons Learned*), and the conclusions are used in the design of the LLF in **Chapter 3** (*From challenges to perspective*) and **Chapter 4** (*Features of an LLF for Crisis Management*).

4) design a process for decision-makers to define and prioritise their needs for Lessons Learned.
    a) what are the needs for decision-makers to direct and prioritise the lessons learned process?
    b) how should such a process be designed, and who should be included?

In addition, to be able to design the LLF, we recognized the necessity to analyse the general challenges of the lessons learned process, and different perspectives that can be applied. This is done in **Chapter 3** (*From challenges to perspective*), and the results are used throughout the main document.

1.5 Report structure

In the Description of Work (DRIVER, 2013, p. 118) it was stated that work package 53, Lessons Learned Framework for Crisis Management, should as a first step develop an overall concept for Lessons Learned in CM in Europe. The development of the LLF concept was to be based on both a theoretical approach and on input from practitioners and end-users.

The work presented in this deliverable hence rests on three principal sources of information:

- A state-of-the-art (SOTA) literature search (DRIVER, 2014) .
- A series of interviews and questionnaires with end-users and experts from different parts of Europe regarding lessons learned for crisis management, carried out January to May 2015.
- Two seminars (April and June 2015) with respondents representing decision-makers and end-users.

This report consists of a main document and describing the LLF and its theoretical foundation, and the Annexes 1 to 6. After this introductory chapter that explains the motives for a Lessons Learned Framework for crisis management, Chapter 2 establishes a baseline consisting of end-user needs, existing systems and processes, and previous research. Chapter 3 (From c*hallenge to perspective*) expands on the challenges to lessons learned, especially in crisis management and proposes some solutions and perspectives. The 4th chapter (*Features of an LLF for Crisis Management*) contains the proposal for a Lessons Learned Framework that is elaborated on with a demonstrator (or prototype) in Chapter 5. The final chapter, Chapter 6, summarises the conclusions and offers suggestions on how to start the implementation of the LLF.

Annex 1 (*EU LL Processes and Structures*) discusses existing lessons learned processes in the European Union. Annex 2 (*Cross-border, Cross-sector and Cross-phase Lessons learned in Crisis Management)* analyses the cross-border, cross-sector and cross-phase aspects of lessons learned in crisis management. Annex 3 (*Functional User Interface*) discusses a functional interface and the role of the human in the lessons learned process. Annex 4 (*Processes for Defining and Prioritising Needs for Lessons Learned*) analyses the preconditions for defining and prioritising the needs for lessons learned and proposes a process for this. Finally, Annexes 5 and 6 present the interviews and questionnaires.

2 User needs for a Lessons Learned Framework

This chapter describes the steps towards a generic harmonised Lessons Learned Framework (LLF) where inter-organisational Lessons Learned are collected and categorised. We start this chapter taking stock of user needs for lessons learned in crisis management. Following that we pick up on a discussion about the challenges and perspectives for an LLF that follow from these needs. As such, this chapter is mainly concerned with subtask 1, and research questions a, b and c, as defined in Section 1.4:

1) identify the gaps in current LL systems/processes and scope the needs,
    a) what needs for lessons learned, and lessons learned processes, are identified by the users?
    b) what processes/systems for lessons learned in crisis management exist already today?
    c) what are the gaps in the existing systems/processes for lessons learned and in the overall crisis management lessons learned processes?

Main sources for this goal are the State Of The Art (SOTA) analysis for DRIVER SP5, *Training and Learning*, in which insights from recent literature including previous FP7 projects such as ACRIMAS, CRISYS and ELITE helped to identify the available processes, methods and tools for lessons learned analysis (DRIVER, 2014). Additionally, in the context of DRIVER Work Package 530 (WP530), *Lessons Learned Framework for Crisis Management*, a series of 45 interviews has been carried out with representatives from public and private organisations involved in crisis management. The overarching objectives of the interviews were to identify in what way these organisations work with lessons learned, especially for crisis management, and how they would like to develop these processes. Furthermore, two workshops have contributed to this chapter: The SP5 SOTA workshop in October 2014 and WP53 workshop on the interview results in April 2015. Both workshops included external experts/practitioners and gave further insights into the current situation regarding lessons learned processes.

2.1 Previous research

In the State of the Art analysis for Training and learning it was noted that there have been only a few research projects dealing with lessons learned processes for crisis management. However, lessons learned have been underlined as important in EU FP7 projects such as ACRIMAS (*Aftermath Crisis Management System-of-systems Demonstration*), CRYSIS (*Critical Response In Security and Safety Emergencies*) and ELITE (*Elicit to Learn Crucial Post-Crisis Lessons*).

Of these, ACRIMAS and CRYSIS mainly highlighted the needs for lessons learned on a conceptual level while ELITE had a more practically approach, collecting and categorising lessons from different types of emergencies as well as developing and testing a wiki-solution for storing and presenting the information. The ELITE project also showed on some of the inherent difficulties in lessons learned, including the challenge in creating a lessons learned process that is able to deliver the information that you need, when you need it. In a dynamic setting, the up-to-date information may very well be reached

faster and more efficiently through other channels such as personal contacts or internet search engines (ELITE, 2014).

2.1.1 Existing methods and resources

Looking at the existing systems for lessons learned in crisis management, the SOTA concluded that although many organisations do have processes for lessons learned, "few seem to have a well-functioning, systematic and continuous process". Most of the studied lessons learned systems were bottom-up, and in many cases users felt that the processes and systems had difficulties in meeting the challenge of disseminating meaningful lessons. Furthermore, in multinational organisations, the validation of lessons could be politicised, leading to watered down conclusions. The usability of existing systems was questioned also at the national level, as was the ability of these systems to share and disseminate lessons.

It can also be noted that identified well-functioning processes for lessons learned in areas related to crisis management often have a limited scope. An example is the Swedish Traffic Accident Data Acquisition (STRADA), collecting information on about deaths and injuries in road traffic. Complemented with in-depth studies on the causes and circumstances of fatal accidents, this has been used to develop road safety and reducing the number of traffic accidents. When broadening the scope, the process is often to conduct case studies that investigate a specific type of incidents/crisis situations. It can be very valuable, using a variety of sources including interviews, radio communications records, etc. to draw conclusions that are implemented in training and exercises (Israel). Sometimes the lessons are presented through web-resources that can be either publicly available or restricted with a login (UN, US FEMA).

The ACRIMAS project pointed at a number of different evaluation methods as potentially useful in lessons learned for crisis management (ACRIMAS, 2012c). However, evaluation are in most cases carried out to investigate if and how specific objectives were achieved. Lessons learned has a somewhat different approach, basically describing a situation, the actions taken and the resulting outcomes as observations that may be further analysed and turned into lessons. Evaluation methods such as the ones mentioned in ACRIMAS (ALNAP, Rec Cross, etc.) or the OECD/DAC evaluation guidance can however be used to generate data for the lessons learned analysis.

The SOTA furthermore identified a number of different tools commercially available, or developed in-house in organisations, for collecting, analysing and managing observations/lessons. These ranged from quite simple tools using Word or pdf documents to more complex databases with advanced functionalities. Some tools focused on the collection of observations, others on the analysis and sense-making. There was also a group of tools that included features for supporting the whole process from identification to implementation.

A challenge noted in the SOTA is that, to be useful the systems and tools need to contain large amounts of diverse information at the same time as it needs to be user-friendly and have the information easily searchable and accessible. These specifications are sometimes not only contradicting, but also quite elusive.

2.1.2 The industrial safety domain

"Lessons learned" is considered as one of the key cornerstones for the enhancement of safety in industry (Dien et al, 2012). The ACRIMAS project proposed to use the lessons learned processes developed for the industrial safety domain for lessons learned in crisis management (ACRIMAS, 2012c). This section first of all presents different examples of lessons learned implementation in various industry contexts (aviation, chemical, railway, nuclear, etc.) and secondly discuss similarities and differences between lessons learned in industry and lessons learned for disaster crisis management.

Overview

In a study from 2008, a working group of the European Safety Reliability and Data Association (ESReDA), carried out a state-of-the-art study on accident investigation (Dechy et al, 2012). This study showed on a general level that there are many differences between countries and sectors regarding accident investigations. National regulations define requirements for accident investigations and for extracting lessons from experiences, for instance from different kinds of risks (labour, transport, technological and natural).

In the transport sector, **civil aviation** has had a long tradition of accident investigation: the corrective actions in particular on the design are often implemented and the majority of the countries have permanent investigation boards. In other parts of the transport sector (**maritime, railway and road**), there is less of a tradition in spite of several centuries of experience and many catastrophes. In many cases the investigations are conducted by the industry itself, and focused on liability and blame. However, in the railway sector, an EU directive requires accident investigations and the creation of investigation boards independent from any railway actor and safety authority.

Process industries and **hazardous materials sectors** were shaken by many catastrophes and disasters in Europe (Seveso in 1976, Basel in 1986, Enschede in 2000, Toulouse in 2001, Buncefield in 2005). As a consequence, regulations aiming at controlling major hazards were implemented and revised in the aftermath of new catastrophes (Seveso I Directive in 1982 and Seveso II in 1996). These regulations define requirements for the investigations initiation, for the implementation of learning from experience policy (for the Seveso high threshold sites) and for the notification to the authorities and Member States in case of major accidents. Accident investigations are carried out by companies, by third-party experts and ad-hoc commissions. The resulting reports are stored in the MARS database, managed by the Major Accidents Hazards Bureau.

European **offshore oil and gas industry** have also had catastrophes, such as Alexander L. Kielland in Norway in 1980 and Piper Alpha in 1988 (Lord Cullen ad-hoc commission). Strict regulations exist in the area of Health, Safety and Environment. However, accidents are analysed by the companies and if necessary by the controlling authorities. There is neither a permanent investigation board, nor a commission addressing this issue.

In the **energy production and transmission field**, several energy sources need to be considered (fossil, nuclear, hydraulic, and renewable). Recently, blackouts affected several EU countries at the same time and were the subject of learning from experience studies. With the Three-Mile Island accident in 1979 and the Chernobyl accident in 1986, the nuclear power sector has several safety regulations and an international scale to classify accidents (INES) which relate to notification criteria and a specific

procedure. The operators and controlling authorities perform accident and incident investigations; there are no requirements for investigation boards.

In the **space sector**, the European Space Agency (ESA) is in charge of accident investigation, along with the CNES and the French authorities if the accident occurs at the launch pad in French Guyana. The sector was especially shocked by the disintegration of the Challenger and Columbia space shuttles and the investigations were carried out by ad-hoc and independent commissions (presidential for Challenger and a specific board for Columbia).

The aviation sector

From the 1920´s – when passenger planes came up and their trust in flying was needed – lessons learned have enhanced the safety in aviation. For a long time, experience and knowledge sharing has been in the spotlight of decision-makers and engineer.

It seems that there are three distinguishable elements for lessons learned in aviation (see Figure 1) that contribute to the effectiveness of the experience and knowledge sharing process: (i) repositories of knowledge, (ii) virtual global venues for information sharing, and (iii) system of job training and information sharing.

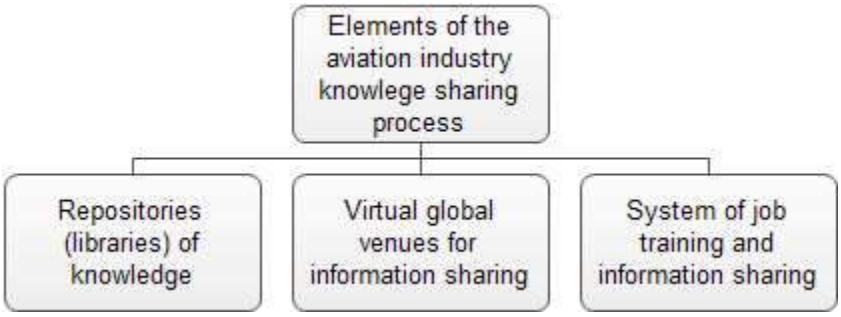


Figure 1: The most significant elements of the aviation industry knowledge sharing process

Methods and good practices of learning from experience are already there, gathered and grouped in digital libraries and knowledge repositories. What is even more important, they are easily accessible. One example is the Transport Airplane Accidents library, which is managed by the U.S. Federal Aviation Administration. The library consists of descriptions of lessons learned from different categories such as Airplane life cycle, Accident Threat Categories, and Accident Common Themes[9].

In the aviation industry new safety and security measures often arise in the wake of a serious accident. However, it should be noted that the sharing of knowledge and experience is facilitated by strong organisations such as the Federal Aviation Administration, Global Aviation Information Network, U.S. National Transportation Safety Board and the Flight Safety Foundation. It is obvious that well organised structures facilitate the communication and the sharing of experiences. Virtual global venues to share and exchange aviation safety lessons learned and corrective actions are one of the most important features of the process for learning from experience in the aviation industry.

Lessons learned has also been widely applied into the Crew Resource Management (CRM), which is one of the most significant achievements of the aviation industry in terms of improving security and safety of the industry. CRM is a set of training procedures for use in environments where human error

[9] http://lessonslearned.faa.gov/

can have devastating effects. Used primarily for improving air safety, CRM focuses on interpersonal communication, leadership, and decision making in the cockpit.

Lessons from chemical industry sector

Processes for lessons learned and knowledge sharing regarding prevention in chemical industry intensified in the mid-80's after the massive incident in Bhopal, India. OECD declared then: *"We will ensure the existence of appropriate measures to control potentially hazardous installations, including measures to prevent accidents."*

One of the most interesting results of the OECD proceedings was the establishment of the Chemical Accidents Programme. The Programme stands on three pillars: (i) development of common principles, procedures and policy guidance; (ii) analysis of issues of concern and recommendations for best practices; and (iii) information/experience sharing and communication. The foundations of the Chemical Accidents Programme should be considered as a well-proven guidelines for establishing similar practices in different sectors and domains.

One of the main achievements in the field of lessons learned in the chemical industry is the dissemination of joint publications, guidelines and recommendations. These cover the most important issues in terms of chemical safety and security. As was the case in the aviation industry processes, the Lessons Learned and knowledge sharing was extensively supported by a powerful organisation (OECD) which obliged its members to contribute and to implement a proposed recommendations[10]. Also in the chemical industry there has been added value in the development of repositories of knowledge. One well-known example of such a library is the Major Accident Reporting System (MARS), which was developed by Joint Research Centre.

The Baker review, published after the BP Texas City accident[11], proposed several issues which should be addressed in order to avoid similar incidents in the future:

- Establish Process safety as a Core Value;
- Provide strong leadership;
- Establish and enforce high standards of performance;
- Document the process safety culture emphasis and approach;
- Maintain a sense of vulnerability;
- Empower individuals to successfully fulfil their safety responsibilities;
- Defer to expertise;
- Ensure open and effective communications;
- Establish a questioning and learning environment;
- Foster mutual trust;
- Provide timely response to process safety issues and concerns;
- Provide continuous monitoring of performance.

The following four conclusions from the Baker report are of particular interest: (i) document the safety process: including its culture, emphasis and approach; (ii) maintain a sense of vulnerability; (iii) foster mutual trust; (iv) provide continuous monitoring of performance.

[10] http://www.oecd.org/chemicalsafety/chemical-accidents/Chemical-Accidents-25years.pdf
[11] http://www.hse.gov.uk/leadership/bakerreport.pdf

Lessons from the nuclear sector

IAEA (International Atomic Energy Agency), created in 1957 by United Nations, is one of the pillars of lessons learned and trainings in the nuclear energy sector. Nuclear safety and security is one of the three key missions of IAEA with nuclear technology and applications and safeguard and verification. Activities in nuclear safety and security aim at *providing a strong, sustainable and visible global nuclear safety and security framework, protecting people and the environment from the harmful effects of ionizing radiation*[12].

Capacity building is one of the activities conducted in the topic of nuclear safety and security. It integrate 1) the establishment of sustainable education and training infrastructures and processes, 2) the development of an effective workforce at both the national as well as organisational level, 3) the management of knowledge and 4) the establishment of knowledge networks to promote the pooling, analysis and sharing of nuclear technical, safety and security knowledge and experiences at national, regional and international levels.

IAEA published safety standards and nuclear security series from a lessons learned perspective. One example is the yearly *Nuclear Safety Review*. Safety standards provide a system of safety fundamentals, safety requirements and safety guides reflecting an international consensus on what constitutes a high level of safety for protecting people and the environment from harmful effects of ionizing radiation. Nuclear security series addressed issues relating to the prevention and detection of, and response to, theft, sabotages, unauthorized access and illegal transfer or other malicious acts involving nuclear material and other radioactive substances and their associated facilities (nuclear security fundamentals, recommendations, implementations guides, technical guidance).

Learning from lessons learned systems in industry

Some conclusions can be drawn from lessons learned in industries. First of all, it is to a large extent accident and incident driven. Secondly, strong organisations have generally functioned as sponsors. Thirdly, lessons learned in industry often concerns, compared to crisis management in large-scale crisis, well-defined and controllable socio-technical systems.

Although the field of lessons learned can be considered as young (Le Coze, 2013), theoretical models, methods and tools have been developed and research has been conducted to understand factors impacting the different steps of a lessons learned system (from data collection to the implementation of lessons learned based organisational changes). However, these models, methods and tools are generally not designed to handle the complexity of large-scale disaster crisis management.

While the differences in scale, characteristics and preconditions mean that the models used in industry probably are difficult to transfer to systems managing large-scale disasters, the experience in lessons integration and appropriation by organisations may be of interest.

The methods and tools used in safety industry lessons learned are generally based on accident models. Two types of models are generally considered: sequential and epidemiological (Hollnagel, 2004). Sequential models consider specific causes and well-defined links as search principles and aims to eliminate or contain causes. Epidemiological models consider carriers, barriers and latent conditions as search principles and aims to make defences and barriers stronger.

[12] http://www-ns.iaea.org

Furthermore, the models used have a socio-technical approach considering systems as the product of the interaction between people using a range of technologies and tools, working in a physical infrastructure, operating with a set of cultural assumptions, using sets of processes and working practices to achieve goals (Davis et al, 2014). The lessons learned generally focus on technological failure, human errors or organisational failure. One of the more complex models used as a basis for lessons learned is the Rasmussen's risk management framework. This model considers interactions between six layers in a hazardous process: staff, management, company, regulators, association and governments, considering that those systems are involved in the control of hazardous processes through law, rules and instructions (Rasmussen and Svedung, 2000).

Although the control of hazardous processes could be an important part of a disaster management operation, it nevertheless does not cover the overall complexity of disaster management. Origins of disasters could be technological failures and human errors but also natural events, deliberated human behaviour, etc. Crisis management furthermore involves a large number of different organisations interacting in order to contribute to the prevention, preparation, response and recovery phases in crisis management. Disasters can also be managed simultaneously at a local, regional, national and organisational level further increasing the complexity.

As a consequence the models used for lessons learned in industry generally do not have to handle the type of complexity that disaster management event offers. The lessons learned framework for crisis management may still be relevant for such organisations' hazardous processes, but in most cases these organisations instead need to rely on methods and tools using models capturing the full complexity of prevention, preparation, response and recovery from disaster.

Experience from industrial safety can be used for lessons appropriation and integration in an organisation. Results of research related to multilevel learning in organisation (Hovden et al, 2011), organisational learning (Wahlström, 2011), adaptive management (Reiman et al, 2015) and theoretical reflexion on lessons learned (Le Coze, 2013) can be used to facilitate the appropriation of lessons by the diversity of organisations interacting during disaster management.

2.1.3 Lessons learned in previous EU FP7 projects

In the state-of-the-art report on Training and Learning (DRIVER, 2014) it was concluded that there are only few research programmes dealing specifically with lessons learned in crisis management. However, three previous FP7 projects have investigated the topic in somewhat more detail: ACRIMAS, CRISYS and ELITE. As these projects had a European focus, they are of specific interest to the current study.

ACRIMAS (*Aftermath Crisis Management*) developed a roadmap for a Demonstration Project within crisis management. As a basis, an inventory of improvement areas was conducted, based on an end-user perspective. In this inventory sharing and implementing lessons and best practices was given a high degree of support (ACRIMAS, 2012a). ACRIMAS viewed lessons learned as a tool to support*, among other things,* capacity building and exercises/training. However, it was also concluded that

today there is “very little ‘real’ learning taking place in the field of multi-national, cross-border, cross-agency crisis management” (ACRIMAS, 2012c, p.67).

ACRIMAS regarded lessons learned from operations and exercises as “one of the most important sources of knowledge to develop the disaster relief capacity” while pointing out cross-organisational and cross-border dissemination as a challenge. It was also noted that lessons learned need to be more than a database, and that differences between organisations regarding data formats and data management complicates any cooperative efforts (ACRIMAS, 2012b). ACRIMAS furthermore underlined the importance of *learning* in lessons learned and proposed a development area for cross-border and harmonised training (ACRIMAS, 2012d).

ACRIMAS pointed at external evaluation teams as well as tools and methodologies for best practices in *high reliability systems*, such as avionics and nuclear industries, as possible starting points for developing lessons learned for crisis management. The project furthermore had a strong emphasis on evaluation as a foundation for lessons learned (ACRIMAS, 2012c). It is concluded that although methodologies for event analysis in high-reliability systems may be useful to lessons learned in large-scale crisis management, they are not necessarily transferable from the type of well-defined systems they were designed for to the fuzzy and dynamic system of crisis management. Moreover, lessons learned is about extracting experience-based knowledge, using observations based on the results of actions taken in a specific situation that through analysis are turned into lessons. Evaluation may yield important input to such a lessons learned process, but lessons learned are not evaluations in itself.

Although ACRIMAS offered little advice on *how to* conduct lessons learned, the proposals for future research – a deepened understanding of how different organisations work (albeit through training rather than lessons learned) and of the transfer of information cross-border and cross-organisational – has been adopted into the DRIVER project.

CRISYS (*Critical Response In Security and Safety Emergencies*) aimed at developing a strategic roadmap for the 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) aimed at serving “as a guide for classification of capabilities, identification and demonstration of available practices and [technology] solutions […]”. It represented a common framework, neutral to any territorial boundaries and able to support crisis management on all levels (local, regional, national, multinational) (CRISYS, 2012, 27)

To realise the COM, CRISYS identified and prioritised several necessary actions, with help from end-users. Among the actions for ‘Learning and Public Awareness’ the need for a lessons learned capture and dissemination system was noted. It was also suggested to exploit, in support of learning/quality management, virtual learning technologies and online networking for sharing lessons learned, and introduce desk-based joint operational training. The CRISYS Operating Model was a combination of several, interdependent components used to fulfil the actions. (CRISYS, 2012)

Although the CRYSIS Operating Model is based on end-user input and is well-designed, it is mainly a theoretical concept. The main legacy is the description of the different tools and components necessary for common planning and command of a multinational crisis management operation.

ELITE (*Elicit to Learn Crucial Post-Crisis Lessons*) collected and categorised lessons from different types of emergencies. The basis was a holistic and all-phase framework for lessons learned reporting. It was developed through a structured discussion identifying different problem areas (communications, interoperability, logistics etc.) for a specific type of crisis. These could be used for the collection of lessons from similar types of crises (ELITE, 2014).

The ELITE project used the *Communities of Practice* (CoP), described in a concept model (Figure 2). Within the CoP individuals are either active in private or public business, working on the individual, organisational, sectorial, national or international level and handling tasks that are operational, tactical or strategic (ELITE, 2013).

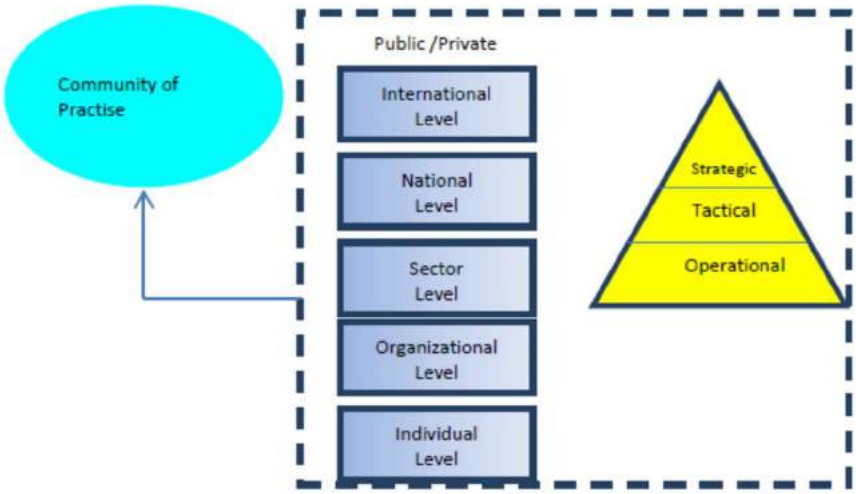


Figure 2: Description of the Community of Practice (ELITE 2013).

With this concept model as a basis, ELITE also developed a model of the learning process in which the individuals in the CoP learn through participating in crisis management, through analysing lessons and through sharing.

In parallel with the development of the framework, ELITE also developed and tested a *living document* for presenting the information collected, that is, a wiki solution. The ELITE project highlighted some of the inherent difficulties with lessons learned, including the challenge of creating a lessons learned process that is able to deliver the information that you need, and when you need it. In a dynamic setting, the up-to-date information may very well be reached faster and more efficiently through other channels such as personal contacts or internet search engines (ELITE, 2014).

The ELITE project had a hands-on approach, collecting real lessons from real cases while developing the framework and the living document. The use of CoP in structured discussions seems successful and the emphasis on learning is also beneficial for the future work.

Other FP7 projects

In addition, other FP7 projects have addressed lessons learned to some extent, although not from the overall cross-border and cross-sector crisis management perspective foreseen in ACRIMAS. **PULSE**

(Platform for European medical Support during major emergencies)[13], developed decision-support tools ensuring access to among other things lessons learned and best practices. **EDEN** (End-user driven DEMO for CBRNE)[14], aimed at developing the resilience capacity regarding CBRNE, offering amongst others, a repository of best practices in the form of tools, systems and procedures. Methods and tools developed and used in these projects will be taken into consideration in the choice of tools for the forthcoming DRIVER experiments.

2.2 Interviews

Most of the respondents would welcome, at least to some extent, a more structured process for collecting and analysing experiences. The types of lessons they see a need for, however, differed significantly between sectors and between actors[15]. Some respondents, especially at the operational levels in the production industry, foresaw only a limited need for lessons learned and then primarily restricted to product safety and product quality. Furthermore, most respondents were primarily focused on internal lessons while the interest for cross-border and cross-sector lessons was less obvious. Although it was recognised that other organisations, sectors and countries could have lessons of value, to find these lessons and transfer them into a new context was in many cases seen as complex.

2.2.1 Local and regional public crisis management organisations

The local and regional public crisis management organisations (municipal rescue services, regional crisis management organisations) considered the lessons learned system as a repository of best practices, procedures, risks and threats, that is, as a part of the organisational memory. These respondents also underlined the need for lessons as a basis in training events and in the development of procedures.

Local crisis response organisations (eight respondents from five countries) primarily wanted *hands on* lessons regarding for example threats, risks, methods/tactics and equipment, but also regarding technical aspects, coordination and cooperation. Most of them had some kind of process for collecting information from different incidents and accidents. However, generally the respondents called for structured processes and methods, allowing for the analysis and storage of information in an easily searchable manner. Several respondents underlined the difficulties in transforming incident raw data into knowledge that could be of value, apart from as crude statistics. Notably, one of the few functional processes mentioned was built on personal interactions for both the collection and the sharing of observations/lessons learned (*Dutch Association of Mayors*, see Annex 3). Generally it seems that most of the sharing took place in working groups or through one-on-one interactions, not through written reports. In two interviews sharing was said to be hindered, or at least hampered, by a lack of common methods and standards.

At the regional level (ten respondents from six countries) factors added were causes of the crisis, financial consequences and methods to increase resilience. Furthermore, the issue of resource

[13] Pulse project, www.pulse-fp7.com
[14] Eden project, Eden-security-fp7.eu/eden
[15] This is also confirmed in other studies. For instance, a MSB study from 2011 shows that there are big differences in structures and approaches between different sectors (MSB, 2011).

allocation was mentioned as important. All said that they basically write reports after each incident and in some cases have *after-action meetings* for all involved. Sometimes these after action meetings make use of specific techniques, for instance *storytelling*. In one country the reports on incidents/accidents were reported to be stored in a centralised database. However, the processes were generally seen as lacking structure and a systematic approach, and several respondents mentioned that this complicated sharing and/or retrieving information.

Respondents at both the local and regional levels underlined the need for lessons to include descriptions of the nature of the crisis, the resources involved to handle it, the solutions applied and the value of the salvaged resources (lives, buildings, communications assets etc.) – in other words problem, applied solution and outcome. In practical terms this could be case studies.

2.2.2 National public crisis management organisations

At the strategic level (national crisis management organisations), ten respondents from six countries offered a somewhat heterogeneous picture. In some countries the national level mainly deals with information on a crisis with national dimensions. These are seldom occurring events, meaning that the need for databases to be able to handle the information is often seen as low. Still, two different types of approaches to their role in lessons learned could be discerned: those who perceived their role as a hub for detailed incident data from regional and local organisations and those who saw their role as collecting and analysing information from the rare, national crisis events. In both cases the conclusions were included in training activities, exercises, development programmes, etc.

The national level furthermore seemed to be somewhat more focused on what could be called *general abilities*, that is abilities needed in all types of large-scale incidents, for example communications, division of responsibilities and allocation of resources. Efficiency of actions, bottlenecks in crisis management processes and costs of crises were also highlighted as important issues, together with possible cross-sector ripple effects. Case studies was the most common tool in the LL process.

In other countries, the national level also has a responsibility for the collection of data on all incidents and accidents. This provides large amounts of data, but it is not certain that the necessary resources for analysing this data are available. There are also differences between countries regarding the mandate for the national level to draw conclusions and follow up on implementation at other levels. In some cases information and conclusions were implemented in training courses, in other cases through person-to-person interaction. Finally, only one national level lessons learned process for reporting and analysing was identified in the interviews. This was however in its start-up phase, and had still to prove its functionality.

The survey in *D82.11 – CM Organisations Report including Procurement Regulations and D83.11 – Policy and Legislation Report*, basically confirms the interview results. Some EU member states have processes and directives for lessons learned that are based on meetings or reports with a formalized discussion on lessons, possibly combined with in-depth assessments of specific, large-scale events. Exercises are in some member states seen as important instances for generating lessons. Consequently, it is not surprising that in the survey for some member states the information is limited to examples of concrete lessons that adhere to specific events rather than an ongoing and structured process (DRIVER, 2016).

2.2.3 Private sector

Compared with the public sector, the private sectors' incentives seemed -to a higher degree- to consist of a mix of economic issues, brand management and obligations stemming from laws and regulations.

Food chain

In the food production and distribution chain, the respondents showed varying awareness of their role in a large societal crisis. In the seven interviews with representatives from production, distribution, retail and authorities in two countries, the respondents generally saw little need for lessons learned processes, with some exception for lessons regarding the safety and quality of the food products. Several respondents, especially food producers, instead said that they relied on the knowledge and experience of their personnel but also on information and guidelines shared by other organisations (for instance suppliers) or authorities. The respondents primarily focused on practical issues, such as numbers to call or regulations to follow.

Most of the respondents viewed lessons learned as something they primarily would use for improving their own operations. However, one food chain respondent, a large distribution and retail firm, had a well-structured process for collecting, analysing and implementing lessons from large incidents or from patterns of incidents. The main motives for this process were said to be brand protection and prevention of economic losses. He underlined the need to understand how their decisions in a crisis affect other parts of the crisis management system, either upstream in the production phase or downstream at the consumer level. The need for a closer relationship between the food industry and authorities regarding issues of crisis management and lessons learned was raised in a couple interviews.

Telecommunications sector

The interviewed telecom organisations (six interviews in three countries) displayed higher awareness of their respective roles in crisis management. Risk management and incident reporting in many cases followed from laws and regulations, like the case in the food sector. One respondent pointed at national meetings on continuity issues, involving the major telecom operators. These meetings were legally obligated and carried out with a high degree of confidentiality. The vertically integrated telecom sector, where local networks as well as the national strategic level many times exist in the same company, also seemed to allow for some sharing of lessons within companies. Still, when it came to other aspects, for instance internal operational procedures in a crisis, the respondents saw few structured processes for lessons learned in their organisations, although several respondents did call for such processes. The telecom respondents mainly focused on lessons about risks and threats, together with effectiveness of different mitigation or prevention methods, but also on the functionality of methods and systems in earlier incidents. After-action reviews and case studies were primarily used to collect information about large-scale events.

Water sector

The water/wastewater sector, based on four interviews with two producers, one branch organisation and one national agency in two countries, seem to fall in between the food and telecom counterparts in their views on lessons learned. Similar to the food industry, their focus regarding lessons learned was on tangible issues such as the product quality. However, in their awareness of being part of the larger crisis management system and acknowledging a role for lessons learned in the context of managing societal crises this sector was more similar to telecom. The sector has processes for collecting statistics on water quality and similar features. Although none of the respondents said that they had a *structured* lessons learned process, they did analyse and implement lessons from exercises and incidents. The results of large scale incidents could also be used in training. However, the need to keep weaknesses confidential meant that it could be difficult to share information or to have a centralised function to collect and store observations/lessons learned. The improvement of processes and functions aimed at reducing the consequences of an incident was mentioned. Some important factors to investigate were said to be performances, competencies and when and how to scale up the response.

The use of case studies

As noted above, several respondents have referred to case studies as the preferred way to collect and disseminate lessons. At the same time, respondents also underline that it can be difficult to know in advance what cases or what lessons may be of future interest. Prioritisation is important as no actor can collect information on all potentially interesting cases.

2.3 Questionnaire

In the questionnaire (cf. Annex 6), the respondents were asked what they would like to use a lessons learned system/process for. Out of 35 respondents, 27 (77%) saw the lessons learned system as a potential tool to make observations/lessons available within their own organisation. Furthermore, 26 respondents (74%) regarded it as a potential tool for the exchange of lessons with *similar* organisations within their own country. Fewer would like to use the lessons learned process as a tool for cross-sector and cross-border exchanges:

- with organisations in other sectors in one´s own country (12) [34%]
- with similar organisations in other countries (15) [43%]
- to a broad audience in diverse organisations at different levels in different countries (14) [40%]

Even fewer would like to use the lessons learned system/process for vertical sharing, that is, to share lessons with subordinate or superior organisations:

- to subordinate organisations (10) [29%]
- to superior organisations (8) [23%]

The role of the LL system as a tool to support the process of analysing and validating the observations and turn them into lessons was seen as important by 19 respondents [54%].

The number of responses to the questionnaire is, however, too low to make any statistical comparisons between different sub-groups (sectors, levels).[16] However, overall the results offer some interesting indicative conclusions: 1) the end-users mainly see the lessons learned system/process as a tool for exchanging lessons among themselves or with their national peers, 2) cross-sector and cross-border sharing seem to have low priority, and 3) sharing within any *hierarchy in* crisis management organisations seems to have even less priority.

Furthermore, the questionnaires also asked in what activities the respondent would like to use lessons. The respondents prioritized:

- in preparation/planning of crisis management operations, 23 [66%]
- in development/planning of exercises, 22 [63%]
- in development of training/education, 21 [60%]
- in the development of their own organisation, 20 [57%]
- in the development of standard operating procedures/handbooks, 20 [57%].

On the other hand, support to ongoing crisis management operations (e.g. decision support) was of less interest, 13 [37%]. The preparedness phase was thus a priority to the respondents, rather than the operational phase.

The questionnaire furthermore asked from what sources the respondents would like to be able to extract observations/lessons. The majority expected to find relevant lessons within their own organisations:

- from training/education (23) [66%]
- from exercises (19) [54%]
- from large-scale operations (20) [57%]

Not surprisingly, and consistent with the interview results, fewer expected to find lessons from other organisations:

- from training/education (12) [34%]
- from exercises (16) [46%]
- from large-scale operations (15) [43%]

To extract lessons from daily routine operations from the own organisation was foreseen by 16 respondents (46%) while only six (17%) foresaw a role for lessons from other organisations' routine operations.

To identify the potential role of lessons learned in both large-scale crises and every day incidents, we carried out interviews with end-user and decision-maker representatives at different levels (local,

[16] The selected organisations are but a small sample of the total set of crisis management organisations that they represent, covering such diverse organisations as small food production companies and large multinationals telecom corporations. For this reason, the 35 collected questionnaire responses are too few to conduct any statistically sound analyses with reasonable error margins and confidence intervals.

regional, and national) and in different sectors. The interviews had four purposes. First of all, to gather information about the current frameworks and systems for Lessons learned at various levels, ranging from the EU to the local rescue services. Secondly, to further investigate the need for Lessons learned systems and the features such systems should include according to end-users and practitioners. Thirdly, to identify such differences in structures, policies and approaches that may affect the layout of a Lessons Learned Framework. Finally, to identify a group of decision-makers, experts and end-users that could later on participate in the expert seminars of task T53.1 and may participate in forthcoming WP530 experiments.

The interviews were semi-structured, using a template (Annex 5) that was further adapted to suit the specific sectors. The main focus of the interviews were the role of lessons learned in the respondents' contexts, current and desired processes for lessons learned, the need for direction of the lessons learned process and the main challenges to learning.

The interviews included both the strategic level decision-makers and the levels directly responsible for handling the crisis, since both have strong interests in a Lessons learned framework. As, it was recognised that crisis management concerns many different sectors, apart from public crisis management functions, representatives from several of these sectors: water production and distribution (distributed public sector with a broad impact), food supply (distributed private sector with a broad impact) and telecom (centralised and primarily private sector) were sought to participate as well. Some additional interviews were conducted at the EU institutions and NATO JALLC, as well as with volunteer organisations.

In the project team working on this WP, seven countries plus an EC agency were represented. The aim was to interview representatives from the various levels of public crisis management in all these countries represented while the EU institutions and specific sectors (telecom, food supply, water production and distribution) would be distributed among the participants in the team.

Each participant in the project used their respective organisation's network to identify suitable and willing interviewees, within the public crisis management organisations and in the sectors allocated to them. However, there were considerable national differences in the willingness to participate in these kinds of interviews and questionnaires. Altogether, 46 interviews were carried out with representatives from public and private sector organisations active in crisis management from 9 countries. For an example of the interview template, together with the distribution of interviewees, see Annex 5.

Complementary to these interviews, all respondents were asked to respond to a survey that covered topics such as the perceived purpose of a lessons learned process. The questionnaire focused on the content (meta-data) needed in the observations/lessons, where the information was to be found and with whom it could be shared. The questionnaire complemented the interviews, and was distributed to all interviewees. 35 questionnaires out of 42 (83%) were completed and returned. For an example of the questionnaire please see Annex 6.

Since the questionnaire respondents are representatives of European Crisis Management organisations of several sectors, nationalities and types, it is not surprising that their responses differ considerably. The selected organisations are but a small sample of the total set of CM organisations that they represent, covering such diverse organisations as small food production companies and large multinational telecom corporations. For this reason, the 35 collected questionnaire responses are too

few to conduct any statistically sound analyses with reasonable error margins and confidence intervals. The reported results therefore contain only descriptive summaries of response frequencies grouped by respondent sector, for each question.

The respondents represented public crisis management organisations (local, regional and national) and private actors within sectors such as food processing and distribution, energy and telecom. The responding organisations were from France, Germany, Israel, The Netherlands, Poland, Portugal, and Sweden. The interviewed actors were all likely to become involved in the handling of any future large-scale crises in their corresponding region. For more information about the interviews, the questionnaire and the respondents, please refer to Annexes 5 and 6.

2.3.1 Workshops

Workshop on existing lessons learned systems (Berlin, October 2014)

During the kick-off meeting of the DRIVER subproject on Training and Learning (SP5) in Berlin, October 2014, a workshop with external experts representing nine countries[17] discussed the state-of-the-art on training and learning. The method used was that of *learning café*, where four groups alternated between tables representing the work packages of SP5. In the first session, the focus for WP530 was on identifying functional lessons learned processes and factors that inhibits such processes. In the second session the focus was on identifying factors that affect the ability for cross-border, cross-sector and cross-phase analysis.

The workshop confirmed that there exist few well-functioning lessons learned processes at the national or sub-national levels, and those processes that were mentioned were mostly confined to one level only. After action reviews were however used, and the results from these were in some cases communicated to supervising levels. The workshop furthermore showed that the conditions for lessons learned – organisational, political, cultural, and legal – differ significantly between the nine countries discussed. This presents a challenge for any lessons learned process wishing to be valid in all or even in the majority of member states.

Another observation from all nine represented countries was that there were few or no flows of lessons learned information between organisations, between sectors or between levels. This seemed true regardless of any lessons learned activities within the single organisations or within a specific level. Although an organisation or a company may have routines for after action reviews and evaluations, the information stays there and in some cases is not even disseminated within the organisation.

Other challenges high-lighted during the workshop were the potential political sensitivities of lessons learned, which may decrease the will to share information. These seem to exist on both the organisational levels and on the regional/national levels. Similar, the potential legal implications, i.e. that information on failures could be used in or affect ongoing legal investigations, may also affect the willingness to share. The need for an organisational culture that encourages extraction of lessons,

[17] Representing France, Germany, Greece, Israel, the Netherlands, Poland, Portugal, Sweden and the UK. Furthermore a representative from the EU DG ECHO participated.

sharing of lessons as well as learning from lessons was underlined as vital for any functioning lessons learned capability.

Workshop on the interview results (Revinge, April 2015)

During the SP5 meeting in Revinge, Sweden, April 2015, a workshop with external experts/practitioners[18] discussed the preliminary results from the interviews. This offered some additional information on existing lessons learned processes as well as on the gaps.

First of all, the issue of willingness to learn was raised as an equally important challenge as the willingness to share. Motivating individuals to learn becomes crucial, and it was pointed out that even when there do exist large amounts of data, not much learning is taking place. Innovative methods for learning, such as mind-maps used to describe the responsibilities and needs for actions in different types of crisis were presented and suggested as methods for making learning easier.

Secondly, a "push-model" for sharing, where the lessons are actively sent out to the possible users, was seen as lacking today, but potentially beneficial. This would call for the identification of target groups and dedicated receivers within organisations and was seen to increase the probability of actions really been taken.

Finally, the need for understanding the differences between actors' will and ability to participate in lessons learned activities for crisis management was underlined in several discussions. This could be a result from differences in organisational cultures, for instance in the will to discuss and share lessons, but also from differences in the incentives for engaging in lessons learned activities. The private sector often has profit as its primary incentive (every action undertaken should support this), while public organisations may have crisis management as one of its dedicated roles.

These differences between organisations may help explain gaps in the internal lessons learned process of a specific actor as well as in the overall lessons learned structures for the crisis management system. Participation in lessons learned processes may for instance in some cases have to be made compulsory, for instance through laws and regulations, for the benefit of the overall crisis management system. In addition there should also be attention for ways to share important information in a more anonymous way and in general wording.

2.4 Gaps and needs

The ACRIMAS project identified the overarching gap *sharing and implementing lessons and best practice*s (ACRIMAS, 2012c). This gap was confirmed in the state-of-the-art analysis, where the absence of well-functioning processes and systems was noted. In the interviews, the questionnaires and the workshops this was further explored, divided into four dimensions of gaps regarding lessons learned for civilian crisis management in Europe:

First of all, there is **a lack of well-functioning lessons learned processes** that deliver valid and useful information. Some reasons could be 1) general lack of incentives for lessons learned, 2) culture that is

[18] Three practitioners/experts representing the local level rescue services (SE, NL, PT), three practitioners/experts representing the regional crisis management level (SE, NL, PT), one from the national strategic level (telecom, PL) and one academic expert (NL).

not supporting experiential learning, 3) lack of leadership involvement, and 4) lack of resources. Especially within the private sectors the interest for lessons learned seems quite low, possibly because of low general awareness of their role in the crisis management system. It should also be noted that among these organisations lessons learned processes are sometimes perceived as high cost/low return processes. All taken into consideration, this means that there are sectors and areas where few lessons learned activities are taking place.

Secondly, even in those regions, sectors and organisations where lessons learned processes are commonplace, there are **few exchanges of lessons between different actors**. This is true within and between sectors/organisations, but also between different levels (local, regional, national and international) in the crisis management system. Differences in needs, incentives and cultures are some possible explanations for this. However, a lack of a common understanding of the objectives of lessons learned may be equally important. In some cases there may also be an unwillingness to share lessons with others as well as an unwillingness to learn from others due to competition, politics, etc. The need for confidentiality is a hampering factor, both in private business due to competition and in the overall system due to the necessity of not revealing weaknesses to potential adversaries. However, there are methods, used for instance in the telecommunications sector, for sharing information with sectorial organisations and public agencies who may then share this information, in generalised form, with others. Furthermore, there seems to be a lack of mechanisms and structures for generalising and transferring lessons between different actors in different contexts as well as a lack of interoperable methods and systems.

Thirdly, the **implementation and learning aspects seem underestimated** in many instantiated lessons learned systems. The information is there but no learning is taking place. Although every organisation has the responsibility for its own learning, increasing the incentives may be important to stimulate learning, e.g. by committing time and other resources, as may be lowering the thresholds of learning, e.g. by making information easy to find, adapt and implement.

Fourthly, **simplicity is vital for the usability of a lessons learned process**. This applies to the guiding conceptual ideas as well as the supporting tools and the user interfaces.[19] Tools are important but not as important as a clear idea of motives, mandates and resources for the collection and analysis of observations and lessons. A difficult but closely related issue, also evident from the interviews and workshops, is the need for a clear division of labour between the collection and analysis of factual circumstances (what happened, what actions were taken, and what the outcome was) and the political considerations and decisions regarding future actions.

In addition to the conclusions above, it can also be noted that in 45 interviews[20], there has actually only one example been identified of an IT-supported lessons learned management system. Some incident reporting systems are also doubling as systems for lessons learned. This could imply the conclusion that another gap is the lack of functional lessons learned management systems.

However, although many respondents do see the potential use of such a system it is also evident from the interviews that the main part of collection, analysis and dissemination/sharing of lessons today

[19] A common end-user critique is that the interface for reporting incidents is too complex and not user-friendly enough to be used. (See for instance Pilemalm, p. 11.)

[20] See Annex 6 for a list of types of organizations and countries the respondents represented.

take place in the form of meetings or joint actions (after action reviews, high-level meeting, seminars, case studies). It seems that very few lessons are shared in the form of database posts or as written statements. This could imply that to many organisations "lessons learned" is first and foremost a process of interaction and cooperation, internally and externally. Apart from being an efficient way to identify relevant lessons, it may also allow for broad context understanding as well as confidentiality.

It can also be noted that few organisations seem to have functioning processes for defining and prioritising needs for lessons learned. It is likely that this negatively affects the focus of the lessons learned processes and the rational use of available resources in the collection and analysis of observations.

2.5 Learning from practice

These intermediate conclusions show a grim picture of the lessons learned practice. Apparently, there is a lack of information and what is available is not presented in a way to facilitate learning, either because it is not accessible to the relevant stakeholders or because it is not presented in a way that facilitates learning. In the remainder of this chapter, this will be the starting point for a discussion on the general challenges facing most lessons learned processes in most types of organisations.

It is an often heard cliché that we need to learn from experience. It is uncontroversial to state that experiences have an important role in knowledge creation (Argyris & Schön, 1996, pp. 20–21; Levitt & March, 1988, p. 325ff; Nonaka, 1991) and naturalistic decision-making (Klein & Klinger, 1991; Weick, 1993). Still, a significant body of academic literature outlines the challenges and pitfalls of knowledge-building based on experience (Levitt & March 1988; Levinthal & March, 1993; Deverell, 2012). Basically it seems that learning from experience can be the wrong answer to the right question but also that it can be an answer that shuts out other relevant sources of knowledge. Furthermore, a too high emphasis on technical tools can lead to too little focus on what lessons to look for and why. (Levinthal and March 1993, Schultz 2001, Schultz 2002, Försvarsmakten 2010, Frelin & Ödlund 2011)

This is discussed below, in the paragraphs about experiential learning and its challenges with a starting point in the research on organisational learning. In the remainder of this chapter we present a number of perspectives and challenges specifically for lessons learned in crisis management.

2.6 Organisational Knowledge

2.6.1 Organisational learning

The knowledge of an organisation is stored in internal documents, in policies, in social and physical structures, in best practices, in organisational stories and in a common view on how things are done (Levitt & March, 1988, p. 327; Walsh & Ungson, 1991; Argyris & Schön, 1996, pp. 12–13;). This can be summarised as *the theory in use*, meaning that when expected and achieved results no longer match, a learning process leading to a new theory in use may begin (Argyris & Schön, 1996, pp. 18–19). When organisations accumulate knowledge in norms, rules and forms through learning from its members, these members become part of the organisational memory in what has been called a process of *mutual*

learning (March, 1991, p. 73). The model of single-loop and double-loop learning fits well into this, with single loop learning defined as instrumental learning to correct errors that hinders the upholding of existing norms and values (Argyris & Schön, 1996, pp. 20–21). Double-loop learning, by contrast, involves changing the values of the theory in use. Changing the learning processes themselves can also be an important part of double-loop learning (Argyris & Schön, 1996, p. 29).

In a ground-breaking article presented by March (1991), *exploration* is the search for and generation of new knowledge, while *exploitation* means making use of pre-existing knowledge. Although exploration can yield high returns, the associated costs are generally high, as are the risks. Each successful explorative project is bound to be preceded by a number of failed ones. Exploitation on the other hand, has a higher probability of success but generally yields lower returns in each successful project (Schulz, 2002; Levinthal & March, 1993; March, 1991). The ability to explore depends on the availability of processes such as experimentation and on investment in search activities while learning from others depends on availability of processes for accessing or exposing yourself to the experiences of others (Schulz, 2002).

Exploitation is closely related to lessons learned, although some types of lessons learned, e.g. trend analysis through aggregation of multiple lessons, can be regarded as explorative actions. Some authors view learning from experience as a method of reinforcement learning, reducing the production cost (Levinthal & March, 1993, p. 96), and, closely related, that Lessons learned may accelerate this learning curve (Milton, 2010, p. 9).

2.6.2 Organisational memory systems

The organisational memory (OM) is the accumulated knowledge acquired over time in an organisation, and stored in individuals, culture, transformations, structures, ecology, and information systems (Stein & Zwass, 1995; Walsh & Ungson, 1991). Thus, an organisation's memory is tightly connected to its' employees and therefore easily damaged e.g. by turnover. To reduce the brittleness of the memory, some common approaches include turning individual knowledge into standard operating procedures and doctrine (*externalisation*), and to encourage information sharing, formally through seminars and education or informally through coffee table discussions (*socialisation*) (Nonaka, 1991). The usefulness of an OM is dependent on its distribution, accuracy, and how it is managed (Weick, 1969).

2.6.3 Organisational amnesia

New recruits in organisations are often brought up to speed and into the organisational routines with the help of their fellow co-workers, either via mentorship programmes or via less formal socialisation mechanisms, such as communities of interest (Williams, 2008, p. 256). How effective this socialisation is has a direct impact on the knowledge creation potential (March, 1991, p. 78). However, in organisations with high turnover, or defunct socialisation mechanisms, the OM tends to decrease over time, commonly referred to as organisational amnesia (Kransdorff, 1998; Levitt & March, 1988, p. 328). The problem is particularly obvious when considering infrequent events that individuals may face only a handful times during their career. This is the case with most major emergencies, perhaps illustrated most effectively by the Fukushima triple-disaster which surely was outside all the frames of reference for possible disasters at the time.

On the other hand, a turnover that is too small and a socialisation process that is too fast would risk stagnation. Too few new ideas are imported and new perspectives are never given enough time to gain influence (Levinthal & March, 1993, p. 107).

One of the primary purposes of implementing OM systems is to overcome this problem, e.g. by storing it in retention bins decoupled from individuals (Walsh & Ungson, 1991). While it may be difficult to imagine individual knowledge, particularly the tacit portion, being stored in e.g. doctrines and IT systems, according to Nonaka (1991) knowledge can be converted between tacit and explicit through externalisation and internalisation of knowledge. However, it should be remembered that through each transformation the knowledge artefacts gets distorted, for better or worse (Tsang, 1997, p. 78).

2.7 Lessons learned definitions

Specific lessons learned processes have been an issue in military organisations since the 1950´s, partly as a result of a tradition of long- and medium term planning. Many of the definitions therefore have their origin in military applications.

Lessons learned are instances of OM, which represent significant, valid, and applicable experiences, positive or negative (Weber et al., 2001). Lessons are valid only if they can be used to guide the solution of similar recurring problems. Typically a lesson is context-dependent and need domain knowledge to be applied (Patton, 2002, p. 331; Weber et al., 2001). In other words: lessons learned deal with incremental changes, i.e. improvement on procedures and processes (Binney, 2001). A more relaxed view on lessons is to regard it as "any form of valuable knowledge, learned from direct experiences in relation to specific situations in business operations that exist in an organisational boundary" (Jongwoo, 2009). The latter definition reveals a context-dependent dimension to experience that has bearing on the implementation of an inter-organisational lesson repository (Andersson, 2013). That is, for a lesson to be transferable between different contexts there has to be a boundary that is at least cognitively separable from the intellectual asset of a lesson.

Among the plethora of definitions of lessons learned, one of the more commonly quoted is the comprehensive definition used by several space agencies:

"A lesson learned is a knowledge or understanding gained by experience. The experience may be positive, as in a successful test or mission, or negative, as in a mishap or failure. Successes are also considered sources of lessons learned. A lesson must be significant in that it has a real or assumed impact on operations; valid in that is factually and technically correct; and applicable in that it identifies a specific design, process or decisions that reduces or eliminates the potential for failures and mishaps, or reinforces a positive result". (Secchi, Ciaschi, & Spence, 1999; Weber et al., 2001)

The above definition includes three conditions for good lessons learned: significance, validity and applicability. Other authors have pointed out similar sets of conditions, e.g. that lessons should be based on valid data, refer to the original objectives of the task, not express opinions, and generate tangible knowledge (Milton, 2010, pp. 35–36). Further it is sometimes stated that the lessons should be extrapolated from multiple sources and independently triangulated (Patton 2001, p. 334).

Lessons learned systems can be categorised by how the lesson collection mechanisms work: i.e. through spontaneous submittal (passive), requested/invited submittal (reactive), after-action collection (debriefs), proactive collection (scanning), and active (monitoring) (Weber et al., 2001).

Closely related to the lessons learned concept is that of *best practices*. Weber et al. (2001) consider them derivations from successful actions only, and not always from specific experiences. JALLC defines them simply as the "best way of operating", and states that a best practice ideally should be adaptive, replicable and immediately usable (NATO, 2011, p. 12). The EU definition of best practice is more focused on how the best practice is conceived: Best practice is an activity which conventional wisdom regards as more effective at delivering a particular outcome than any other technique (EU, 2012, p. 6).

Looking at the LLS from an inter-organisational perspective, the fact that lessons in different organisations may target different management levels, combined with the lack of standardised lessons learned processes (LLP) makes the vision of LLP interoperability seem far-fetched. The same inconsistencies can exist also within an organisation, since informal socialisation mechanisms are routinely at work and valuable for knowledge dispersion. Perhaps it is true that formalisation of the LLP should even be discouraged since these informal routines promote learning (Burley & Pandit, 2008). Therefore the route to LLP interoperability may not always be formalisation and standardisation, instead others paths may have to be chosen. Some tentative examples are socialisation and communities of interest.

In this deliverable, a set of definitions, primarily derived from EU's (EU, 2012, p. 6) and NATO's definitions (NATO, 2011, p. 11), will be used. However, an extra step, between identified and implemented has been added, to underline that learning and implementing are two different things.

- **Observation** – an observed effect of an action (or inaction) in a specific situation. An observation can be both positive (a successful action) or negative (the action fails to achieve the intended objective). A preliminary observation may need further inquiry for confirmation, e.g. through the collection of more contextual information.
- **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.
- **Lesson Learned** – a *lessons identified* that has been acknowledged by the appropriate decision-makers together with a decision on desirable actions regarding doctrine, organisation, training, materiel, leadership, personnel and/or facilities.
- **Lesson Implemented** – a *lesson learned* where the decided action has been implemented and the results of this implementation are verified.
- **Best Practice** – is the preferred actions in a specific type of situation to achieve a certain objective. Best Practice is often formalised in internal policy documents such as doctrines and standard operation procedures and could be based on one or several lesson identified/lessons learned.

2.8 The lessons learned process

A Lessons learned process (LLP) is what transforms observations to lessons identified, and ultimately to lessons learned. It is thus a systematic process for the collection, analysis and implementation of operational experiences. In its most general form, the LLP is no different from an intelligence cycle, see

Figure 3. In the planning and direction phase, the need for experiences is defined and the prioritisation of collection resources decided. In the collection phase, different methods are used to gather the sought observations/lessons. These are then processed, analysed and validated. Finally the lessons should be implemented and the implementation should be followed up.

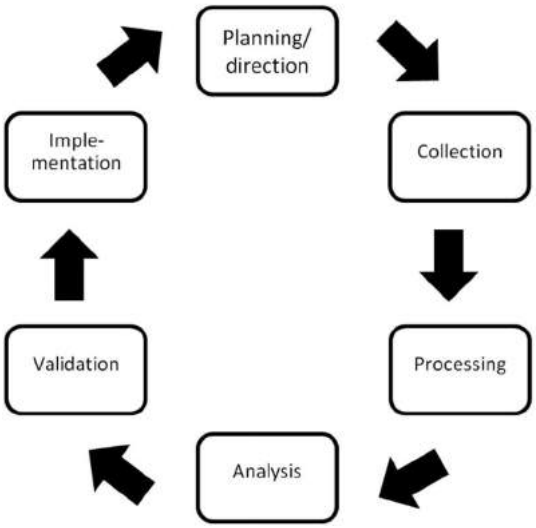


Figure 3: The Intelligence Cycle.

Systematic collection and management of experiences is popularly coordinated through a LL system, commonly with the aim of supporting resource management, increasing safety, and inducing organisational learning (Weber & Aha, 2002). Whatever the purpose, most realisations of LL systems target the collection and storage of LL through formal or informal mechanisms, with the purpose of collecting or connecting experiences (Milton, 2010; Rhodes & Dawson, 2013). LL systems can also be classified with respect to how experiences interact with the system, e.g. the system can be active vs. passive, and collecting vs. distributing (Borghoff & Pareschi, 1997). Ideally, the LL system is complemented by a process and dedicated organisation that administers the system and keeps it effective (Lackey, 2003).

Top-down, or strategic, learning means that some management level has identified a particular knowledge area as promising and takes deliberate actions to acquire that knowledge (van Heijst, van der Spek, & Kruizinga, 1997). Bottom-up, as a contrast, refers to lessons learned by individuals who recognise the potential benefit of spreading this knowledge within the organisation (van Heijst et al., 1997). Many current LL systems are based on bottom-up insights triggered by mismatch between expectations and observations, either positive or negative (van Heijst et al., 1997; Voit & Drury, 2006). Further, it has been reported that 70% of all lessons learned systems fail to implement lessons (Weber et al., 2001), popularly attributed to lack of a pushing approach to disseminate lessons (Liebowitz, 2008, p. 49). Thus, an effective LL process should target not only collection of lessons, but also analysis, dissemination and implementation.

The JALLC LLP consists of gathering, staffing, acting, and communicating lessons to ensure that learning from experience leads to improvement (NATO, 2011). This breakdown is practical as it guides the implementation of LL in an organisation, e.g. like in Figure 4. Observations, lessons identified, lesson learned, and lessons shared represent four distinct products in this framework that can be realised through a procedure of appointing responsibility for each reported observation (staffing), followed by

analysis and implementation of the lesson to learn and evolve. Dissemination of the lesson learned is the fourth step of the model, enabling sharing and vicarious learning through communication.

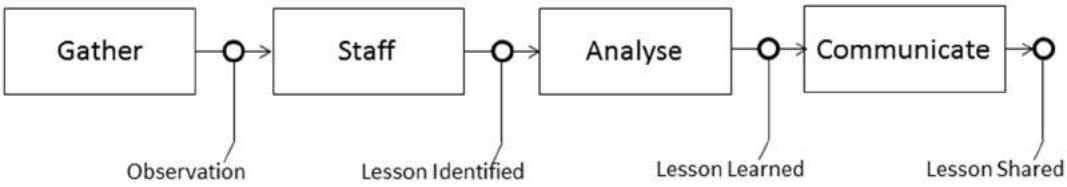


Figure 4: NATO JALLC's collection-based Lessons Learned Process.

Each step in the LL process comes with a batch of separate challenges, and involves a decent amount of craftsmanship, ranging from how to capturing observations, to that of documenting and disseminating experiences, and adapting them to new contextual constraints.

2.8.1 Capture and analysis of an observation

The beauty of the JALLC LLP description lies in its simplicity. The process is collection-based in the sense that it treats lessons as knowledge artefacts that be analysed in their own right. This viewpoint poises a grand challenge since knowledge is often a mix of components with a varying degree of tacitness (Polanyi, 1966). Capturing the most tangible pieces of knowledge is usually fairly simple as there is little more to it than writing it down on a piece of paper. However, with increasing level of tacitness, more refined methods and knowledge representations are needed (Weber et al., 2001). Qualitative methods, with varying degree of formalisation, aim at resolving this challenge by digging deeper into the source of the desired knowledge. They do so by extracting potentially useful pieces of information, connecting the dots, and systemising a way of articulate the knowledge. One such example is a methodology based on causal mapping (Weick & Bougon, 1986), self-Q interviews (Bougon, 1983) and storytelling (Schön, 1993) that has been proposed as a powerful method of eliciting tacit skills (Ambrosini & Bowman, 2001). In short the idea is based on interviews and reflection to create causal flows of events and actions that relate to a particular skill, and reveal details of the tacit tricks-of-the-trade.

Another challenge related to capturing observations is that of identifying what is relevant. Elements of attention and information usefulness affect how information is processed and reviewed, and therefore when an observation is triggered (Voit & Drury, 2006). A case study from NASA showed that the LL process needs to be incentivised to get employees to engage in observation and codification, e.g. by integrating LL into the regular work procedure (Goh & McMahon, 2009).

For lessons from missions, the mission history approach can be used to construct a media-rich story of causal relationships for post-hoc analysis that is factual and non-biased. Such story-reviewing solutions open up for qualitative methods based on other techniques than interviews and focus groups, e.g. retrospective ethnographic studies, event coding, abstraction, and content analysis.

Analysed lessons can be tagged and categorised according to the task areas which they affect. The purpose of such categorisation is to enable clustering of lessons. It has been suggested that common task interdependencies should be identified at the organisational level, to guide the categorisation of lessons as they are analysed (Burley & Pandit, 2008, p. 482)

Improper analysis can lead to *superstitious learning*, i.e. success or failure attributed to a behaviour to which it in reality has little or no causal connection. This can result in inferior routines being kept or introduced due to coincidental causality. Likewise it can result in a superior routine being discarded without having ever been given time to prove its worth (Levitt & March, 1988, p. 325). Such inaccurate learning can in fact lead to degraded performance and have a negative effect on organisational development (Tsang, 1997, p. 78).

Another problem of event-driven analysis is that of *fantasy documents*. These are reports created in the aftermath of major events to show that the responsible organisations have acted as a consequence of the event (Birkland, 2009). The primary purpose of fantasy documents is to be persuasive to the mass and thus they are less concerned with accuracy. Consequently, there is a risk that the lessons that fantasy documents teach are based on vague or fake causal relationships.

According to Bukszar & Connoly (1988), there is also a risk of hindsight bias when retrospectively assessing performance with known outcome as is often the case when reporting lessons e.g. at debriefing sessions. That is, failed performance will typically be more critically examined than successful ditto, leading to potential exaggeration of cause and effects relationships.

2.8.2 Implementation of a lesson

Typically, an implemented lesson modifies at least one of the impact factors, i.e. doctrine, organisation, training, materiel, leadership, personnel and facilities (DOTMLPF) (Civic & Carreau, 2010, p. 136). For the transformation to have a positive effect, the affected staff should acknowledge and embrace the change, regardless of which impact factor the lesson concerns. Burley & Pandit suggest that the key to employee commitment is transparency, i.e. to strengthen and communicate the relationship between the problem and the solution, and how it fits into organisation's mission (2008, p. 485).

The actual learning in itself may also meet a number of complications. For instance, inferior routines that deliver positive results may hinder the introduction of new superior routines, resulting in a *competence trap* (Levitt & March, 1988, pp. 322–323). Similarly, development of competence and abilities in the short time perspective may result in immediate results in performance, but also hamper learning in the long time perspective. Knowledge and development of abilities that lead to immediate results in performance may reduce the will to try new technologies etc. (Levinthal & March, 1993, p. 97). A related problem, *codification trap*, occurs when new problems are pursued with familiar, but in this context irrelevant, methods (Schulz, 2002).

Organisational learning is often motivated by specific objectives that the strategic management wants to achieve, although these objectives are often not as crisp when broken down to the performance level (Levinthal & March, 1993, p. 95). Because of this lack of traceability it becomes difficult to assess whether implemented learning completes the objectives. Further, the objectives themselves are not constant, as managers tend to adjust them as development is progressing, e.g. by lowering the bar or by redefining the goals to fit the results (Levitt & March, 1988, p. 325). Multiple individuals drawing conclusions from one learning scenario may create even more ambiguities, since interpretation, background knowledge, personal experience and understanding of history come into play (Levitt & March, 1988, p. 327).

Is has been recognised that it is not necessarily true that this performance increase can be attributed to learning even when lessons have been implemented and performance increase is observed. In dynamic environments the learning setting may be complex enough to conceal hidden disturbances that sometimes affect the outcome in positive ways, i.e. sheer luck (Tsang, 1997, p. 78).

To draw valid conclusions from a learning scenario, it is imperative that the identified cause and effect relationships are correct. Even with the sharpest analytical ability it can be nearly impossible to do so when the flow of events contains reciprocity, feedback loops and feedforward loops (Tsang, 1997, pp. 78–79). This, in combination with the number of samples often being very low and sometimes contradicting, adds to the complexity of learning from experience, especially in a complex and changing world (Tsang 1997, p.78f; Levinthal & March 1993, p.96; Levitt & March, 1988, p. 323f).

It is not uncommon that analysis of lessons result in the need to implement organisational change. Such changes often cause employee resistance because of perceived uncertainty and threat to power and control (Burley & Pandit, 2008). It is therefore wise to implement changes sequentially, step by step and quickly identify role models and influential team members (opinion leaders) who can initiate the transformation (Burley & Pandit, 2008, pp. 481–483).

2.8.3 Communicating lessons

Dissemination of lessons is an area that has many well covered cousins in academia, e.g. knowledge transfer, vicarious learning, and socialisation. Without the knowledge transfer sub-process, the lessons learned process becomes more of a feedback process where the affected system component is the same as the one the original observation concerns. A functional knowledge transfer process on the other hand, can spread the knowledge and share it to other portions of the system, or even to other systems. Such knowledge transfer requires strategy and planning, essentially management issues. On a system level, the transfer requires a definition of what the knowledge artefact is, how to represent it, and the process of how to actually transfer it from one part of the system to another (Goh & McMahon, 2009).

Many operational lessons learned systems and processes are good at collecting lessons but still struggle with dissemination, i.e. they are effectively used as black hole into which observations are put and never seen again (Weber et al., 2001). Acknowledging this *lesson distribution gap* is the first step to its' remedy, for which at least three different approaches are commonly employed: (1) the doctrinal approach, (2) the pushing approach, and (3) expert system approach (Aha, Weber, Muñoz-Avila, Breslow, & Gupta, 2001). The first refers to lessons being implemented in standard operating procedures and doctrines to be practiced throughout the organisation. The second can be either active or passive, directed or broadcasted, reactive or proactive (Weber et al., 2001) and implemented e.g. by massive information spreading through seminars, education initiatives, word-of-mouth, etc. The third refers to just-in-time solutions where lessons are being pushed, or requested and delivered in support of a decision-making scenario, e.g. through monitored distribution processes (Aha et al., 2001).

The positive effects of pushing information seem obvious, but Burley & Pandit (2008, p. 486) warns that too many lessons being communicated (pushed) may cause information overload among the recipients, and therefore recommends directed targeting and a balance between push and pull strategies for sharing knowledge. An alternative for sharing and disseminating lessons is the use of

Communities of Practice. This is sharing through social interaction in groups where the participants have similar interests and/or roles (Williams, 2008, p. 256).

2.9 Strategic lessons learned challenges

As is evident of the text above, every step in the described LLPs is coupled with major challenges; collection of observations has to deal with bias and accuracy issues, analysis and validation needs to deal with concealed cause and effect relationships, transferral and sharing of lessons is dependent on the ability to articulate and distribute the knowledge, storing lessons is dependent on the externalisability, and successful implementation can be difficult to verify. There are also challenges on the strategic level, e.g. regarding whether the organisations should invest in lessons learned processes or stay focused on utilising their current resources and knowledge.

The following sections presents a review of strategic concerns for organisations in the process of implementing, upgrading, or simply auditing, a lessons learned process.

2.9.1 Lessons learned and decision making

A motivating purpose for any LL system is to improve decision making, a purpose which has created two alternative views on LL systems at large. On the one hand are the just-in-time (JIT) lesson providers, which act as a decision support or expert systems. Proposed such JIT systems (Weber & Aha, 2002) often target slower decision making processes such as planning, where analytical reasoning (Tversky & Kahneman, 1981) is commonplace. Another example of JIT lessons dates back to World War II where the German army actively pushed refined tactical procedures in handouts to the soldiers. Although the lessons in these *merkblätter* were rarely novel, they did serve a purpose to proactively distribute and maintain doctrinal skills. Further, they can be argued to have contributed to a heightened morale through a perceived tactical superiority (Mains & Ariely, 2011).

On the other end of the spectrum are the systems designed to increase the knowledge base. The rationale behind such systems is that recognition of familiar structures - pattern matching - is a critical ability in naturalistic decision making theory (Klein, 1993); therefore the applicability of a lesson corresponds to how it affects the recipients' perception of the future and, ultimately, its decision making ability (Andrade et al., 2007). Thus, these naturalistic lessons learned (NLL) systems work by adding lessons, i.e. instances of knowledge and experience, into the recipients' pool of experience. Naturalistic lessons can, consciously or subconsciously, be interrogated in a time-pressed decision making situation, in the search for a viable option. Although both JIT LL and NLL systems target the LL process they have different applications from a decision making perspective and conversely need to be treated in their own right.

2.9.2 Adopting a lessons learned strategy

There is a need to score a balance between the exploration of new knowledge and the exploitation of existing knowledge (March, 1991, p. 71). When not enough time is given for new techniques and approaches to reach their potential, exploration may turn into a frenzy where new approaches are

continuously sought, applied and rejected, commonly referred to as a *failure trap*. In this situation exploration will dominate exploitation (Levinthal & March, 1993, pp. 105–106). On the other hand, exploiting existing knowledge may seem successful in the short run, and remove the incentives for the exploration needed for success in the long run, resulting in a potentially equally detrimental *success trap* (Levinthal & March, 1993, pp. 105–106). Maintaining the balance between exploration and exploitation is a debated issue referred to as *organisational ambidexterity*, with March (1991) claiming that organisations need to balance the two, while others propose that focusing on one or the other is important to gain edge (Raisch & Birkinshaw, 2008, p. 392).

2.9.3 Organisational learning culture

Culture affects organisations lessons learned efforts on several levels. First of all, culture is a lens through which an organisation interprets the world. A strong culture could be something positive, giving the organisation a strong understanding of its role and functionality. However, this cohesion may also hinder new thinking (Pfeffer & Sutton, 2000, p. 77). Relatively weaker organisations may by necessity have developed a culture and ability that is more open to continuous change than those organisations that effectively control their environment. In times of paradigm shifts, these weaker but more adaptable organisations may come out ahead (Levinthal & March, 1993, p. 101). A learning culture has been identified as a prime reason for this seemingly contradictory relationship (Levitt & March, 1988, p. 332).

Organisational learning culture is associated with the tendency to identify relevant observations and lessons and the willingness to work with these (Tsang, 1997, p. 78; Williams, 2008, p. 254). The willingness to report LL depends on the transparency of the process, simplicity of reporting, ease of contacting the information giver, timing of decisions, the ability of filtering and categorising similar lessons, etc. (Renborg, Jonsson, Broqvist, & Keski-Seppälä, 2006, p. 21). This will to engage in LL activities can be severely damaged if the process is associated with negative issues and control, therefore it is utterly important to encourage learning from positive examples and not only failures (Milton, 2010, p. 21) and to identify and cultivate incentives to engage employees in the LLP (Burley & Pandit, 2008, p. 483).

On the individual level there is always a risk of bias in self-reporting, and likewise lessons can become distorted by the reporting mechanisms themselves, either through sloth, human errors or inadequate granularity (Riege, 2005; Williams, 2008, p. 254). It is also well-known that individuals tend to manipulate and filter information if there are incentives for them to do so, e.g. to avoid blame, to gain attribution, and to avoid criticising others (Tsang, 1997, p. 78). Furthermore, at the individual level the lack of time as well as lack of incentives and awareness will affect negatively the willingness to work with lessons learned (Riege, 2005; Williams, 2008, p. 254). Whether this negligence to report has political, strategical or personal reasons, it generates challenges for the organisation to capture such observations.

Riege (2005) points also at the management levels, with the importance of including knowledge sharing in the organisation's long-term strategic approach, and using leadership to encourage learning. Commitment and high level of expectations from the management have been noted as important keys for learning (Milton, 2010, p. 23f; Popper & Lipshitz, 2005, p. 48.). Related, Weber et al (2001, p. 71) regards lacking integration of lessons into decision-making processes as a factor hampering lessons

learned systems. Further, management consistency and social identity reinforces a learning culture in organisations (Pfeffer & Sutton, 2000, pp. 87–88).

The average ability of an organisation's performance increases with learning, while the need for improvisation is reduced. Such streamlining is good for predictability in production when success is coupled to the quality of combined performances. However, when survival depends on a few events, where winning is the only option, relying on experiential learning is a less appealing alternative. Instead new and innovative thinking may be required, increasing the variance (Levinthal & March, 1993, p. 106; March, 1991, pp. 81–82). Therefore, stimulating improvisation and creative thinking may be equally important as implementation of organisational learning to the organisations' success (Andersson & Rankin, n.d.). This is not just a matter of motivation and capability, it is also a matter of time and will – if employees are not given the time to reflect and engage in creative thinking or fail to understand its' value, the lessons learned process is not likely to produce any value for the organisation (Burley & Pandit, 2008, p. 484). Publicising employee involvement has been suggested as one method of increasing overall engagement (Burley & Pandit, 2008, p. 487).

3 From challenge to perspective

The primary purpose of interoperable lessons learned management is to enable the transfer of valuable experience from one organisation to another. To fulfil this objective the process and system must support basic LL functions such as collection, analysis and dissemination of lessons. These tasks are complex and filled with challenges such as getting employees engaged in reporting observations, resolving cause and effect relationships, and implementing lessons in the organisation to generate the desired effect.

While these tasks are complex enough themselves, the added complexity of organisational interoperability brings new challenges to the table, such as role translation, context transformation etc. That is, a lesson taken from a specific crisis management system may not be immediately applicable to another system because of different organisational structures, cultures, procedures and legislative frameworks. However, after some careful analysis and translation, there may, just may, be hidden gems to be found.

An interoperable lessons learned framework should encourage organisations to look beyond rank, procedure, and nationality when identifying lessons. A preferred method for sharing identified lessons is through communities of practice using well-practiced methods for knowledge sharing e.g. with the support of social media, custom software and through face-to-face interaction at recurring conferences. A challenge is that of attaining interest in such communities and reaching out to the relevant organisations. Central to the current chapter are the research questions related to sub-task 2. These deal with characteristics and challenges of cross-border, cross-sector, and cross-phase (X-BSP) lessons. By bringing together our ideas on this topic with the findings from the previous chapter, the contours of a Lessons Learned Framework are coming into view in the final paragraphs.

3.1 Challenges

There is good reason to believe that the area of crisis management has an even more complicated relationship to lessons learned, compared to many other areas. Fragmented in nature, the crisis management system consists of a multitude of organisations that are often competitors, although still interdependent, within a multitude of sectors with different rationales, purposes and legal frameworks. They may be public or private and they can be active on one or several levels: local, regional, national and international.

Furthermore, crisis management is literally about life and death. The political and economic cost *of not learning* from earlier experiences could be high. At the same time, it is necessary to encompass a wide variety of different types of events. It is on the one side *routine everyday incidents*, such as a domestic fire or a car accident. New observations and lessons regarding procedures, methods, equipment, etc. are potentially available daily from these events. On the other hand, it is the *seldom-occurring large-scale crisis*, such as a severe flooding or a large chemical accident. Few observations and lessons are available from these exceptional events. In many cases these observations/lessons are furthermore drawn from a very specific context, making their general applicability difficult to assess.

The issue of leadership involvement is important in all lessons learned processes (Annex 3). It is a question of encouraging the members of the organisation to take an active part in all steps of the lessons learned process, by underlining its importance and by creating a *learning culture,* but also by allocating time and other necessary resources to the process. However, in the crisis management system this is further complicated by the fragmented nature of the system. Hence, not only the leadership within a specific actor needs to advocate lessons learned, also leading actors such as branch organisations and national and multinational crisis management agencies need to take such a role in the crisis management system. The fragmentation also means that what is seen as important lessons may differ between organisations, sectors and levels. Leadership may include to motivate and/or persuade actors to collect and analyse lessons that are not of immediate importance to themselves.

Finally, the issue of trust is pivotal if the cultural, political and organisational gaps between sectors and between countries are to be bridged. Without trust, information that is sensitive will not be shared. At the same time, an LLF that involves a large number of organisations and actors will have a severe challenge in creating such trust.

All of the above will complicate the development of a common understanding of the lessons learned process, including how and with whom lessons should be shared. Any well-functioning framework for lessons learned in crisis management will need to handle these complexities.

In the next sections the challenges in each phase will be further analysed. However, first we will discuss two challenges present in all phases: contextual differences and lack of resources.

3.1.1 Contextual differences

Contextual differences exist between organisations, sectors and levels (local, regional, national, international) in the crisis management system. In Annex 2 a number of contextual factors, from a cross-border and cross-sector perspective, are identified: culture and language, legal and administrative frameworks, private or public ownership, crisis management role, perceived threats and risks and physical geography.

Some factors may have several dimensions. Culture is both the internal culture and how we as humans perceive and explain the world. While the former is an enabler (or disabler) for the lessons learned process, the latter may result in losses in translation when transferring a lesson from one context to another. Language is both about the actual language used and about the meaning of specific terms in different contexts.

The contextual differences will affect how a crisis is perceived. They will impact what observations are identified and reported, how these observations are analysed and how the resulting lessons are disseminated, understood and subsequently learnt.

It would be naïve to believe that the contextual differences could be removed. Although the internal culture of an organisation can be influenced at least to some extent, if enough time and leadership commitment is invested, factors such as national administrative culture, geography and risks are more inert. Thus, the LLF must offer a structure and process which allows for the translation of lessons from one context to another. This may be attempted in several different ways, which are not necessarily mutually exclusive.

First of all, it can be done by carefully, and in quite some detail, describing both the event and its context. The former will include describing the situation, actions taken and outcomes. The latter will include describing details of organisations involved, persons involved, administrative and legal preconditions, geography, weather, date and time, technical equipment and other circumstances that may affect the analysis and interpretation of the situation. This will enable an analyst in another organisation, sector or country to compare the context with his/her own, and make necessary adjustments in conclusions. This is a cumbersome method that at least in the case of more complex lessons is difficult to manage.

Secondly, it can be done by decontextualizing and generalising the lesson in the analysis process. This is done either by combining a large number of observations from different contexts, and analysing the overall trend, or by removing all contextual layers of a lesson and only keeping the core, independent of context. The risk with decontextualized lessons is that they may become so general that they are simply not of much use.

Thirdly, it can be done through an interactive and collaborative process. There are several alternatives. The perhaps most simple one is the use of seminars, after-action reviews, high-level or expert meetings and collaborative web resources to identify, analyse and share lessons. Another alternative, somewhat more ambitious, is to have a human interface acting as a broker of information. This could be a role for a public crisis management agency or branch organisation (see the suggested approach in Annex 3). Finally, and definitely the most ambitious alternative, is to have joint collection and analysis of observations and lessons, involving all actors with an interest in a specific type of crisis or in a specific functional area. Although efficient in achieving mutual understanding, these methods are costly in resources. Furthermore, seminars and similar events can only be arranged for a limited number of crises or types of lessons.

3.1.2 Lack of resources

It is a recurring theme in the interviews that lack of time and other resources is a hinder for working with lessons learned. This is said to affect all steps of the lessons learned process – collection, analysis, and dissemination/learning. To a large extent, the availability of resources could be seen as a reflection of the leadership commitment. If in practice no or inadequate resources are allocated to the lessons learned process, the attention of the management is probably focused on other processes regardless of what is stated in policy documents or presentations.

The lessons learned process needs considerable resources, and it is understandable if management levels shy away from these costs, especially if the gains seem uncertain or unclear. In some cases, *fantasy processes* (cf. *fantasy documents* in Section 2.8) are set up just to be able to say that there is a lessons learned process, however marginal its resources are in practice.

A Lessons Learned Framework can do little to change the allocation of resources within individual organisations. However, leading actors such as government agencies and branch organisations have a role in explaining when and why a “lessons learned” process may be useful for the individual organisation and for the overall crisis management system. The LLF may show on these advantages, and help actors to develop well-functioning and cost-effective lessons learned processes. It should also point out the need to allocate adequate resources to the lessons learned processes.

3.2 Perspectives

In this section the discussions and conclusions are used to give further perspectives on the different steps in the lessons learned process: Direction, collection, analysis, dissemination, and learning.

3.2.1 Direction

The process of directing the lessons learned process aims at prioritising available resources to the most pressing needs for experiences. The interviews, however, show that very few actors have processes for such direction. It is either completely lacking (meaning that either nothing or almost everything is collected) or programmatic (meaning that all crises of a specific size or character are searched for lessons). Even in the latter case, it is in many occasions rather a direction saying to collect lessons rather than a direction describing what types of lessons to collect and within what functional areas (cf. Annex 4).

The fragmented nature of the crisis management system is in itself a challenge to direction and prioritisation. This is especially true if one actor's need for lessons is actually best fulfilled by another actor. Apart from such reporting that is defined in laws, regulations and voluntary branch agreements there are few tools for prioritising across organisational, sectorial or national boundaries. The LLF should support the development of a process for multi-organisational, multi-sectorial and multi-national direction.

The process of direction needs to be based on a strategy for lessons learned. As we have seen though, it is not certain that experience is always the right answer to the question. There is a need for a balance between exploration (developing completely new knowledge) and exploitation (taking advantage of currently existing knowledge, for instance in the form of lessons learned). Especially in a situation where completely novel ways of thinking are necessary, it is less plausible that these will be revealed in a lessons learned analysis dealing with existing structures and procedures. However, if improving and developing procedures, technologies, training etc. is in focus, the exploitation of lessons (internal and external) may be the preferred choice.

3.2.2 Collection

Collection is the sub-process where observations are collected by individuals taking part in the operation/exercises/preparations or by observers (or in some cases by sensors such as cameras). Collection can take place in all phases. Collection of observations relevant to actions in the operational phase may take place during *and* after the operational phase. In many cases important operational lessons will not be evident until the recovery phase, when the consequences of the chosen actions become obvious.

Several challenges regarding the collection of lessons learned are explored in the current chapter. One is to identify the most relevant observations in the multitude of different potential observations. Direction of the lessons learned process could offer some guidance, specifying those areas that are of

specific interest. However, in reality the personal experience of the persons collecting the will in many cases affect what observations are recognised as relevant.

Another challenge is the willingness to identify and report observations. This could partly be seen as an effect of the organisational culture. Is it a culture that encourages reporting, also of negative issues, without the risk of reprisals? Or is it a blame-seeking culture where only politically acceptable observations can be reported without negative consequences? These extremes would affect the reporting in very different ways. Closely related, human traits such as bias and sloth will also affect the willingness to report.

The available procedures/methods will affect the willingness to report. Straight-forward and easy-to-use tools will encourage reporting while the lack of such tools will lead to fewer reports. The LLF must offer tools that are adapted to the users, often pressed for time and working in chaotic situations, at the same time as providing the analysts with the necessary information, including context and enough granularity.

In Section 3.1.1 the need for a detailed description of the context was underlined. The tools in the LLF need to support the capture of such context, without overloading the collector with long lists of information to collect.

Finally, the transparency of the process and the feedback to the collectors, will impact the reporting. It is however difficult to achieve instant feedback, and the collectors may also have unrealistic expectations on the results of their observations.

3.2.3 Analysis

Analysis is where the observations are analysed and turned into validated lessons. Without analysis, observations remain just recordings of events, with unknown generalisability and validity. Analysis is in many cases carried out by others individuals and groups than those who collect the observations.

In Section 2.8 a number of issues in the analysis of observations are discussed. The issue of causality is perhaps the most important one. With few observations in an uncontrolled environment it is extremely difficult to establish the causality between a chosen action and an outcome. Instead, what has been named *superstitious learning* (Levitt & March, 1988) may appear, and result in the keeping or implementation of inferior procedures, due to false causality. Another aspect of causality is hindsight bias (Bulkszar & Conolloy, 1988), where the outcome of events affects how the different actions are assessed in the analysis.

Furthermore, the phenomenon of so-called *fantasy documents* (Birkland, 2009) is noted. These are documents primarily used for show of initiative and white-washing, rather than to duly explore and present relevant lessons.

It can also be noted that the analysis and validation of observations/lessons take time and other resources. Failing to allocate such resources or believing that the analysis can be handled in the regular structures will hamper the lessons learned process (Försvarsmakten, 2010).

Politics will in many occasions play a role in the analysis and validation of lessons (cf. Section 2.4). Unwanted results may be down-played or not communicated, and positive ones overstated. This can be especially true in multinational contexts, where national prestige can affect the willingness to accept certain conclusions (cf. Sections 2.7 and 2.8).

To be able to carry out the analysis, it is necessary to ensure that the context is well-described. This is a balance between the needs of the analyst and the time and resources available to the collector. However, well-designed reporting tools may help to achieve the desired levels of detail in describing the observation and its context.

The LLF must emphasize the need for analysis as well as the need to allocate the necessary resources for this. Furthermore, a separation between the analysis and the decision what to do with the results from the analysis is necessary to avoid political contamination of the analysis. Finally, the difficulties in determining the true causality and in validating the potential lesson, calls for a multi-source approach both in the analysis (using several different sources describing the same or similar observations) and in the validation (using several different types of analysis, for instance expert advice, earlier research etc.) to confirm the value of the lesson.

3.2.4 Dissemination

Dissemination is the step where analysed and validated lessons are shared with potential users, within or outside of the organisation of origin. It can be done through push (send out lessons to all users, i.e. broadcast, or to groups of potentially interested users) or pull (the users themselves search for and acquire relevant lessons in a repository). The willingness to share can be hampered by similar mechanisms as the collection, such as reluctance to reveal weaknesses and failures. This can be true both between and within organisations (cf. Section 2.4 and Annex 2). Furthermore, competition and the risk to reveal sensitive information (business secrets, security information) can also affect the willingness to disseminate and share information.

In the questionnaires, the question *what types of information regarding observations/lessons would you, generally speaking, be able to share with others?* was asked. Although 10 respondents answered that they would be able to share everything (observations and lessons, including all relevant information), 8 answered that they could only share lessons/observations that were anonymised and 8 answered that they could only share lessons/observations that were anonymised *and* summarised. 10 respondents answered that they would be very restrictive in sharing, or not share at all, primarily due to confidentiality and data protection issues.

The question *with whom* the respondents wanted to share, showed that 15 respondents would only make lessons available within their own organisation, while 9 respondents would be able to share the information with everyone, without limitations.

Also the receiving side in the dissemination process can encounter challenges. The first is to admit the need for lessons and recognise that the experience of others may be of value. Several respondents in the interviews saw little use for lessons from others, primarily due to perceived differences in context. The second, if the need and value of lessons are recognised, is to overcome the barrier of translation from one context to another (cf. Annex 2). The challenges in contextual differences will be further accentuated in cross-border, cross-sector and cross-phase sharing (cf. Annex 2). This will also be discussed in the next section.

In many cases, lessons learned dissemination is based on a pull philosophy. Users are supposed to tap into a storage of lessons and try to search for lessons of relevance to their situation. This process is often seen as cumbersome and as not providing the necessary lessons in the right time.

From the interviews, it is evident that much of the actual sharing and dissemination happens via completely different channels, such as after-action reviews, seminars, high-level meetings, communities of interest etc. Furthermore, the sharing usually is less about handing over pieces of detailed lessons in writing (in a database or on paper) and more about story-telling and case studies, not seldom primarily shared orally. The Dutch Mayors organisation, with a lessons learned broker functioning as an advisor to mayors facing crises, is another form of interactive and collaborative dissemination/sharing, and could be an efficient way of transferring and translating lessons from one context to another (cf. Annex 3).

Different types of lessons need to be disseminated via different channels. A database may be a good storage facility, but less suitable for sharing. However, for the sharing of technical and very specific lessons to a community of interest, it may still be an alternative.

The use of broader push methods, such as edited web-papers for specific user groups could also be an alternative for lessons that are not sensitive or classified. Furthermore, different types of web-resources, such as discussion fora with chat functions, could be used for distributed dissemination, peer to peer. Different types of interactive and collaborative methods for sharing, including workshops, high-level meetings and information brokers, can be useful to a broad spectrum of lessons.

Branch organisations and national/multinational authorities can function as clearing-houses in the sharing and dissemination process, if necessary anonymising and generalising the information before sharing. Sharing could then take different forms: databases, newsletters, high-level meetings, communities of interest etc.

There is a difference between lessons of an everyday character (e.g. concerning a novel method for extinguishing chimney fires) and lessons of rare and/or very large crises. Whereas the former are usually well-defined and specific, with a clear target-group (firefighters) and few contextual factors to take into consideration, the latter are more often complex and diffuse, involving large groups of different actors on different levels (local, regional, national and multinational) and heavily dependent on context. Everyday lessons can be more suitable for written dissemination (e.g. in edited web-papers), while lessons from large scale crisis more often need collaborative and interactive methods of dissemination to be properly understood.

Regardless of how the sending side is organised, the receiving side must be able to receive and interpret the lessons. This calls either for lessons that are well-described or for access to knowledgeable persons in the sending organisation who can relate and explain the lesson. Furthermore, the receiving organisation must translate the lessons into its own context (cf. Annex 2). This analysis will in many cases take time but may also require considerable knowledge.

Dissemination is a key question for any lessons learned process and needs to be based on trust, mutual benefits and functional methods. The LLF can help develop trust. However, it is important that leading actors in the crisis management system (branch organisations, national and international public agencies etc.) take active part, and show leadership, in the lessons learned process. Mutual benefits are not always evident and in some cases lessons will not be exchanged on an equal basis. Instead, some producers of lessons may benefit from an improved crisis management system rather than from receiving lessons of use for their own development. Finally, the LLF will need to offer useful and functional methodological approaches to dissemination and sharing. From the analysis one conclusion is that this should only to a lesser extent be IT-supported lessons learned management systems.

Instead arenas and fora for interactive and collaborative dissemination are more important. However, a format for lessons needs to be developed.

3.2.5 Learning

Learning is the final step in the lessons learned process, in which the lessons identified are implemented. The interviews, as well as earlier research, indicate that the learning side is generally underestimated in lessons learned processes of crisis management organisations.

In Section 2.8 it is noted that about 70% of all lessons learned systems fail in the implementation and learning phase. There are several general challenges: competence traps, in which inferior routines delivering positive results undercut the implementation of potentially superior routines; codification traps, in which well-known technologies and methods are preferred even though they are not at all adapted to the problem; failure traps, in which new methods and technologies are not given enough time to prove their value, being abandoned prematurely; success trap, in which short term successful changes and improvements undercut the search for and implementation of long-term solutions (cf. Section 2.9).

In the interviews, the most frequent answer to the question of challenges and barriers to learning was however a different one: the absence of time and other necessary resources for learning. This included resources for testing, training and exercising. Several respondents also mentioned contextual differences as complicating the learning process. Finally, a lack of a common format and methodology for describing lessons was noted as problematic in some interviews.

Altogether, this calls for the implementation of a learning culture, in which openness to new ideas and experiences, even if they originate from someone else, is encouraged. To foster the development of such a culture is a leadership responsibility, both within organisations (management) and within the crisis management system (leading organisations).

This culture must however be paired with the allocation of time and other necessary resources for learning and implementation. The role of the LLF would primarily be to underline this and offer a structure. Leading crisis management organisations (branch organisations, national and multinational organisations) can support learning and implementation by underlining and explaining its importance and by offering education, training events and exercises in which actors get the opportunity to implement lessons.[21] However, lack of common aims, procedures and benchmarks for lessons learned between countries, sectors and organisations, may complicate such common events for exercise and training.

Finally, how the lessons are presented will affect if and how they are learnt. As noted in the interviews, few lessons are successfully disseminated in the form of a post in a database or in the form of a formalised, written statement. Instead collaborative and interactive ways of dissemination are primarily used, increasing the transferability but possibly also the chances of actual learning. Lessons that are easy to understand and easy to adapt to local contexts, will have an advantage. However, not all experiential learning can be based on common training and interactive transfer of lessons. There is

[21] At the EU-level DG ECHO have an expert training and exchange programme. At the national levels there also exist different kinds of training and exercise programmes that may function as arenas for learning. An obvious challenge is the lack of common routines and procedures on the multinational level.

still need for ways to transfer lessons, or conglomerates of lessons, in a written format. The easiest form could be edited articles in branch media (web, paper), but more innovative ways, such as mind-maps could also be used.[22] Different methods would apply to different types of lessons (cf. Section 2.3). An LLF should, as a part of an exchange on *Best Practices for Lessons learned*, offer advice on this.

3.3 Discussion

3.3.1 Cross-border, cross-sector and cross-phase lessons learned

Many of the challenges identified above are reinforced in cross-border, cross-sector and cross-phase (X-BSP) processes for lessons learned. This is true for the challenges of contextual differences as well as for the challenges in direction, collection, analysis and dissemination. There are several reasons for cross-border, cross-sector and cross-phase sharing. The most important one is that sharing lessons will help different organisations to manage a crisis in a more effective, efficient and safe manner. Since large scale crisis seldom occur in the same country and in the same sector, there is little experience to build upon. The available experience is often drawn from situations occurring in very different contexts. In many cases these experiences will also stem from exercises, which in themselves may be more of limited experiments than a true representation of a complex crisis. This calls for methods and means to access available information and adapt it to new contexts.

Furthermore, the need to be able to work together in the immensely complicated crisis management system also calls for the sharing of lessons. In crisis management, the lessons learned system cannot be limited to deal with the improvement of one's own operations. This includes mainly public sectors such as the rescue services or the health care system as well private sectors such as telecom and food production and distribution. Therefore lessons focused on how other actors may be affected by the crisis or by your actions can be equally important.

The conclusion is that lessons are important both to incrementally improve an organisation's ability to manage both major and minor crisis and to improve an organisation's ability to function in, and contribute to, the overall crisis management system in a major crisis.

The X-BSP perspective must thus be present in all steps of the LL process, not only in the dissemination. Direction must take place at the sectorial, multi-sectorial, regional, national and multinational levels, resulting in needs for lessons that may have to be collected by other organisations than those where the needs were identified. X-BSP hence also affect the collection and analysis. Collection must include needs originating outside one´s own organisation, and sometimes be carried out jointly with others. Two sectors may for instance recognise the need lessons on similar subjects and consequently carry out a common collection and analysis.

Branch organisations and public bodies (local, regional, national, multinational) will need to play a role in the development of X-BSP lessons learned. This can be done through the creation of cross-border and cross-sector forums where needs and lessons can be discussed and shared. The European Union can establish both cross-border and cross-sector forums. Branch organisations can establish cross-

[22] One example that was brought up during the seminar was mind-maps, based on experiences, explaining the division of responsibilities and labour during different kinds of complex crisis. See www.burgemeesters.nl/node/658.

organisational and, jointly with other branch organisations, cross-sector forums. National agencies can establish cross-sector forums and, jointly with other countries, cross-border forums.

However, not all lessons need to be shared X-BSP. That could even be counterproductive, resulting in a massive X-BSP flow of big and small lessons of varying interest to other actors. Instead there is a need for different processes on different levels in the crisis management system – organisational, sectorial, national, and multinational. Even in cases where cross-border, cross-sector and cross-phase sharing is actively sought, it is far from easy. First of all there needs to exist an understanding both at the receiving and sending organisation of the need for sharing. Secondly, culture, organisation, legal framework, political issues, competition etc. will complicate the process and the risk is significant for vital information being lost in translation or not received at all. Thirdly, availability of time and resources for lessons learned will vary from sector to sector, from organisation to organisation. It is therefore necessary to identify those lessons that are of real interest to share X-BSP. A process that is seen as cumbersome and not containing enough interesting information will not be used. Simplicity seems to be a basic feature for any successful lessons learned system and process, and probably also for a Lessons learned framework, with the ambition to foster X-BSP sharing. As discussed in Annex 3, formalised processes may not always be the way forward. Instead these can be shared through communities of interest (*ad-hoc* or permanent), through joint training and exercises, through information material (films, proposals for best practice etc.), through web-resources or printed resources, through communicated voluntary agreements and through directives and regulations. However, there are limitations to this since the incentives on the sharing and the receiving sides may not always coincide.

Finally, co-operation on lessons learned should not start and end with the sharing. Co-operation on collection and analysis could help creating an in-depth understanding of both the lessons and their contexts among a wider group of organisations, sectors and countries. Similarly, the co-operation in actual learning may also be beneficial, for instance in the form of co-operative exercises.

It would be naïve to believe that any structures for X-BSP lessons learned could instantly be broadly implemented. Instead, it is probably more fruitful to try to identify some functional areas for which cross-border and/or cross-sector sharing are acceptable and desirable to most actors. Starting with these, trust and structures can be built between organisations, paving the way for further development of lessons learned cultures within organisations and within the functional area, but also spearheading a broader implementation, outside of the functional area. In addition, the interviews also showed that many respondents are generally hesitant about the usefulness of X-BSP lessons, due to the perceived contextual differences and due to the view that they have adequate experiences within their own organisation (See Annex 2).

3.3.2 User needs

The interviews indicated that there is no common view among organisations involved in crisis management regarding the nature of their need for lessons learned. However, many organisations do acknowledge the need for lessons, although less so for cross-border and cross-sector lessons. As is confirmed in the questionnaires, these lessons are seen by many as too difficult and not meaningful due to the contextual differences between countries, regions and organisations. Most of the

respondents foresee that lessons will mostly be extracted from their own organisation. Furthermore, lessons are primarily seen as implemented in the preparedness phase (training, education, organisational development, procedural development, planning of operations), and less so for the operational phase, something that is also confirmed in the results from the questionnaire.

The interviews further indicated that local and regional public crisis management actors search for lessons on quite concrete matters such as risks, threats, methods and procedures. At the regional level lessons on issues such as causes, resilience, mitigation and resource allocation were added while the national level focused on overall development of risks and threats, including costs and cross-sector effects. Furthermore, in the private sector economic incentives were the leading ones; to that purpose lessons regarding product safety, production continuity and brand management were important.

The responses to the questionnaire also highlighted that most organisations foresee that lessons learned system/process will mainly be used to share lessons within the own organisation or with similar organisations within the country. Furthermore, the conclusion from the questionnaire that vertical sharing is seen as less important for a lessons learned system/process, is consistent with the findings in the interviews that few or no vertical flows of information actually exist.

Previous EU Security Research projects such as ACRIMAS and CRISYS highlighted lessons learned as an integral part of the planning and execution of crisis management operations. In the ELITE project, the need for lessons was the starting point and the problem areas that ELITE defined could be seen as representations of the perceived needs. These areas were however fairly general.

What processes/systems for lessons learned already exist?

Previous research, interviews and the responses to the questionnaire all show that most organisations have some process for gathering observations from exercises, training, incidents and operations. However, these processes are in many cases referred to as *incident reporting* or *investigations*[23] rather than lessons learned. As such, they are in some occasions rather ad-hoc and decided on a case-to-case basis instead of included in a systematic and structured process. One exception is the Dutch Mayors organisation, with a lessons learned broker functioning as an advisor to mayors facing crises.

Very few common formats or structures for investigating and reporting seem to exist, and those that exist are mostly in those areas where this is required by laws and regulations. Cross-border and cross-sector sharing seem to be ad-hoc, built on personal or in some case geographical ties. Case studies and after-action reviews were mentioned by several respondents from different types of actors as important methods for collection. Only a few examples of other types of active collection (sensors, observers etc.) were noted.

What are the gaps in the existing processes for lessons learned for crisis management in Europe and in the overall crisis management lessons learned processes?

Overall, there is a general lack of functioning, structured lessons learned systems within organisations, sectors and countries. As noted above, most of the existing systems are based on incident reporting

[23] However, systems for incident reporting can in some organisations be very structured and closely monitored by the management.

rather than the active and structured search for lessons. There is *de facto* little or no direction of the process: it either collects everything, whatever happens to be available or only that which is required by laws and regulations.

Furthermore, the flows of observations/lessons within and between organisations and sectors, and across borders are weak. Factors such as culture, organisational and sectorial roles, security, sensitivities, and competition, affect negatively the willingness and ability to engage in lessons learned and to share lessons. Also, lack of structures and formats for sharing was raised as an issue. The lack of IT-supported lessons learned systems could be a gap, however most respondents, although not ruling out the use of technical systems, emphasised cooperative and interactive methods for the sharing of lessons rather than technical.

From the interviews and questionnaires, it is apparent that many organisations simply do not recognise the usefulness of lessons from others, mainly due to perceived differences in contexts, roles, etc. Finally, the importance of the implementation and learning aspects can hardly be overestimated, and the need for understanding the incentives for learning in different types of organisations must be underlined.

Previous EU Security Research projects have recognised the importance of lessons learned processes, while highlighting a number of challenges in the collection, analysis and dissemination of lessons learned. These challenges include cross-border and cross-sector issues as well as learning issues, but also the need for a framework that is general and holistic, and possible for most organisations to accept. However, except for the ELITE project, very few concrete methods and approaches have been presented. The results of the ELITE project also underlined some of the inherent challenges, including the difficulties in ensuring that relevant information is easily accessible.

The Lessons Learned Framework

The LLF could help the development of both a more common view among actors of the needs for lessons learned and an understanding of what lessons are of interest to what type of organisations. Furthermore, the LLF should be the basis upon which individual processes and systems can be built, encouraging the development of well-functioning and well-structured lessons learned systems that can exchange information with each other.[24]

This underlines the conclusions from Chapter 2 that a harmonised LLF needs to be adaptable enough to be relevant for several different levels, sectors and types of lessons. On the other hand, if it is to be implemented at multiple levels and types of organisations and if it should be able to bridge the identified gaps, then it must also be simple and straightforward to use for all these actors. This means that it must be based on a structure and on a terminology that makes sense to a broad selection of organisations.

This does not mean that all types of lessons should or could flow in a singular system. Quite the opposite, the LLF must help us understand what information should be shared and in what channels

[24] *Exchange information with each other* does not imply any kind of automatic exchange of information between individual systems, apart from in those cases where this is desired by all actors involved. Instead it should be understood facilitating exchange, regardless if automatic or on a case-to-case basis, through common formats, levels of detail, etc.

and in what formats. Furthermore, this also means that the incentives for each organisation to engage in LL activities must be properly understood.

To be able to develop a functional LLF, it is necessary to further investigate the general challenges to all lessons learned processes as well as the specific challenges to lessons learned processes in crisis management. Furthermore, the preconditions for cross-border, cross-sector and cross-phase dissemination/learning need to be studied to enable the LLF to increase the flows of lessons between actors, sectors and levels. The interface between the lessons learned process(es) and the humans also need to be understood, as a step towards a LLF that encourage simple and still useful LL systems.

It is noted that most lessons learned processes today lack a direction of the collection and analysis of observations/lessons. This is thought to lead to an information overflow, resulting in misuse of resources and lessons important to the crisis management capability being missed. A model for the direction needs to be proposed in the LLF. These subjects receive attention in Annex 4 and are all further analysed in the next chapter. Finally, the difficulties in achieving actual learning has been noted, and will also be discussed further in the coming chapter.

3.3.3 Perspectives on lessons learned as a system-of-systems

Lessons learned processes in crisis management could be seen as a *system-of-systems*. In its most simplified and ideal form, a single sector such as the rescue services could be illustrated in Figure 5.

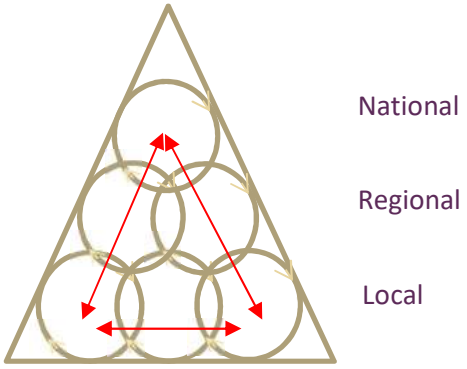


Figure 5: An ideal lessons learned process in the public sector (e.g. rescue services).

At the local level there are a number of different rescue services, working together and also sharing lessons. At regional level, the regional crisis management body will have cooperation with the local rescue services, each other and with the national level. An important task will be the coordination of efforts and resources. There will be flows horizontally and vertically.

However, as has already been discussed, in the real world the situation is often quite different from this ideal representation. In many cases the circles will not overlap each other, let alone exchange lessons.

In the private sector the lessons learned system of systems would in some cases look somewhat different, and more complex, depending on what sector and what types of actors are studied. In a vertically integrated sector, such as telecom, the lessons will flow inside actors, and only be shared at the strategic level, through a public authority or a branch organisation (Figure 6).

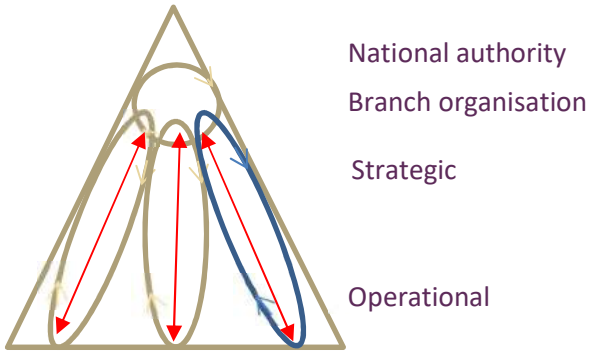


Figure 6: Lessons learned processes in a vertically integrated private sector (e.g. telecom).

Another type of private sector is the fragmented one. Food production could be one example, where both the production and processing of food products are fragmented (multiple actors), from which the big retail chains purchase the food products that they sell. For each food product there will be complex internal relationships affecting the flows of lessons (Figure 7).

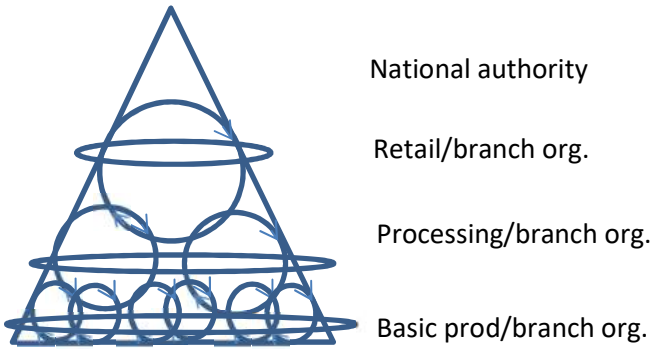


Figure 7: Lessons learned processes in fragmented sector.

When trying to combine the lessons learned processes of these three different types of sectors, that often need to cooperate in a crisis and thus have potential need to share observations and lessons, the full complexity of a more comprehensive LL process is well-illustrated (Figure 8).

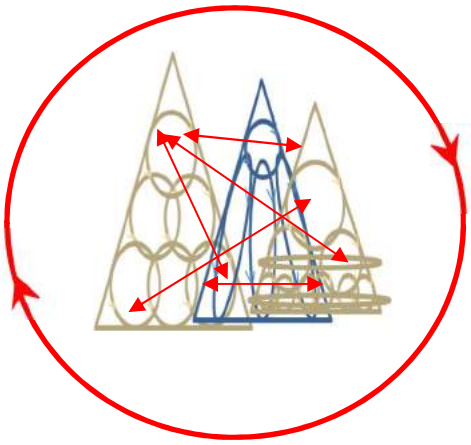


Figure 8: An overall LL system encompassing different types of sectors.

This complexity due to the different characteristics of different sectors underlines the conclusion that there is little meaning in trying to construct an all-encompassing process or system for lessons learned. Instead we need to understand what lessons could and should be collected and shared in a cross-border and cross-sector context.

3.3.4 Lessons learned in crisis management

In Chapter 2 we established that there is a need for lessons learned in crisis management. This includes the need to exchange lessons between organisations and between sectors. These exchanges can, however, be very different in nature depending on both who is sending and who is receiving.

Horizontally, between organisations of the same type, in the same sector and active at the same level, the exchange could be *best practices*. This would be experiences that show the best possible choice of actions in a certain crisis situation and/or possibly on actions to avoid. Since the organisations are similar, with similar tasks, the challenges will also be similar. If the actors are heavily interdependent, lessons describing how a crisis will affect the output from an actor, or the need for input, may also be of interest. One example could be interdependent electrical distribution systems.

In the example above, regulations, cultures and other contextual factors would generally be similar, which could make the sharing easier. This does not rule out unwillingness to share due to for instance reasons of competitiveness or due to not wanting to expose failures. Furthermore, on the surface similar organisations may still have very different cultures and sets of values, leading to differing views on when, how and what to collect/analyse as well as on the learning process itself. In a situation with organisations residing in different countries, the potential for information being lost in translation would increase.

Horizontal exchange of lessons learned may also take place between actors at the same level and of a similar type but in different sectors. For instance, telecom and electrical power distribution may have a useful exchange regarding best practices concerning line repair. Furthermore, due to the strong interdependence between electrical power and telecom, these actors would probably benefit from lessons regarding how to support each other, including the need for input and the potential output in different crisis situations. These lessons would probably be on a more aggregated level, rather a type

of conclusions based on lessons.[25] Since the actors will have different cultures, languages and incentives the transfer of lessons will probably be more difficult in this case.

There is also a need for vertical exchanges of lessons. Such exchange may take place within one organisation (in a vertically integrated business such as telecom), when the strategic and operational levels exchange lessons and best practices. It can also take place between actors and authorities or actors and branch organisations. In this case mitigating actions, best practices etc. would be of interest and the authority or branch organisation could function both as an analysing level and as a hub or clearing house for lessons. Finally, vertical exchanges can take place between actors at different levels. Producers and processers of food stuffs could be one example. The focus in this case would probably be on aggregated lessons describing the needs and abilities of actors during crisis. For instance, the livestock farmer needs to know if the meat processing factory under certain circumstances will not be able to accept any deliverance of livestock.

Lessons learned processes exist already today in many, if not all, actors involved in crisis management. However, the interviews show that these processes are in many cases focused on the everyday operations rather than on crisis. It can be lessons regarding how to maintain the quality of the products produced or regarding the correct implementation of regulations. Often this experience is seen as internalised in individuals rather than in a systemised process.

In the private sector, the economic incentives are strong, and will be both a driver to learn from certain experiences (to avoid future losses or brand degradation) and a barrier to learn from others (when the mitigation of the risk is seen as too expensive compared to the possible loss and the frequency of occurrence). In the public sector, drivers could be that crisis management in itself is the *raison d'être* of a sector or organisation (i.e. for the rescue services) and/or that the political costs are seen as unacceptable as the economic costs in the private sectors.

The interviews confirm a general lack of flows of lessons from/to actors, both horizontally and vertically. In a few cases, such flows seem to exist but this has in most cases either been a result of requirements in laws and regulations or been a result of internal dissemination in vertically integrated organisations/businesses. In some cases more or less *ad-hoc* arrangements for sharing cross-border (geographical neighbours sharing the same risks) or cross-sector (sectors with similar problems) have been identified.

The public sectors are not that different from the private ones in this sense. However, the public sector organisations generally seem to have access to more arenas for information sharing. The flows of lessons learned between the public and private sectors in many cases seem virtually non-existent. In some interviews criticism has been raised from the private side that the responsible authorities are too focused on the public sectors and the public organisations. On the other hand, the public sector respondents sometimes see a lack of willingness from the private actors to participate in such discussions.

[25] An example could be if an actor from lessons could identify a specific type of situation when it will not be able to solve its own needs for back-up electricity – this could be overall lesson, of interest both for potential suppliers of electricity (who could take certain actions to support the actor) and those dependent on

4 Features of an LLF for Crisis Management

In this chapter a design for a Lessons Learned Framework (LLF), addressing the outlined needs as well as the identified challenges, is proposed. In the last section some conclusions of relevance to the EU context are discussed. The proposal is based on the analysis presented in the preceding chapters and in the Annexes.

4.1 The Lessons Learned Framework

In Chapter 2 the need for lessons learned in crisis management was established, stemming from the need to improve operations, from the interdependence between crisis-management organisations and from the importance of experience as a basis for decision-making in uncertain and dynamic environments. Since large scale crises are seldom occurring events, extracting lessons becomes even more important. Finally, failing to learn from experience could have high costs; in human terms as well as in economic and political terms.

However, as was noted in Chapter 3, the heterogeneity of the crisis management system means that these needs, as well as the prerequisites for lessons learned processes, will vary from sector to sector as well as from organisation to organisation. It was also noted that few well-functioning lessons learned processes are operational in the crisis management domain today. Even fewer of these have any cross-border and cross-sector dimensions.

Lessons could be strategic, tactical and operational and could deal with the inner and outer world of an organisation. The learning could be both single-loop and double-loop, and could be seen as process of interaction between the organisation and its members.

Furthermore, a number of challenges to lessons learned, general as well as specific to crisis management, have been identified in the Annexes and further discussed in Chapter 3. These include contextual differences, lack of resources, and unclear causalities. The analysis in Chapter 3 also discussed a number of conclusions regarding the design and content of an LLF.

An LLF should consist of at least the following features:

- A definition of the purpose and role of an LLF, including its relationship to implemented systems for lessons learned.
    - This will help make clear the rationale and position of the LLF.
- An ontology,
    - This will help develop a common language and a shared understanding of the concept of lessons learned.
- A set of recommended approaches and rules.
    - This will help develop a common understanding of the practical issues of LL, including the understanding of a common format of LL. At the same time it will help create a more uniform methodology on which local LL systems can be based.
- A set of validated tools and mechanisms.
    - This will help actors to start working with LL, while it simultaneously helps homogenising the process.

Specifications of methods and tools are covered in detail in forthcoming DRIVER reports and consequently only briefly touched upon below.

4.2 Definition of the purpose and role of the LLF

As concluded in Chapter 2, it appears unlikely that any LL process could successfully handle all types of lessons from all sectors, phases and crises since the differences in needs, incentives, cultures etc. are overwhelming. This is even more evident when looking at the learning side – the same diversity of organisations, sectors and levels can be found there. That any process would be able to fulfil the needs of all these potential user groups does not seem plausible. Still, the interdependencies between organisations/sectors/countries mean that a process that only deals with a narrow sample of observations/lessons will be inadequate.

The LLF must thus be general enough to allow for the inclusion of multiple perspectives and specific enough to be of practical use. The harmonised LLF therefore must offer structure, common understanding and flexibility to cater for different needs, expectations and perceptions. Clear distinctions between the comprehensive LLF versus the specific processes, methods, systems or tools are required to avoid confusion of the real role of the LLF.

In many ways it is easier to establish what the LLF is not. It is not a lessons learned system or a database, nor is it a specific process. It is not a toolbox either, although it will contain direction for the design of tools together with some examples of such tools.

Instead the LLF should be seen as an architecture for the construction of specific lessons learned processes and systems. It should function as a lubricant helping different types of organisations and entities to collect, analyse and share lessons in a cooperative manner. Perhaps it is best described as a set of norms, structures and best practices for lessons learned. In this way it can help the development of a common view among crisis management organisations regarding the role and function of lessons learned.

The LLF forms the cornerstone for implementing lessons management, being able to handle lessons from crisis, exercises/training and routine operations. The framework supports lessons learned activities in all crisis management phases, although implementation is foreseen to take place primarily in the preparation, prevention and recovery phases, where the time factor is generally less pressing.

To function, it is necessary that there is *a sponsor* that has ownership of the framework and takes responsibility for its overall development. The sponsor could be one specific actor, in whom other actors have confidence, or a group of actors that jointly ensures the implementation of the framework. Among the roles of the sponsor would be to further develop and describe the LLF, to offer improved approaches, methods and technologies for all steps in a lessons learned process and to offer arenas for discussing overarching cross-sector and cross-border lessons as well as for collecting and disseminating *best practices for LL*. Sponsors could be defined both at the overall level and in specific parts of a system-of-system LLF (such as sectors or countries).

4.3 An ontology for lessons learned in crisis management

This ontology for outlines the structure of the LLF and offers a common language and understanding for the LLF. It consists of definitions, types of lessons, roles, and types of events.

4.3.1 Definitions

The following definitions, established in Chapter 2, are used:

- **Observation** – an observed effect of an action (or inaction) in a specific situation. An observation can be both positive (a successful action) or negative (the action fails to achieve the intended objective). A preliminary observation may need further inquiry for confirmation, e.g. through the collection of more contextual information.
- **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.
- **Lesson Learned** – a *lesson identified* that has been acknowledged by the appropriate decision-makers together with a decision on desirable actions regarding doctrine, organisation, training, materiel, leadership, personnel and/or facilities.
- **Lesson Implemented** – a *lesson learned* where decided action has been implemented and the results of this implementation are verified.
- **Best Practice** – is the preferred actions in a specific type of situation to achieve a certain objective. Best Practice is often formalised in internal policy documents such as doctrines and standard operation procedures and could be based on one or several lesson identified/lessons learned.

4.3.2 Different types of lessons

An observation/lesson is in its most simple form the answer the following set of questions: What was the situation? What actions were taken? What was the outcome? An observation/lesson is however not the respondent's view on what could have been the result if another approach had been tried.

Observations and lessons may be of varying nature and consequently of mixed interest outside of the organisation/sector where they were collected. These differences affect how lessons should be handled for optimal exploitation. In the LLF seven basic different types of lessons are identified (cf. Annex 2):

1) **Local observations/lessons.** Lessons regarding conditions specific to one unique organisation, e.g. lessons from the use of specific facilities or from a particular production process. Especially in large organisations local lessons may be of interest to just a single part of the organisation.
    - These lessons may be of great importance to the organisation itself, but often of little value to others. Generally they are collected/analysed by the organisation itself, and of marginal use outside the organisation of origin.

2) **Sectorial observations/lessons.** Lessons regarding conditions specific to a type of organisation in a specific sector. For instance lessons from incident management in an operator within the telecom sector.
    - These lessons may be of interest to organisations within the same sector and with similar roles – nationally and internationally. Generally they are collected/analysed by the organisation itself, or possibly by a branch organisation or public authority, and they can be useful to share cross-border, but less so cross-sector.
3) **Cross-sector observations/lessons.** Lessons regarding specific conditions that are found in organisations of similar kind, also in other sectors. For instance lessons regarding maintenance of distribution networks in the electricity sector and in the telecom sector.
    - These lessons may also be of interest to organisations in other sectors that face similar tasks and have similar roles. Generally they are collected/analysed by the organisation itself, or possibly by one or several branch organisations or by a public authority, and they can be useful to share both cross-border and cross-sector.
4) **Observations/lessons regarding organisational roles.** Lessons regarding the needs and roles an organisation may have in crisis management. For instance what the organisation needs to function in a specific type of crisis and what it can contribute.
    - These lessons may be of interest to all organisations that are dependent on the organisation of origin in a crisis, but also to those who have to prioritise the distribution of their own resources. They are collected/analysed by either the organisation itself, by a branch organisation or by a public authority, and they can be useful to share cross-border and cross-sector.
5) **Observations/lessons regarding generic functions.** Lessons regarding those functions that exist in most organisations, for instance logistics, information security, etc. Furthermore, this category can also include lessons from processes such as risk analysis.
    - These lessons may be of interest to many organisations. They are generally collected/analysed by the organisation itself, and they can be useful to share cross-border and cross-sector, e.g. via branch organisations and authorities.
6) **Observations/lessons regarding organisational crisis management concepts.** Lessons on a meta-level, for instance lessons regarding concepts and principles such as the design of an internal contingency organisation or the staffing of a 24/7 crisis management cell.
    - These lessons may be of interest to many organisations. Sometimes they are collected/analysed by the organisation itself, but more often by a branch organisation or an authority, and they can be useful to share cross-border and cross-sector.
7) **Observations/lessons regarding systemic crisis management concepts.** Lessons regarding the overarching functions and concepts of the crisis management system. For instance, principles for prioritisation, division of labour, distribution of resources, etc.
    - These lessons are primarily found in the coordination and cooperation between organisations, and often need to be analysed in a cross-sector context, probably under the lead of national or regional crisis management authorities. They can be useful to share cross-border and cross-sector.

4.3.3 Different roles in a lessons learned process

Any lessons learned process will involve four different roles:

1) **The decision-makers.**
    - Those who direct the lessons learned process and decide on the sharing and implementation of lessons. This could be the CEO in the company, the local fire brigade chief, the head of the safety department at the ICT authority, the Director General at the national crisis management authority or the head of the branch organisation; or any so-appointed mid-level manager.
2) **The collectors.**
    - Those who collect the observations, e.g. a dedicated observers, lessons learned officers or someone active in operations reporting an observation.
3) **The analysts**
    - Those who analyse and validate the observations and turn them into lessons identified.
4) **The users**
    - Those who use the lessons, for instance in the development of handbooks and courses or in the planning and management of operations.

All four types of actors contribute in different but indispensable ways to the lessons learned process. There is, however, no clear-cut line between them. The same individual may in a specific situation be both the collector and analyser or both the decision-maker and the user. Yet, in many cases they will be different individuals, thus underlining the need for developing a shared and common understanding of the concept of lessons learned as well as of the need for lessons learned.

4.3.4 Different types of events from which to learn

Observations/lessons for crisis management may be collected from three main types of events: *Routine operations*, *crisis situations* and *training/exercises*. All of these may be equally important as sources of knowledge for the development of an organisation:

- *Routine, everyday operations*, such as maintenance of equipment may result in valuable lessons. Two examples could be the change in the production sequence in a factory that leads to a more efficient production and the change in rescue services' equipment maintenance that increase the reliability in operations. Learning from every-day, routine operations is a continuous process of incremental improvement on both the individual and organisational level. However, the routine phase may also generate lessons about the preventive and preparedness phases, including planning.
- *Crisis situations*. This type of event may generate lessons regarding the actual management of the crisis, but also about the usefulness of different actions in the preparatory and preventive phases. Crisis operations may be divided into the following three categories, from all of which an organisation may learn:
    - **Routine incidents.** Routine incidents are those that an organisation/group of organisations handles almost every day, and that is – explicitly or implicitly – thought to be part of the organisation's general assignment. It could be the rescue services and

the police handling an ordinary domestic fire or the telecom provider and the electric distribution firm handling a normal power outage. These incidents are often not perceived as crises but do potentially involve experiences important when preparing for and handling crises. Such observations/lessons are generally collected and analysed by the organisations themselves.

- **Local/regional crisis.** Local and regional crises are those that require more than everyday routine approaches and resources. They often call for complex interaction between multiple actors, for example, cooperation between the rescue services, the police, the local communities and the media, possibly with the help from neighbouring regions in a large-scale forest fire. Most big crises fall into this category, and are handled at the local/regional level. Although the participating organisations have the primary responsibility for their own collection and analysis of observations, local or regional organisations (local/regional authorities as well as branch organisations) may also become involved and focus on the collection of specific observations and lessons. In some national crisis management systems, the national level will also be involved, depending on the type and size of the crisis.
- **National/international crisis.** These are crises on the national and multinational level that cannot be handled with the local and regional contingency approaches and resources. Instead, support from other regions and possibly with national and international resources is necessary. Crisis management in these scenario usually involves many actors and a massive coordination of efforts. One example could be a wild forest fire spreading over large areas or large scale power outages in combination with severe weather leaving a region powerless and isolated for days. Although the organisational, regional and sectorial levels all have a responsibility to direct, collect and analyse observations and lessons from these crises, this type of crisis will in many cases involve lessons learned processes at the national/multinational levels. The direction of the different lessons learned processes at the different levels and in the different organisations needs to be done in a co-ordinated manner. This does not, however, imply any additional mandatory collection or sharing routines, other than in such cases as demanded by laws and regulations.

- *Training/exercises.* Since large-scale crises seldom occur, training and exercises will remain important sources of observations/lessons. Participating organisations always have a responsibility to collect and analyse observations of importance. However, the organisation hosting an event (a school, a training institute, an authority) can also collect and analyse lessons as can the commissioning organisation (when not the same organisation).

  Exercises are occasions during which new methods, procedures and technologies can be introduced and tested. In such cases lessons learned will often need to be an integral part of the exercise design. Exercises can furthermore be important opportunities to train the lessons learned functions as such. Lessons learned teams can be included and train in their role.

4.4 Overarching approach

In this section, a generic lessons learned process is presented and the different steps are further developed. Two perspectives on the lessons learned efforts are furthermore presented: Firstly, a system-of-systems process, where different parts of the systems by exchanging observations and lessons vertically and horizontally, cross-border and cross-sector, help each other to improve. Secondly, a joint process, where different organisations/sectors cooperate in the whole process from direction to analysis and dissemination.

Finally, an illustrative example of how the LLF could be applied to the EU context is presented.

4.4.1 A generic lessons learned process

All organisations and sectors have their own unique needs and prerequisites for lessons learned. This generates a broad spectrum of lessons, from very concrete and specific ones, for instance on specific operational procedures, to more complex and abstract lessons for instance on an overarching crisis management approach. It also includes an equally broad spectrum of organisational types, from the small private business to the large public agency, both as producers and consumers of observations/lessons. As noted earlier, there is no known process that could fit all these needs, instead every organisation must adopt a model to suit their unique preconditions.

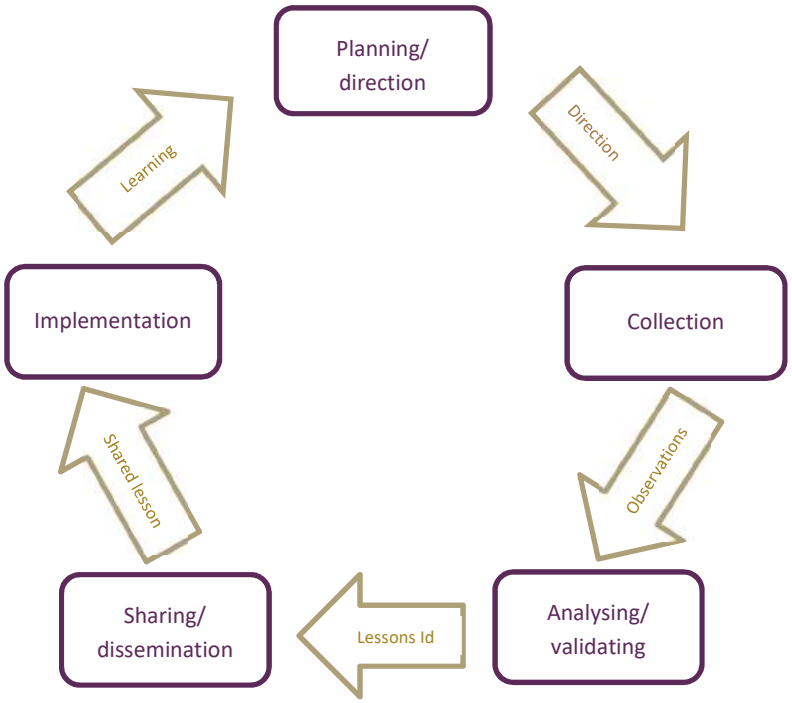


Figure 9: A generic lessons learned process.

However, it is possible to outline a generic LL process depicting an overarching approach. The basic assumption behind this process is that any LL process, just like most other operational processes, needs to be directed by the management regarding focus and prioritisation of available resources. The process will have an explicit top-down character to make it possible to use the available resources in a

focused manner and to direct the organisation(s) to search for lessons on specific subjects, avoiding the disruption of efforts and improving the chances of successful implementation.

Even though the process should preferably be mandated from management, spontaneous (bottom-up) observation collection would still be a valid and encouraged approach. This could capture important lessons that are not actively searched for, covering blind spots where the management *does not realise what they do not know*. Any bottom-up approach needs to be carefully moderated to ensure that the system is not clogged with faulty or marginal observations.

The process (Figure 9), adapted from the intelligence cycle in Section 2.8, consists of a number of steps: planning/direction, collection, processing, analysis, validation and implementation (learning). Basically, the same process works for both top-down and bottom-up approaches. In the latter, however, the planning/direction step is focused on choosing what observations to take further through processing and analysing, whereas in the former it is more concerned with identifying issues that need to be investigated through the collection and analysis of observations.

The generic lessons learned process is a process for both double- and single-loop learning. In the former, learning involves not only incremental changes within the norms and values of the system, but also actual changes of these norms and values. This process will in most cases involve higher management. The latter is generally a quicker and more agile process, albeit more limited in scope, and may also be carried out by local management.

4.4.2 Sub-processes of the lessons learned process

A "lessons learned" process will generally contain five significant sub-processes.

- **A process for directing the lessons learned process.** An actor's management decides on what the lessons learned activities should focus and what resources to commit. Depending on the type and size of the organisation these processes may look different. In a small private business it may be a simple decision by the CEO, while it in a large government agency can be a process of rigorous analysis as well as negotiations between internal and external interests. For public organisations and branch organisations, it may be necessary to secure the support and involvement of the subordinate/member organisations. In some cases the direction could be based on bilateral or few-lateral arrangements, for instance between neighbouring regions with coinciding needs for lessons or between two sectors potentially affected by the same risk. The starting point for the top-down LL process are the needs that the management has identified/defined; for instance, is it lessons for the improvement of a production process or as a basis for an upcoming policy decision? The output of the direction sub-process would be a prioritisation of the resources available for lessons learned. See Annex 4 for a detailed discussion on the design of this sub-process.
- **A process for collecting observations.** Collecting observations is the handicraft of noticing valuable experience and making it explicit. It is the same handicraft regardless if the observation is spontaneous or if it is the result of a directed collection. The spontaneous approach has the benefit of the first-hand perspective, and spontaneous observations are generally perceived as important by the reporter. It should be noted that the first-hand perspective may be accompanied by emotional attachments clouding objectivity.

The directed approach, on the other hand, has the benefit of giving the observer a better chance to prepare for observations, carefully study the events, and generate structured observation reports to generate more comprehensive data. Such a process could be achieved either through sending out teams of experts to collect information or through providing the operators with a set of questions regarding subjects of interest (such as for instance *how does equipment X function in hard wind*).

The group of experts could come from one organisation/sector/country or from many different organisations/sectors/countries. One important risk associated with this strategy is the risk of over- or under-interpretation of incidents in a desire to appease for instance the management. Furthermore, observer bias is another important issue, i.e. that the mere presence of observers may affect the behaviour of the studied phenomena. Regardless of strategy, the collection needs to take into consideration what information to collect to make the observations relevant and shareable. The outcome of the collection sub-process would be well-described observations, of relevance to current or coming challenges. See Annex 3 for a more detailed discussion on the necessary meta-information.

- **A process for processing, analysing and validating observations and turning them into lessons identified.** The process of converting an observation into a *lesson identified* can differ from one organisation to another, and even within an organisation there can be differences for instance due on the nature of the observation. One common feature is that the observation needs to be put into context by combining it with all other types of available knowledge (e.g. research, evaluations, media, other observations, etc.). The analysis can be quantitative, but more often the number of observations is rather low and a qualitative approach will be the only option. Sometimes the analysis is simple and straightforward, and the observation can quickly become ready for validation. In other cases the analysis demands lots of resources and hard work. It can be done within a single organisation or in collaboration between many organisations.

  The validation part of the process, which is where the applicability of the lesson is decided, is crucial especially when transferring an observation/lesson from one context to another. The final validation of a lesson is a specific process that requires the involvement of decision-makers. The output of this sub-process is a validated lessons identified. Processing, analysing and validating may be divided into separate sub-processes.
- **A process for disseminating/sharing the lessons identified.** Sharing lessons (and sometimes observations) is fundamental to enable implementation/learning. Databases and similar tools for sharing generally have little impact, instead collaborative and interactive methods have to be sought. Furthermore, different types of lessons present different demands on the resources and arenas for sharing. Local and sectorial lessons can for instance be shared through web resources (e.g. a web based, European *Fire Fighter's daily* presenting an article on the use of a new extinguishing technique for potentially catastrophic chemical fires, with references to in-depth material for further reading). These lessons can also be exchanged in common training programs at the sectorial, national or international levels[26] or through official exchange

[26] At the international level an example is the European Commission's *Civil Protection Mechanism Training Programme*.

programmes[27]. Finally, exchange may take place within established Communities of Practice, for instance at conferences or via web-resources such as discussion forum.

On the other hand, lessons that are cross-sector or concern the role of a specific organisation within a national crisis management system are more complicated to transfer from one context to another (sector contexts and national contexts). In these cases, specific forums and arenas for mutual exchanges of lessons/observations, and in some cases even for the common analysis of events, may be necessary. Although the analysis would still be done jointly, it is up to each organisational, sectorial or national representative to adapt the results to fit their own context. The aim of this sub-process is to share lessons identified with relevant target audiences. See Annex 2 for a more detailed discussion on this sub-process.

- **A process for implementing and learning lessons.** In most organisations the implementation of lessons and the learning from lessons are processes integrated into already existing processes such as development processes for doctrine and organisation, procurement programmes, training programmes, exercises, etc. Ideally, in a top-down oriented LL management, representatives from these types of implementing processes should participate already in the directing process to help focus the collection and ensuring relevant lessons to implement. The output of this sub-process is learning, meaning that the lesson is implemented. The implementation will need to be verified and reviewed, which could be seen as separate sub-process, and this may result in the identification of new needs for lessons, restarting the process.

4.4.3 Lessons learned as a system-of-systems process

The lessons learned framework is based on a system-of-systems approach based on four postulates: 1) LL is every organisation's responsibility, 2) sharing is in most cases voluntary, 3) large crises call for multi-organisational, multi-sectorial and multi-national approaches to extract and analyse observations/lessons, and 4) arenas need to be established for defining needs as well as for analysing and sharing observations/lessons.

The basic preconditions for the systems-of-systems approach is however trust. The approach must both build on trust and help develop trust – therefore participating and sharing should be voluntary but also to create well-functioning arenas for analysing and sharing lessons.

- **Lessons learned are every organisations responsibility.** Every organisation[28] with a role in crisis management should have a lessons learned process, adapted to its own needs and prerequisites. The process should handle internal observations/lessons as well as relevant lessons from other organisations. The process should also have the ability to take requests for lessons from other organisations – be it similar organisations, interdependent organisations, national authorities or branch organisations (see Figure 10).

[27] Such as the EU *Programme of Exchange of Civil Protection Experts*.

[28] This goes for both public and private organisations, regardless of level (local, regional, national and multinational). Branch organisations are also included.

Each organisational LL process needs sub-processes for directing, collecting, analysing/validating, disseminating/sharing and implementing/learning lessons. These sub-processes need to be specific to each organisation and adapted to its specific needs and prerequisites. They furthermore need to be assigned adequate resources.

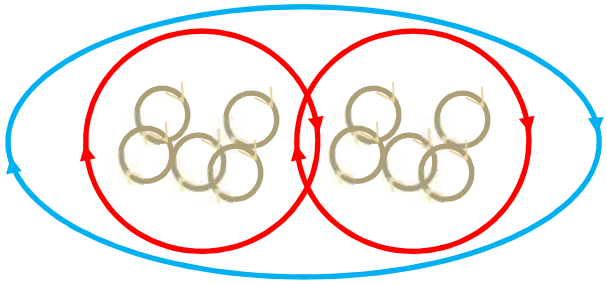


Figure 10: The relationship between organizational, sectorial and national lessons learned processes.

Organisations within for instance a sector, all having their own lessons learned processes, as well as the sector/branch organisation (the red ring). Several sectors may be included in a lessons learned process run by for instance the national crisis management agency (blue ring).

- **Sharing is voluntary.** Every organisation should be encouraged to participate actively in the lessons learned processes, and the need for a broad participation to develop the full potential in lessons learned for crisis management should be underlined. Issues such as competition, culture, lack of resources etc. affect organisations' willingness and ability to share lessons. With the exception of such dissemination/sharing that is required by laws and regulations, no actor can or should be forced to share observations/lessons. Every company, sector/branch organisation and authority (local, regional, national or multinational) must decide for itself what information to share and with whom. However, sharing should be encouraged, inter alia through underlining the mutual benefits as well as the benefits for the overall crisis management system.
- **Large crises call for multi-organisational, multi-sectorial and multi-national approaches to extract and analyse observations/lessons.** Large-scale crisis events may require a multi-perspective approach to direct, collect, analyse/validate and disseminate lessons. Such efforts can be arranged by national or multinational sector/branch organisations and/or regional, national or multinational public authorities, but can also be arranged by ad-hoc groups of organisations with a common agenda (cf. Section 5.4.4).
- **Arenas should be established where needs can be defined and lessons can be analysed and shared.** Dedicated fora for defining, analysing and sharing lessons are important enablers for any learning organisation. For inter-organisational learning, appointed regional, national and multinational organisations and branch organisations have a specific responsibility to establish arenas for joint analysis, discussion and sharing observations/lessons within and across sectors and countries. These arenas could be *communities of practise (CoP)* at different levels but also resources for collaboration and networking such as moderated websites, WIKI-resources, chat functions, social media etc. When necessary, experts acting as brokers of lessons learned could be appointed.

At the top level, the organisation (or group of organisations) acting as sponsor for the lessons learned framework, needs to establish a forum for the development of the LLF and the dissemination of best practices on lessons learned.

4.4.4 Lessons learned as a joint process

In large incidents, involving a number of organisations possibly from multiple countries and sectors, it may sometimes be beneficial to conduct a joint collection and analysis of lessons to establish a common understanding. In this manner all participants contribute with their pieces to the sense-making puzzle, and create a shared post-hoc situational understanding.

Joint lesson collection sessions are typically conducted during or directly after the operational crisis management phase, for example as hot washes. The analysis, however, can be intertwined with the collection, or conducted later, for example during an after-action review or post-mission analysis session. Generic collection plans (outlining what subjects and aspects to cover) and generic observation plans (outlining the division of labour) could be helpful.

To connect the dots after such large-scale events, that is, to post hoc establish adequate situational understanding, necessitates a collection of recorded facts that reflects the important incidents and decision-making cues. These facts may be captured as radio traffic recordings, C2 system logs, observer reports, hand-written notes, video footage, interview transcripts, etc. Ideally, all data that contribute to a better understanding of the course of events should be collected. In reality though, it is rare to find a comprehensive enough set of data from any large-scale event that enables analysts to get the full picture of what happened, what decisions were made, and why.

Engaging a heterogeneous set of observers stimulates a multi-perspective review of the events which increases the chance of capturing important pieces of knowledge. Thus, it is recommended that when learning from large-scale events, observations should be collected by a group of dedicated observers from several sectors, and possibly also from several nations, especially if the event in itself is multinational.

Post-processing of collected data from an event, for instance to establish a timeline explaining causal relationships, can significantly shorten the time needed for sense-making when analysing data from a complex distributed event. Further post-processing of the data may include for instance detection of outliers and deviations from standard operating procedures. Alternatively, filtering can be done by singling out selected incidents and event streams from the dataset that deviate from the plan, or that seem significant for the outcome of the operation. Once the post-processing has generated a dataset that is comprehensible, it is time to draw conclusions from what happened.

Depending on what methods and tools are used for compiling observations (and optionally post-processing them) into a comprehensible dataset, it may sometimes be easier to conduct the post-processing in a smaller group of dedicated experts; quite possibly with a certain expertise if technical post-processing tools are used. The sense-making portion, on the other hand, is framed by the experts own background, which is why all participants may benefit from engaging in this activity. If the objective is to reach a validated consensus on the course of events, it is then also preferable to get the multi-perspective view of a heterogeneous group of reviewers.

Bringing home X-BSP lessons to one's own organisation typically involves adaptation of the acquired knowledge to the fit one's own organisational rules and one's own, internal crisis management system. The adaptation process may involve transformation of causality, translation of roles and activities, and system-specific conclusions from the joint lesson. For this to work, the analysis must enable in-depth understandings of the situation and the relevant background context for other participating organisations. Thus, adaptation of lessons from multi-national events, may require to understand not only of the events and conditions of the particular operation, but also the relevant background information such as organisation-specific rules of engagement, agenda, standard operating procedures, and foreign national crisis management systems.

The process of joint collection, analysis, and generalisation of lessons can effectively be supported by methods and tools that enhance situational understanding and causal analysis. While many crisis management organisations have trained observers, the use of such methods and tools may imply a need for additional training and education of both observers and analysts.

A side benefit of joint lessons learned management is that it may lead to standardisation of procedures and increased interoperability. Working together in this manner may also stimulate future collaboration and information exchange on LL, which benefits the combined European resilience towards crises, for example through communities of interest, exchange of personnel, and joint training programmes.

4.5 Specifications for validated tools and mechanisms

The harmonised lessons learned framework puts more emphasis on the concept and approach than on tools. This does not mean that tools are not important parts of any lessons learned process. On the contrary, there is a need for well-functioning tools for all steps in the lessons learned process: direction, collection, processing, analysis, validation and sharing. A requirement specification and survey of available methods and tools are presented in the DRIVER report D530.2 *Tools for the Lessons Learned Framework*. The same report also outlines a reference architecture of the lessons learned framework complemented with recommended methods and tools identified from the survey. Parts of that reference architecture are tested in the WP530 experiments.

From the analysis above it can however be concluded that IT-supported tools are probably of less interest for the dissemination and sharing, apart from tools supporting collaborative and interactive processes such as discussion forums, web-publishing etc. Instead, collection and analysis are steps in dire need of supporting tools.

4.6 The LLF in an EU context

The LLF needs to be established in the EU crisis management context. An example, developed by DRIVER, of what such an adaption could look like is outlined in this section, primarily for illustrative reasons, and based on the analysis in previous chapters and in the Annexes. Any real implementation would require a more thorough analysis of the differences between countries and sectors – culturally and organisationally – and would probably have to be developed organically, step by step. It would of

course also require an in-depth dialogue with the concerned actors, not least the EU DG ECHO. However, this example could serve as a starting point for further discussions.

The EU context consists of actors – private and public – active on local, regional and national levels. These actors can be divided into different sectors – private and public – also existing at different levels. Furthermore, there is a multinational level, primarily the EU institutions, but also multinational companies and multinational branch organisations.

Every organisation – public or private – with a role in crisis management will need to establish an internal lessons learned process (LLP) adapted to its role and size, based on the LLF. This LLP should include sub-processes for direction, collection, analysis and validation, dissemination, and implementation. It should have the capability to search for internal and external observations and lessons but also to accept requests for lessons from other organisations and, on a voluntary basis, to share lessons with other organisations.

The organisations involved in crisis management will work with lessons learned from both a geographical perspective (lessons learned on local, regional, national or multinational levels) and a sectorial perspective (lessons learned in a specific branch or sector at national or multinational levels). The geographical and sectorial perspectives primarily meet at the national and multinational levels.

The development of a lessons learned process in the EU context should, as far as possible, build on already existing structures. DG ECHO, and its civil protection mechanism (CPM), already has a lessons learned process, involving the Member States. Furthermore, the CPM arranges training and exercise activities in which lessons can be applied. DG ECHO and the CPM would therefore be a logical first choice as sponsor for the EU process for lessons learned in crisis management. However, DG ECHO would need to ensure the support from other relevant Commission directorates, from the EEAS, and from the EU Member States[29].

The DG ECHO/CPM as leading sponsor would, together with the supporting entities, be responsible for at least the following six main strands regarding lessons learned:

- Direction, collection, analysis and dissemination of lessons of overall importance to the crisis management system in the EU. This would primarily be lessons on generic functions, organisational crisis management concepts, and systemic crisis management concepts. The collection and analysis can be carried out within the framework of the EU/CPM LL function, but more often these will be tasks for national or sectorial structures.
- Host arenas for the dissemination of lessons of overall importance to the crisis management system in the European Union. This could be a combination of web-based resources (web-paper, discussion forum etc.), seminars/workshops and training/exercises.
- Support the identification of needs for cross-border and cross-sector lessons learned, and encourage the establishment of bi- and few-lateral arrangements between countries/regions and between sectors.
- Identify needs for joint cross-border and/or cross-sector collection of lessons from large-scale crises, preparing arrangements and procedures for such collection and encourage and support collection in specific crises.

[29] Possibly also the non-EU countries that are associated with the CPM.

- Host an arena for cross-sector and cross-border discussion on approaches, methods and technologies for lessons learned, developing and disseminating *best practices for LL*.
- Advise other DGs within the Commission and national level crisis management organisations in the Member States on lessons learned methodologies, procedures, and technologies.

In addition to this process, every DG needs to consider the establishment of similar multinational structures for lessons learned within their respective branches/sectors, with the support from national branch/sector organisations and the national leading agencies (for instance for telecom).

At the primary geographical level, the local level, the municipalities would in most cases have the responsibility for coordinating the lessons learned efforts within the geographical area. This would include lessons from both public and private entities and have at least the following four main strands:

- Direction, collection, analysis and dissemination of lessons of importance to the local community crisis management system and/or high-lighted by the regional or national crisis management system. Direction could be based on local needs and risks, but also on requests from the regional and national levels. The collection and analysis can be carried out within the framework of municipality administration, but more often these would be tasks for the organisation active in crisis management.
- Host arenas for the dissemination of lessons of importance to the local crisis management system. This would in most cases be in the form of training/exercises, seminars and workshops.
- Support the identification of needs for cross-organisational and cross-sector lessons learned in the local perspective, encourage the establishment of bi- and few-lateral arrangements between actors (public and private) and support the collection/analysis.
- Identify needs for joint collection of lessons from large-scale crises, preparing arrangements and procedures for such collection and encouraging and supporting collection in specific crises.

Similar arrangements as on the local level would apply to the regional level, under the lead of the leading regional crisis management organisation and with the participation from other regional public actors, local municipalities and large companies.[30]

At the national level the leading national crisis management authority, with the support from regional crisis management organisations, leading sectorial agencies, and national branch organisations[31], would take on the role of national coordination of lessons learned processes. This would include at least the following six main strands:

- Direction, collection, analysis and dissemination of lessons of overall importance to the national crisis management system. This would primarily be lessons on organisational roles, generic functions, organisational crisis management concepts, and systemic crisis management concepts. Direction could be based on national needs and risks, but also on

[30] This could for instance be large companies delivering public goods (such as water, electricity etc.) but also large companies that in themselves may pose risks (a large chemical company, a company with responsibility for large dams etc.).

[31] Another possibility is to let the national sectorial lessons learned level be co-hosted by the leading agency and the branch organisation, for instance for telecom issues.

requests from the multinational levels. The collection and analysis could be carried out within the framework of national crisis management organisation, but more often these would be tasks for the regional and local organisations.

- Support the identification of needs for cross-border and cross-sector lessons learned, and encouraging the establishment of bi- and few-lateral arrangements between regions and sectors.
- Identify needs for joint collection of lessons from large-scale crises, preparing arrangements and procedures for such collection and encouraging and supporting collection in specific crises.
- Host arenas for the dissemination of lessons of overall importance to the national crisis management system. This could be a combination of web-based resources (web-paper, discussion forum etc.), seminars/workshops and training/exercises.
- Host arenas for national discussions on approaches, methods and technologies for lessons learned, developing and disseminating *best practices for LL*.
- Advise the national, regional and local level authorities involved in crisis management organisations on lessons learned methodologies, procedures, and technologies.

In parallel with the geographical perspective, the organisations involved in crisis management would also work with lessons learned from a sectorial/branch perspective. National branch/sector organisations would need to take lead, possibly together with the leading government agency, for lessons within their respective branches/sectors. This would include at least the following four main strands:

- Direction, collection, analysis and dissemination of lessons of overall importance to the sectorial crisis management system. This would primarily be sectorial lessons together with lessons on organisational roles, generic functions, and organisational crisis management concepts. Direction could be based on sectorial needs and risks, but also on requests from the national geographical level and multinational branch/sector organisation level. The collection and analysis could be carried out within the framework of branch/sector organisation, but more often these would be tasks for the organisations active in crisis management.
- Host arenas for the dissemination of lessons of overall importance to the sectorial crisis management system. This could be a combination of web-based resources (web-paper, discussion forum etc.), seminars/workshops and training/exercises.
- Identify needs for cross-sector lessons learned, and encouraging the establishment of bi- and few-lateral arrangements between regions and sectors.
- Advice the organisational level (organisations within the sector/branch) on lessons learned methodologies, procedures, and technologies.

5 DRIVER+ LLF

This chapter describes the demonstrator or prototype of an LLF for crisis management in Europe: DRIVER+ LLF. To a large extent, this demonstrator has been based on the contents and experiences that are described in previous chapters.

5.1 Aim of the DRIVER+ LLF

The purpose of the DRIVER+ LLF is to take a first step in translating the 'theoretical' results from previous chapters into a practical solution. Thus enabling more insight into the possibilities and the problems that arise in developing and applying a tool that serves crisis management organisations in processing and sharing their lessons. Moreover, this LLF can easily feed into DRIVER+ and can contribute in particular to the development of the Guidance methodology, the Portfolio of Solutions and ultimately in enhancing a shared understanding of crisis management.

The DRIVER+ LLF prototype is an Excel-tool (see Figure 11). This because by using Excel the prototype could be developed in a relative short period of time, and does not require specific database development skills. Therefore, required adjustments of this demonstrator due to e.g. changing insights, recent research developments or additional end-user needs, can be processed quite easily.

The DRIVER+ LLF is developed in English. The reason is that exchanging lessons and experiences cross border and all over Europe can only be reached by using one language. To that purpose English is the most obvious choice. Of course, background information in other languages can be used, and can also be stored but the main results should be translated into English by the collectors or editors who provide input into the DRIVER+ LLF.

In many places the DRIVER+ LLF asks the editor to select options from a list (e.g. type of incident, type of lesson, etc.). This enables future users to look for certain types of lessons by entering keywords (e.g. when looking for lessons on wildfires, or when looking for lessons that are implemented).

5.2 Overview of the DRIVER+ LLF

The aim of the DRIVER+ LLF is to support organisations in editing, maintaining, consulting and sharing lessons within the domain of crisis management, and especially within the EU. To that purpose the DRIVER+ LLF consists of the following sections or Excel-worksheets:

1. ***Intake***
   Title and identification number of the evaluated event, and a description of the editors who have inserted information on the event, its evaluation and the various lessons in the DRIVER+ LLF.
2. ***Sources of information***
   The overview of documents and multimedia files about the evaluated event that have been used by the editors.
3. ***Event***
   Description of the evaluated event, including short indications of concerned types of

incidents, the geographic location and scale of the event, involved critical and/or societal sectors, and the types of crisis management organisations that had to dealt with the event.

4. ***Evaluation***
   Description of the subject(s) of evaluation, and the approach that was used. In addition an overview is provided of lessons and their current status.
5. ***Lesson x – Overview*** (where x varies from 1 up to 7)
   Overview of (1) the status, relevance and applicability of the lesson, (2) observations, experiences and/or practices (including their consequences) that induced the lesson, and (3) a brief description of the lesson and its potential impact when it has been implemented.
6. ***Lesson x - Details***
   Detailed description of the lesson and its underlying observations.

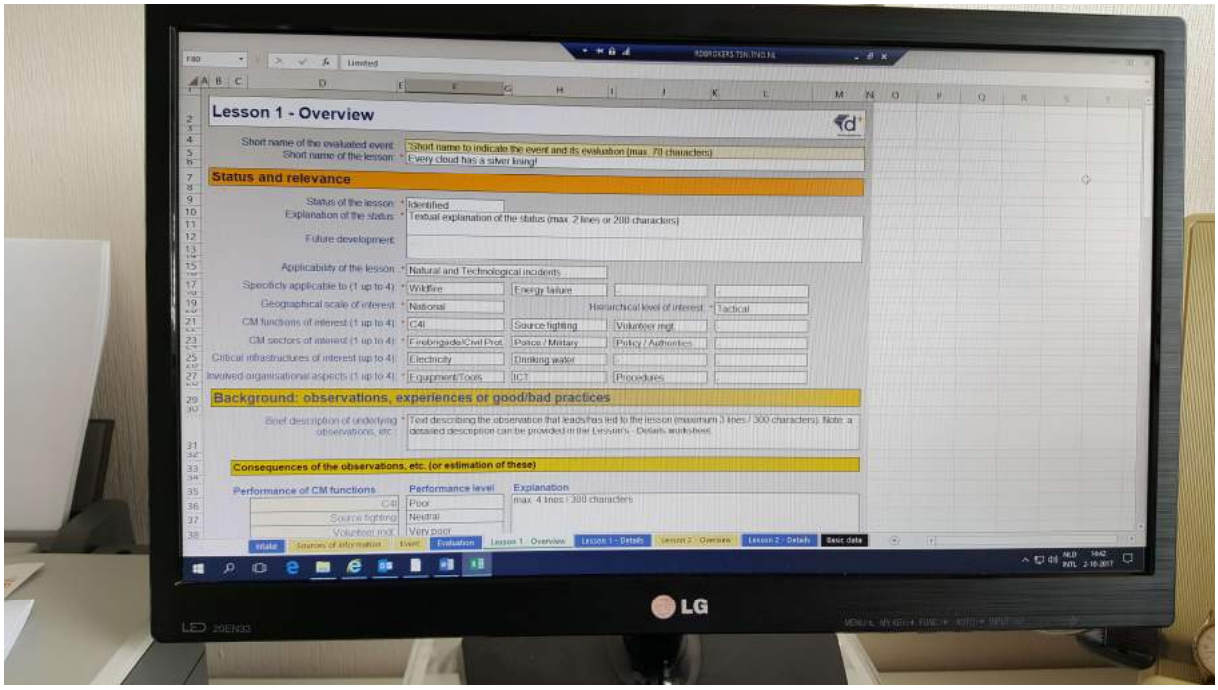


Figure 11: Screenshot of the DRIVER+ LLF prototype

5.3 DRIVER+ LLF worksheets

In this paragraph the various DRIVER+ LLF worksheets are described, including several examples of screenshots.

5.3.1 DRIVER+ LLF – Intake

The 'Intake worksheet' (see Figure 12) requests information to identify the evaluated event, and to specify the editors. At the top of this sheet two questions concern the identification:

- Title or short name to indicate the event and its evaluation
- Unique identification number of the evaluated event

Editors (or collectors)

This section requests information about the initial editors, and most recent editors in case of an update. In both cases questions concern:

- Name of the main editor, his/her organisation and country (EU Member State if applicable)
- Date of the initial intake or update
- Description of other persons who were involved in the intake or update

Additional information

The final section offers the opportunity for additional notes on the evaluated event and its evaluators.

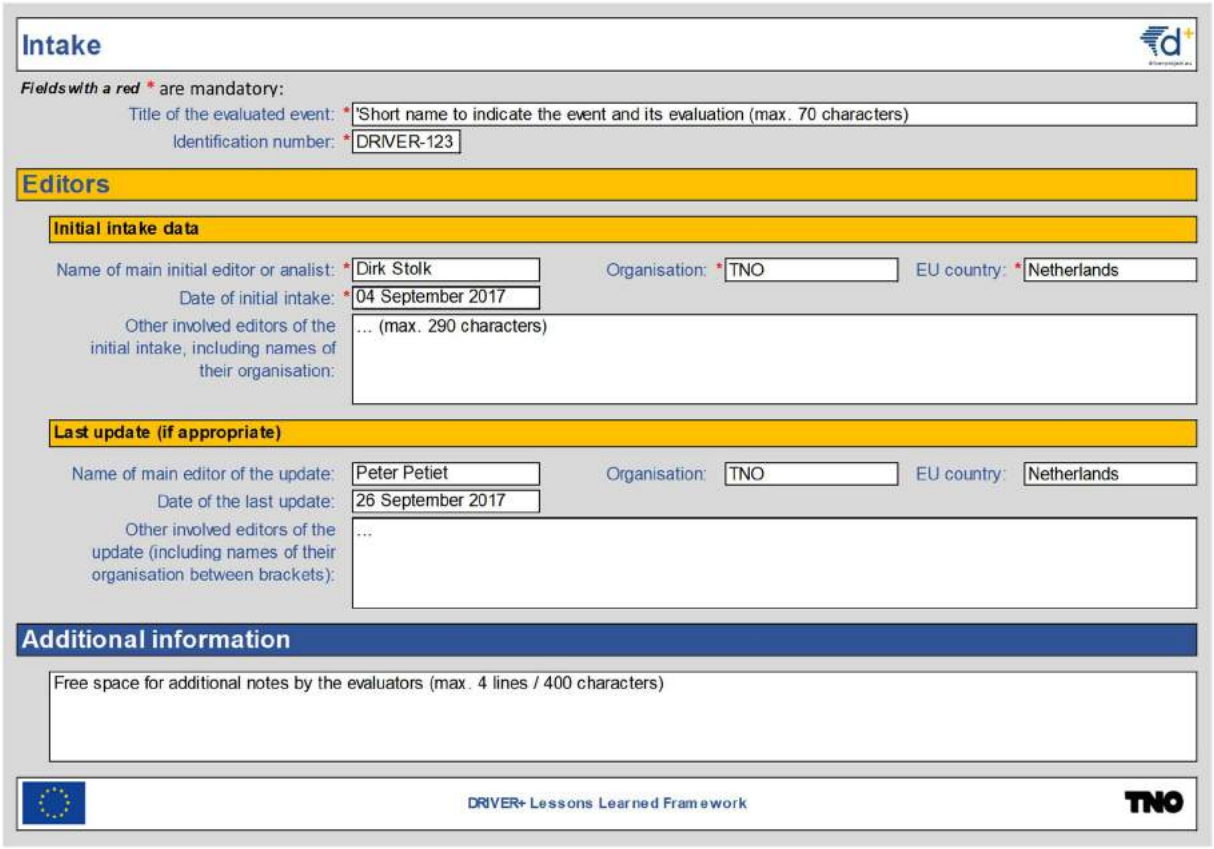


Figure 12: DRIVER+ LLF prototype – 'Intake' worksheet

5.3.2 DRIVER+ LLF – Sources of information

In this worksheet, (see Figure 13) information can be provided about all sources of information that have been used or that are relevant for the evaluated event and its lessons.

Publications

This section is meant to create a list of publications (doc, pdf, …) that are related to the event and/or its evaluation. For each publication the following information should be provided:

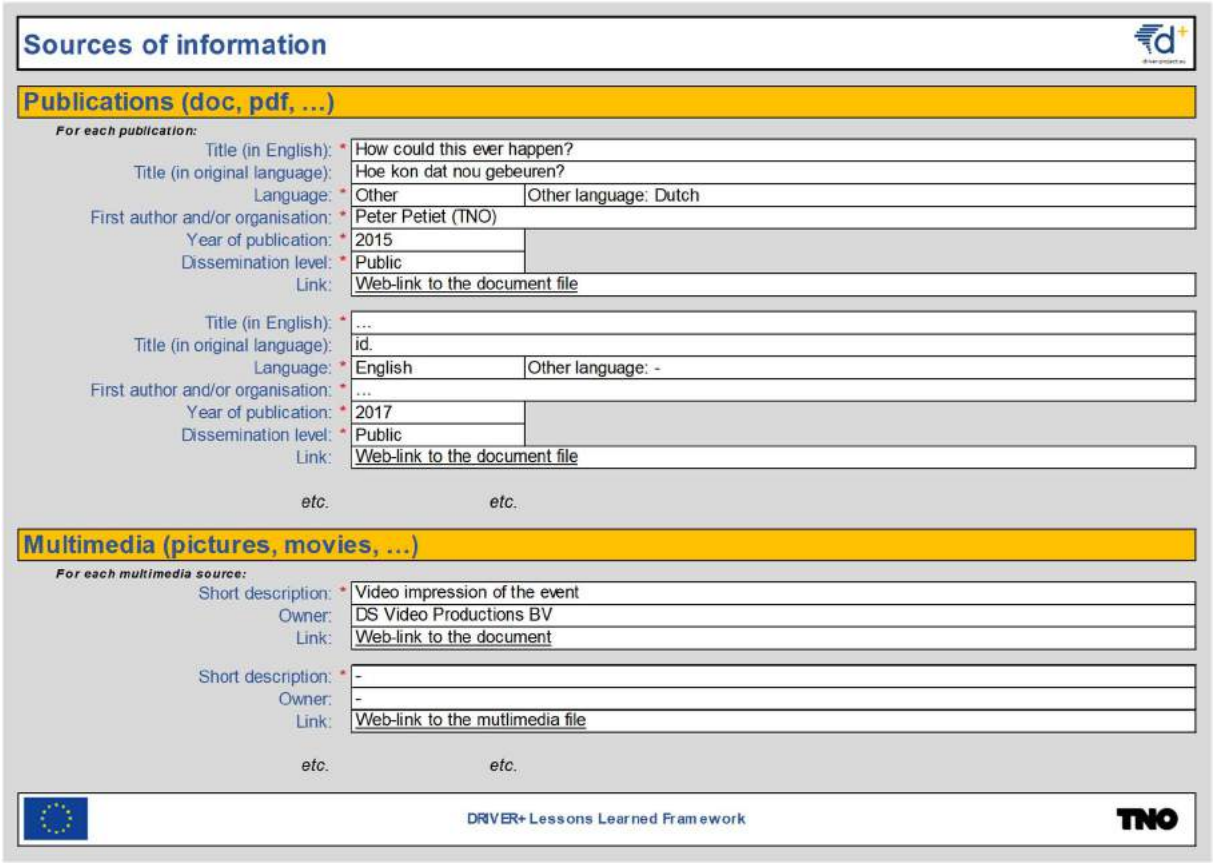
- Title of the publication in English
- Title of the publication in its original language (if applicable)
- Language: English, French, German[32] or Other language (to be specified in text format)
- Name of the first author and/or organisation
- Year of publication
- Dissemination level: public, restricted or secret
- Link to the document file

Multimedia

This section is meant to create a list of multimedia files (pictures, movies, …) that are related to the event and/or its evaluation. For each multimedia files the following information should be provided:

- Short description
- Owner
- Link to the multimedia file

[32] i.e., EU's three so-called procedural languages.



Sources of information

Publications (doc, pdf, ...)

For each publication:

Title (in English): *	How could this ever happen?	
Title (in original language):	Hoe kon dat nou gebeuren?	
Language: *	Other	Other language: Dutch
First author and/or organisation: *	Peter Petiet (TNO)	
Year of publication: *	2015	
Dissemination level: *	Public	
Link:	Web-link to the document file	
Title (in English): *	...	
Title (in original language):	id.	
Language: *	English	Other language: -
First author and/or organisation: *	...	
Year of publication: *	2017	
Dissemination level: *	Public	
Link:	Web-link to the document file	
etc.	*etc.*	

Multimedia (pictures, movies, ...)

For each multimedia source:

Short description: *	Video impression of the event	
Owner:	DS Video Productions BV	
Link:	Web-link to the document	
Short description: *	-	
Owner:	-	
Link:	Web-link to the mutlimedia file	
etc.	*etc.*	

DRIVER+ Lessons Learned Framework

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Figure 13: DRIVER+ LLF prototype – 'Sources of information' worksheet

5.3.3 DRIVER+ LLF – Event

The 'Event worksheet' (see Figure 14) requests information to further describe the evaluated event. It includes questions to briefly indicate concerned types of incidents, the geographic location and scale of the event, involved critical and/or societal sectors, and the types of crisis management organisations that had to deal with the event.

General information

The first section requests information that characterises the type of event and when/where it has taken place. The questions concern:

- Type of event; options are: Risk analysis, Preventive action, Incident, Disaster, Training, Exercise and Test[33]
- Phase of the crisis or disaster management cycle; options are: Risk assessment, Mitigation & Prevention, Preparedness, Response, and Recovery[34]
- Start-date and End-date of the event

[33] The list of possible events from Section 4.3.4 has been extended in DRIVER+ LLF because, apart from incidents and training, in the future lessons might also be identified or learned from other activities in the disaster management cycle.

[34] See also Annex 2

- Description of the location of the event
- Indication of the location's type of area; preliminary options are: Mixed, City/Town-centre, Residential area, Industrial area, Recreational area, Countryside, Forest, Water, Other natural area

Involved types of incidents

This section requests information about the incidents that are related to the event. It concerns:

- An indication of the categories of incidents; options: Incidents in general, Natural incidents, Technological incidents, Natural and Technological incidents, and Intentional incidents/Attacks
- Specification of the incidents; incidents should be selected from a list[35]; in this way up to twelve incidents can be selected; note that at least one incident should be selected

Geographic scale of the event

This section requests information about the geographical dimension of the event. It concerns questions to indicate:

- Whether the event took place inside or outside the EU; options: Inside EU, Inside & Outside EU, Elsewhere in Europe, and Outside Europe
- The number of countries involved; options: One country, Bi-/Tri-national, Multi-national, Pan EU, European, Extern Europe, Worldwide
- The geographical scale of the event; options: Regional, National, Pan-Europe, and Global
- Involved EU Member States, that can be selected from a list with all MS; up to five countries can be specified in this way
- Other involved countries (if more than five EU-MS are involved, these countries can be specified here as well)

Involved critical and/or societal sectors

This section requests information about the critical and other societal sectors that are involved in the event. It concerns questions to:

- Indicate involved critical infrastructures, that can be selected from the following options: Drinking water, Electricity, Gas supply, Public Health, Telecom/ICT, Transport-Air, Transport-Rail, Transport-Rivers, Transport-Sea, and Water management; in this way up to nine critical infrastructures can be selected

[35] The list of incidents has been taken from H2020 project ResiStand (deliverable D1.3) which on its turn has been based on sources like EMDAT. The options are: Earthquake, Volcanic eruption, Mass movement, Storm, Tornado, Extreme cold, Extreme heat, Drought, Wildfire, River flood, Flash flood, Coastal flood, Landslide, Epidemics/Pandemics, Insect infestation, Animal stampede, Asteroids, Meteoroids/Comets, Chemical spill, Explosion, Fire, Gas leak, Nuclear accident, Air crash, Road accident, Rail accident, Accident on water, Collapse of infra, Drinking water failure, Energy failure, Telecom/ICT failure, Bomb attack, CBRN attack, Cyber-attack, and Cyber crime.

- Describe other involved (critical) sectors

Organisations that were involved in executing CM functions

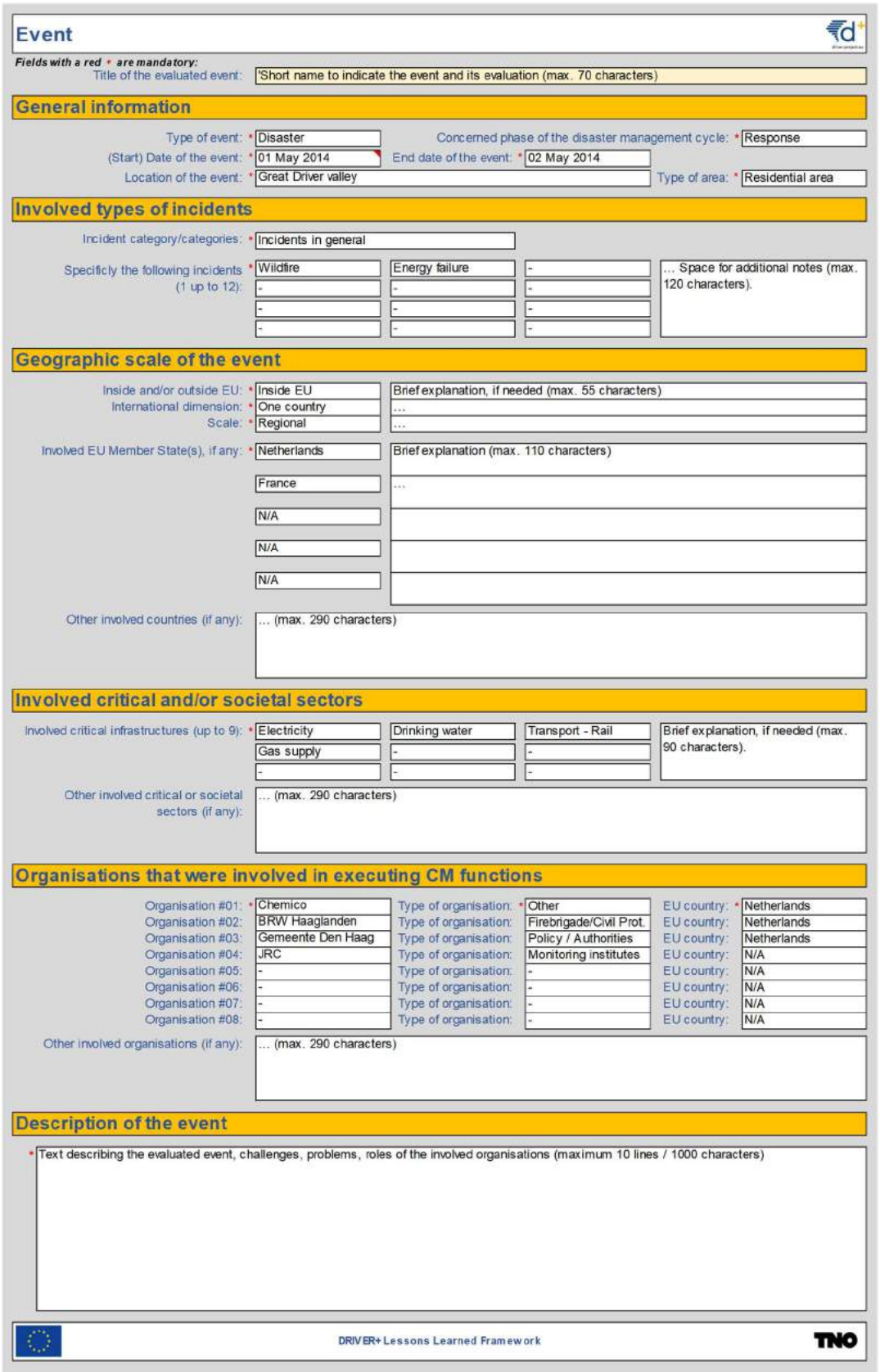
This section requests information about the (most important) organisations that executed one or more crisis management functions (or tasks) during the event. It concerns questions to indicate:

- The name of the involved organisation, including its type of organisation[36], and its country (EU Member State); up to eight organisations can be specified in this way
- Other involved organisations; if more than eight organisations were involved, these organisations can be specified here

Description of the event

In the final section a textual description of the event, its challenges and the roles of most important organisations should be provided.

[36] The options are: Fire brigade/Civil Protection, Police/Military, Medical services, Search and Rescue, Coastguard, NGO/Volunteer organisation, Monitoring institute, Public service, Critical Infrastructure, Command centre, Policy/Authorities, International agency, and Other. With some minor adjustments, the list of options has been taken from H2020 project ResiStand (deliverable D1.3).



Event

*Fields with a red * are mandatory:*

Title of the evaluated event: *Short name to indicate the event and its evaluation (max. 70 characters)

General information

Type of event: *	Disaster	Concerned phase of the disaster management cycle: *	Response
(Start) Date of the event: *	01 May 2014	End date of the event: *	02 May 2014
Location of the event: *	Great Driver valley	Type of area: *	Residential area

Involved types of incidents

Incident category/categories: * Incidents in general

Specifically the following incidents (1 up to 12): *	Wildfire	Energy failure	-	... Space for additional notes (max. 120 characters).
	-	-	-	
	-	-	-	
	-	-	-	

Geographic scale of the event

Inside and/or outside EU: *	Inside EU	Brief explanation, if needed (max. 55 characters)
International dimension: *	One country	...
Scale: *	Regional	...

Involved EU Member State(s), if any: *	Netherlands	Brief explanation (max. 110 characters)
	France	...
	N/A	
	N/A	
	N/A	

Other involved countries (if any): ... (max. 290 characters)

Involved critical and/or societal sectors

Involved critical infrastructures (up to 9): *	Electricity	Drinking water	Transport - Rail	Brief explanation, if needed (max. 90 characters).
	Gas supply	-	-	
	-	-	-	

Other involved critical or societal sectors (if any): ... (max. 290 characters)

Organisations that were involved in executing CM functions

Organisation #01: *	Chemico	Type of organisation: *	Other	EU country: *	Netherlands
Organisation #02:	BRW Haaglanden	Type of organisation:	Firebrigade/Civil Prot.	EU country:	Netherlands
Organisation #03:	Gemeente Den Haag	Type of organisation:	Policy / Authorities	EU country:	Netherlands
Organisation #04:	JRC	Type of organisation:	Monitoring institutes	EU country:	N/A
Organisation #05:	-	Type of organisation:	-	EU country:	N/A
Organisation #06:	-	Type of organisation:	-	EU country:	N/A
Organisation #07:	-	Type of organisation:	-	EU country:	N/A
Organisation #08:	-	Type of organisation:	-	EU country:	N/A

Other involved organisations (if any): ... (max. 290 characters)

Description of the event

* Text describing the evaluated event, challenges, problems, roles of the involved organisations (maximum 10 lines / 1000 characters)

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Figure 14: DRIVER+ LLF prototype – 'Event' worksheet

5.3.4 DRIVER+ LLF – Evaluation

The 'Evaluation worksheet' (see Figure 15) requests to describe the evaluation approach. In addition it provides a summary of the lessons that have resulted from the evaluation.

Description of the evaluation

In the upper section a textual description should be provided about the way in which the evaluation has been conducted. Typical subjects are the approach/evaluation procedure, the evaluation topics, the use of performance indicators, qualitative or quantitative measurements if any, etc.

Summary of lessons

The lower section provides an overview of lessons that resulted from the evaluation, including an indication of their current status. The lessons data that are presented in this section are copied from the seven Lesson – Overview worksheets.

Note: Within the DRIVER+ LLF up for each event up to seven lessons can be defined.

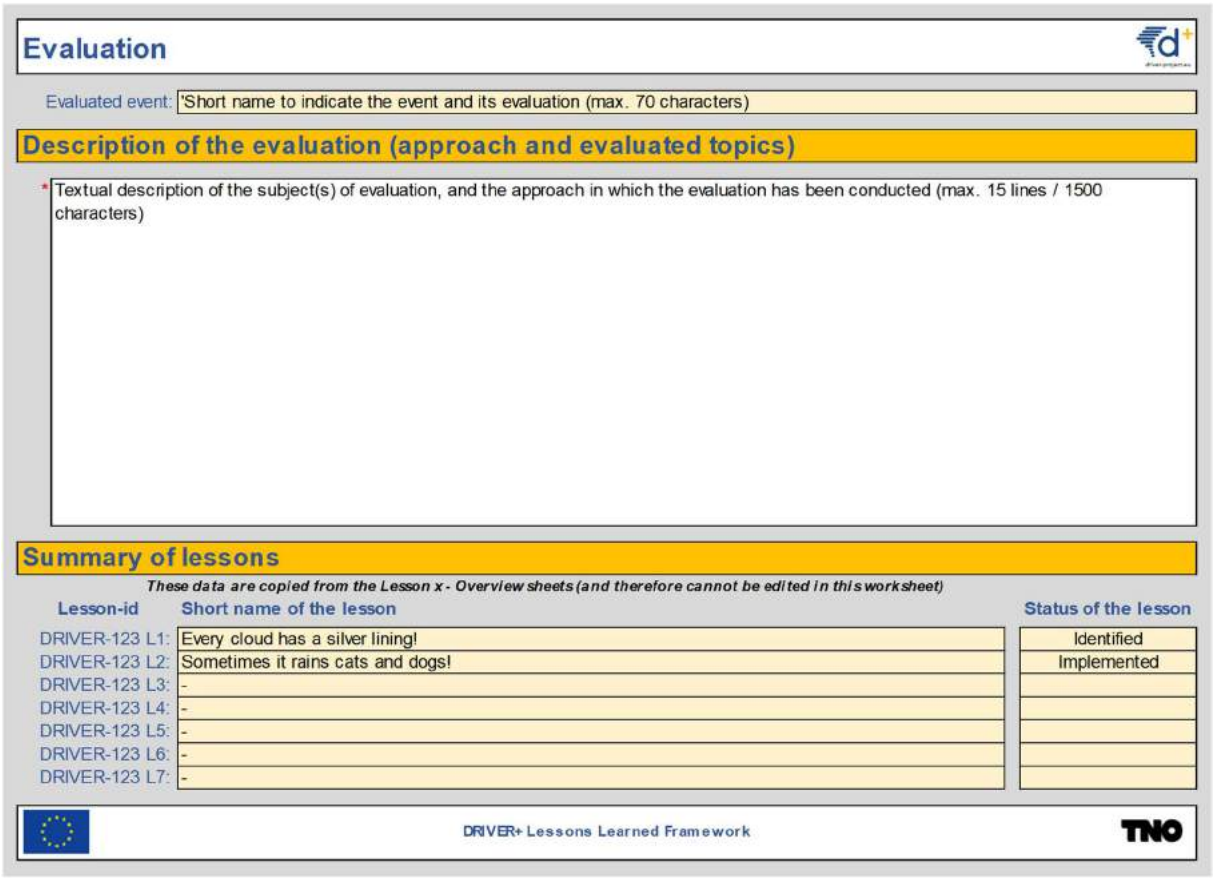

Figure 15: DRIVER+ LLF prototype – 'Evaluation' worksheet

5.3.5 DRIVER+ LLF – Lesson 1 – Overview

The 'Lesson 1 - Overview worksheet' (see Figure 16) requests to describe the lesson and to provide information on its status and relevance, its reason and the (potential) benefits of implementation of the lesson. At the top of this sheet the short name of the evaluated event is copied from the Intake worksheet. In addition a question is asked to provide a short name to indicate the lesson.

Status and relevance

The first section requests information that characterises the status and relevance of the lesson:

- Current status of the lesson; options are: Identified, Learned, Implemented (see Section 2.7)
- Brief explanation of the status
- Brief description of future developments (if applicable)
- Applicability of the lesson to CM related to certain or all categories of incidents; options are similar to the options in the 'Event' worksheet in the section Involved types of incidents
- Applicability of the lesson to specific types of incidents; options are similar to the ones in the Event worksheet; in this way up to four incidents can be selected
- Geographic scale of interest of the lesson; options are: International, National, Regional/Local
- Hierarchical level of interest of the lesson; options are: Strategic, Tactical, Operational, Strategic & Tactical, Tactical & Operational, and All (see Section 4.1)
- Crisis management functions for which the lesson is of particular interest; options are: Risk assessment, Protection/Prevention, Contingency planning, Collaboration planning, Education & Training, Asset management, Detection/Surveillance, Risk communication, Alerting (incl. 112), Crisis communication, Source fighting, Rescue operations, Law enforcement, Evacuation & Shelter, Medical treatment, Clear incident area, Basic needs supply, C4I, Situation Assessment, Collect incident data, Social media mining, Volunteer management, Logistics, Humanitarian recovery, Environment recovery, and Re-establish infrastructures[37]; in this way up to four crisis management functions can be selected
- Crisis management sectors organisations for which the lesson is of particular interest; options are: Fire brigade/Civil Protection, Police/Military, Medical services, Search and Rescue, Coastguard, NGO/Volunteer organisations, Monitoring institutes, Public services, Critical Infrastructures, Command centres, Policy/Authorities, International agency, and Other; in this way up to four crisis management sectors can be selected
- Critical infrastructures for which the lesson is of interest; options are: Drinking water, Electricity, Gas supply, Public Health, Telecom/ICT, Transport [Air, Rail, Rivers, Sea], Water management, and Other; in this way up to four critical infrastructures can be selected
- Involved organisational aspects; options are: Personnel, Equipment/Tools, ICT, Fixed assets, Organisation, and Procedures[38]; at least 1 and up to 4 aspects has to be selected

[37] These options are based on H2020 project ResiStand (deliverable D1.1, chapter 4).

[38] Based on the Federal Enterprise Architecture (United States): the so-called 'Performance Reference Model'. According to this model four main assets are defined for each public organisation: Personnel, Technology (including equipment, tools and ICT), other fixed assets (such as buildings) and Tasks/Procedures. Note: Instead

Background: observations and their consequences

The second section requests information about the background of the lesson, such as observations, experiences and good or bad practices and its or their consequences. The questions concern:

- Brief description of the observation
- Information about the consequences:
    - Performance level of each of the crisis management functions which have been indicated above to be of interest; options are: Very poor, Poor, Neutral, Good, Very good, and Unknown;
    - Societal impact in terms of the following five criteria (from UNISDR[39]): Numbers of victims/casualties, Material damage, Loss of (critical) services, Social/Economic disruption, and Environmental degradation; for each of these criteria the options are: Very limited, Limited, Neutral, High, Very high, and Unknown;
    - Responder Health and Safety in terms of the safety and security conditions for first responders; options are: Very poor, Poor, Neutral, Good, Very good, and Unknown;
    - Costs of concerned crisis management functions in terms of:
        - relative costs level (Very limited, Limited, Neutral, High, Very high, Unknown)
        - absolute costs level; options are a set of ranges starting with 'Less than 100.000 euro' up to 'More than 10 million euro'

  At each type of consequences an explanation of the selected options can be provided.

Lesson, including its potential effect

The final section request information about the lesson and its potential and/or expected impact. The questions concern:

- Brief description of the lesson (note: a more detailed description can be provided in the 'Lesson – Details' worksheet)
- Information about the impact of the lesson once it has been implemented:
    - Expected improvement of the performance level of each of the crisis management functions which have been indicated above to be of interest
    - Expected reduction of societal impact for each of the five UNISDR criteria
    - Expected improvement of Responder Health and Safety
    - Expected cost savings

  For each of these aspects the improvement options are: None, Limited, Moderate, Considerable, Very high, and Unknown. In addition an explanation of the selected options can be provided.

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of this question the editor can be asked to indicate the 'Impact factor' as defined in Section 2.8.2. In that case the options would be: Doctrine, Organisation, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF).

[39] From UNISDR Terminology on Disaster Risk Reduction (2009): "The consequences of a disaster may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation."

Lesson 1 - Overview

Short name of the evaluated event:	'Short name to indicate the event and its evaluation (max. 70 characters)			
Short name of the lesson: *	Every cloud has a silver lining!			

Status and relevance

Status of the lesson: *	Identified			
Explanation of the status: *	Textual explanation of the status (max. 2 lines or 200 characters)			
Future development:	...			
Applicability of the lesson: *	Natural and Technological incidents			
Specificly applicable to (1 up to 4): *	Wildfire	Energy failure	-	-
Geographical scale of interest: *	National	Hierarchical level of interest: *	Tactical	
CM functions of interest (1 up to 4): *	C4I	Source fighting	Volunteer mgt.	-
CM sectors of interest (1 up to 4): *	Firebrigade/Civil Prot.	Police / Military	Policy / Authorities	-
Critical infrastructures of interest (up to 4):	Electricity	Drinking water	-	-
Involved organisational aspects (1 up to 4): *	Equipment/Tools	ICT	Procedures	-

Background: observations, experiences or good/bad practices

Brief description of underlying observations, etc.: *	Text describing the observation that leads/has led to the lesson (maximum 3 lines / 300 characters). Note: a detailed description can be provided in the Lesson's - Details worksheet.

Consequences of the observations, etc. (or estimation of these)

Performance of CM functions	Performance level	Explanation
C4I	Poor	max. 4 lines / 300 characters
Source fighting	Neutral	
Volunteer mgt.	Very poor	
-	-	

Societal impact of incidents	Size of impact	Explanation
Numbers of victims, casualties	Neutral	max. 5 lines / 375 characters
Material damage	Limited	
Loss of (critical) services	Very high	
Social / Economic disruption	High	
Environmental degradation	-	

Other consequences	Responders' condition	Explanation
Responder Health and Safety	Good	max. 2 lines / 150 characters

	Relative costs level	Absolute costs level	Explanation
Costs concerned CM functions	-	less then 100.000	max. 2 lines / 120 characters

Lesson, including its potential expected effect

Brief description of the lesson: *	Text describing the lesson (maximum 4 lines / 400 characters). Note: a detailed description can be provided in the Lesson - Details worksheet.

Estimated or expected potential impact of the lesson once implemented

Performance of CM functions	Expected improvement	Explanation
C4I	Considerable	max. 4 lines / 300 characters
Source fighting	Considerable	
Volunteer mgt.	Limited	
-	-	

Societal impact of incidents	Expected reduction	Explanation
Numbers of victims, casualties	Limited	max. 5 lines / 375 characters
Material damage	None	
Loss of (critical) services	Limited	
Social / Economic disruption	-	
Environmental degradation	Unknown	

Other consequences	Expected improvement	Explanation
Responder Health and Safety	Moderate	max. 2 lines / 150 characters

	Expected cost savings	Explanation
Costs concerned CM functions	Limited	max. 2 lines / 150 characters

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Figure 16: DRIVER+ LLF prototype – 'Lesson - Overview' worksheet

5.3.6 DRIVER+ LLF – Lesson 1 – Details

In addition to the previous worksheet, the 'Lesson 1 – Details worksheet' (see Figure 17) requests to describe the lesson and its background in more detail.

Detailed description of the underlying observation

In the upper section a description should be provided about the cause of the lesson, such as certain observations, experiences and good or bad experiences. This section offers the opportunity to describe them, including the context (and problems) in which they occurred.

Detailed description of the lesson

In the lower section a detailed description should be provided about the lesson itself.

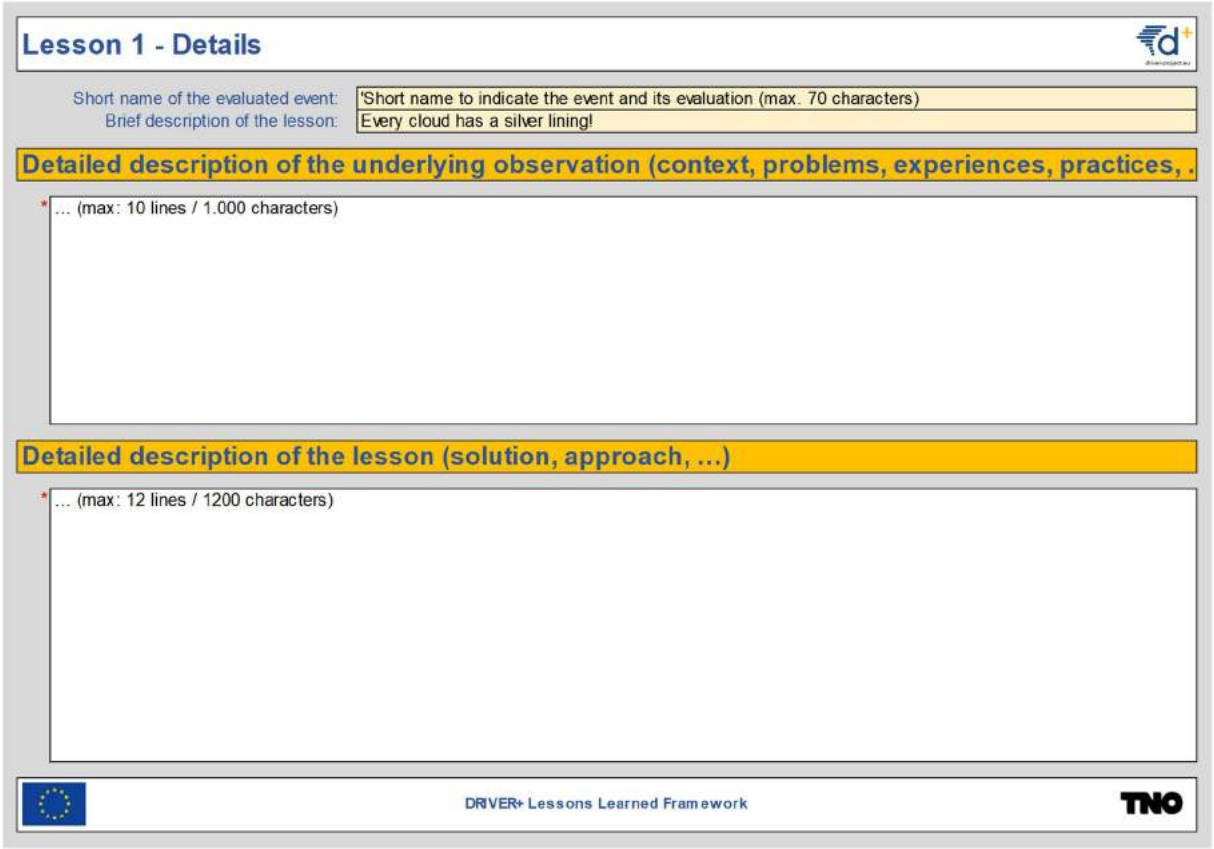

Figure 17: DRIVER+ LLF prototype – 'Lesson - Details' worksheet

6 Implementation – Way forward

6.1 Conclusions

The main objective of this task was to design an overall harmonised Lessons Learned Framework (LLF), aiming at increasing the efficiency of crisis management in Europe and supporting cross-border and cross-sector sharing of lessons. It is the first step in addressing the ACRIMAS gap *sharing and implementing lessons and best practices*. In the upcoming steps the LLF will be used as a basis when identifying, adapting and testing methods and tools for the collection and analysis of lessons.

The research is based on more than 40 interviews with crisis management specialists from different sectors and different countries, together with 35 questionnaire responses and two workshops. The resulting DRIVER+ LLF (Chapter 5) is an architecture for the development of lessons learned processes in different types of organisations involved in crisis management, acknowledging the fact that the fundamental differences in their roles, organisational structures and cultures mean that no single process will fit all. All organisations will need to design lessons learned processes that fit their own context, but by using the architecture as a common ground, the ability to cooperate and exchange lessons will be improved.

The DRIVER+ LLF first of all consists of a definition of its purpose and role. Secondly it includes an ontology, offering a common language and a common understanding of what lessons are. Thirdly, it describes an approach to lessons learned, based on a generic lessons learned process, with defined sub-processes for directing, collecting, analysing/validating, disseminating and implementing lessons.

This generic process is furthermore adapted into two different methodological approaches to lessons learned: a) the system-of-systems approach, where each organisation collects and analyses their own experiences and shares, vertically and horizontally, on a voluntary basis; b) the joint approach, where lessons are jointly collected and/or analysed. Both approaches are designed to acknowledge that sharing, and sometimes also analysis, will in many cases take place using collaborative and interactive methods (workshops, after-action reviews, high-level meetings etc.) rather than databases or written reports. The need to develop arenas for discussing, analysing and sharing lessons is underlined.

It should also be noted that by defining two methodological approaches for lessons learned, this deliverable also addresses in parts the objectives in the task, *Develop methods and tools for identifying, collecting and analysing lessons* (as described in the former DRIVER DoW).

As a basis for the design of the LLF, a number of different aspects have been researched. First of all, the analysis of the gaps and needs in current systems for lessons learned confirmed the general lack of well-functioning lessons learned processes, due to among other things lacks of incentives and allocated resources. Furthermore, the lack of flows of lessons, within and between organisations, was noted and confidentiality issues together with issues such as differences in needs, incentives and cultures were identified as major challenges. The sharing that actually take place, were mostly done in collaborative and interactive processes.

Secondly, the lessons learned capabilities in the EU institutions were scoped. Such processes were identified within DG ECHO as well as in several entities within the EEAS and seen as possible to use as a basis for any future development of lessons learned in crisis management in Europe.

Thirdly, a number of general perspectives and challenges regarding lessons learned were presented together with definitions. It was among other things noted that (internal) lessons learned are not always the right answer to the question, especially if completely new and innovative methods and approaches are sought.

Fourthly, the preconditions for cross-border and cross-sector lessons learned (Annex 2) were analysed, including major challenges such as differences in organisation, culture and legal framework. It was concluded that such sharing could both incrementally improve an organisation's ability to handle a crisis in an effective and efficient way and improve an organisation's ability to function in, and contribute to, the overall crisis management system in a major crisis. Since such crises are rare, and often context specific, methods to access and adapt the information are necessary. However, not all observations and lessons need to be shared cross-border and cross-sector – in the Annex it is described how different types of lessons, with different scope, may be disseminated in different ways. This will affect the design of a Lessons Learned Framework.

Fifthly, the characteristics of a functional user interface (Annex 3) were analysed, using the results from the questionnaire, and a model based on Communities of Practice and Knowledge Sharing Communities was proposed. This is consistent with the conclusion that collaborative and interactive methods are mostly used for sharing.

Finally, a process for defining and prioritising needs for lessons learned (Annex 4) was proposed. This process was designed for supporting the top-down character of the LLF.

6.2 Next steps

The LLF is still mainly a theoretical construction, although built on practitioners input and although a demonstrator has been developed to demonstrate and gain more hands-on insight into the potential of an LLF from crisis management. The definition, ontology and approach of the LLF will be used as a basis for the identification and adaption of tools and methods, especially for the sub-processes of collection and analysis. These tools will be tested, together with the proposed methodology and approach of the LLF, in forthcoming DRIVER+ trials. The tools and methodologies will then be included in the DRIVER+ portfolio of solutions.

In DRIVER+, the conceptual LLF will be further operationalized as part of the Guidance methodology to be developed in SP92 (Test-bed). This Guidance methodology will support crisis management practitioners in designing, developing, conducting and evaluating trials. This methodology will be implemented in the Portfolio of Solutions (SP93). Following a CD&E approach, the collection of lessons learned and defining the next step (which may be a next trial, but also the implementation of a lesson learned) is of crucial importance. During the course of DRIVER+, four trials and a final demonstration will be organized (SP94) during which the Guidance methodology will be applied, evaluated, and updated. Moreover, the DRIVER+ LLF includes an ontology, offering a common language and a common understanding of what lessons are, which supports SP95 (Impact, Engagement and Sustainability).

Outside of the DRIVER context, one or several sectors involved in crisis management could be encouraged to try to go live and test the methodology. One well-defined sector with a potentially strong interest in developing and sharing lessons is the rescue services. A live test could be based on

local, regional and national rescue services in two or three EU member states, involving also the European level (DG ECHO) as a sponsor. Already existing tools, collaborative arenas and methodologies would be adapted to the LLF structure to support the development both the system-of-systems approach and the joint approach within the sector.

Such a live test could also include the development and adaption of a number of sectorial resources for lessons learned. These could include for instance a common reference database, a regularly published and edited newsletter presenting concrete lessons, and a moderated social network tool for presenting and discussing lessons. Furthermore, sector-specific versions of tools for the collection and analysis of observations could be developed.

This type of test could to start with a limited scope, for instance focusing on a specific type of rescue operations. However, the ambition should be to let it develop into a test involving most of the sector, at all levels, including any national and multinational branch organisations. In this way it could spearhead the development of the LLP in the involved sectors as well function as a potential role-model for other sectors. The experiences from this large scale test could be used to further refine the LLF, and to improve the processes for implementation before introducing it to other sectors.

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Annex 1: EU LL Processes and Structures

Introduction

This Annex briefly describes the Lessons Learned (LL) processes at the EU level, in particular in the crisis management domain. It concerns the lessons learned arrangements both within the Commission crisis management structures and within the European External Actions Services crisis management structures.

DG ECHO and the Civil Protection Mechanism

The main crisis management actor within the Commission actor is DG ECHO. DG ECHO is a directorate-general within the Commission of the European Union with responsibility for humanitarian aid and civil protection. Within DG ECHO the *Civil Protection Mechanism* (CPM) has been established for the coordination of Member State efforts in support of disasters (natural as well as man-made) within or outside of the European Union. The CPM has an *Emergency Response Coordination Centre*, monitoring hazards and disasters and planning for the deployment of experts and teams. The CPM administrates a voluntary pool of available Member State resources (experts, teams, equipment) available for quick responses and acts as a communication hub between the different EU Member States.

The CPM furthemore is responsible for a training and exchange programme, providing arenas for the exchange of knowledge and experinces between participants but also for the implementation of validated lessons learned. This could in the long run form the basis for common or interoperable methods, procedures and tools.

Lessons learned in the CPM

Since 2008 the CPM has a process for lessons learned in use, mainly storing large amounts of reports and other information in a database (CECIS) as a broad basis for learning processes and knowledge development. This database stores PDF-documents and has limited search capabilities. CECIS has a simple cross country mechanism that allows saving Lessons Learned gathered from European Crises events. The information is collected in hot-wash-ups, in meetings with the Member States, in different meetings covering more technical as well as more strategic lessons etc. CECIS is only available to the several national entities that belong to the European Union Protection Mechanism.

The information is to be moved to a new database and the work with this database is currently ongoing. This database will enable 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 the training programme, calls for projects regarding prevention and preparedness and priorities for planning.

Annex 2: Cross-border, Cross-sector and Cross-phase Lessons learned in Crisis Management

This Annex is provides additional information related to subtask 2: *determine the main obstructions to learning from others in a cross-border, cross-sector and cross-phase (X-BSP) EU context*, and its related research questions a and b, as defined in Section 1.4:

a) what are the main characteristics of cross-border, cross-sector and cross-phase lessons learned in the EU civilian crisis management context?
b) what challenges do cross-border, cross-sector and cross-phase lessons learned present to the LLF?

The Annex is based upon results from 45 interviews with representatives of actors with different roles in the crisis management system, together with conclusions from two workshops: The SP5 SOTA workshop in Berlin, October 2014 and the WP53 workshop on the interview results in Revinge, April 2015.

Cross-border, cross-sector and cross-phase interdependencies

The civilian crisis management system is highly fragmented and the multitude and heterogeneity of the organisations and sectors involved is truly staggering. It varies from the small, local waste management firm to the large, multinational telecommunications operator. There is the local rescue service on the one hand and on the other hand there are the national crisis contingencies agencies, as well as crisis management sections within almost all other local, regional and national public authority. Organisations with a strong crisis management profile and organisations, although vital in crisis, with a completely different focus. It is a mix of large and small, of national, regional and local and of private and public, with few or no hierarchical structures.[40] Achieving any form of coordination represents a considerable challenge.

Still all these organisations and sectors have important roles to play in the management of large scale crises, such as a severe flooding, a pandemic or a large scale act of terror. Furthermore, they are often interdependent in a complex and not always immediately transparent manner. Although these interdependences exist already during everyday operations, they seldom present any real challenges in cases of “normal” friction. If a supplier fails to deliver food to a hospital due to for instance malfunctioning internal IT-systems, it is possible to find another supplier within hours or days. If the

[40] This could be compared with a military organization where the sub-units are unified by a common, accepted hierarchy as well as by training together regularly. Furthermore, the military commander and his staff in many cases have themselves first-hand experience from the subordinate units, giving them an in-depth understanding of these. This is often not at all the case on the civilian side. The head of a telecom firm may not have any experience from the operational level of telecommunications. The senior civilian crisis manager will in most cases not have an in-depth understanding of the different resources (telecommunications, rescue services, hospitals, water works etc.) involved in a crisis management operation.

electronic payment system is down for a couple of hours it is possible to use alternative methods for payment, including old school invoices.

In a large scale crisis this is no longer the case. If almost all suppliers of food are affected by the crisis there will be no food delivered. If the electronic payment system is out for days, there will be serious repercussions for the overall economic system as well as for the individuals trying to buy food or other necessities. There may appear ripple effects in the system; from one organisation to another, from one sector to another (Krisberedskapsmyndigheten, 2009).

In the same way that a crisis knows few sectorial or organisational boundaries, it knows few national borders. Cross-border interdependence is an effect of growing multinational distribution systems for vital products such as energy, telecommunications and food combined with an increased application of a *just-in-time* philosophy. There can be both primary and secondary cross-border effects. First of all, a power outage could affect energy dependent sectors in neighbouring countries. Secondly, if a producing sector is affected, the ripple effects may lead both to shortages of products in other countries and to the piling up of raw material in these neighbouring countries, clogging production facilities, harbours etc.

The crisis themselves may also be cross-border in a more direct manner. The flooding in central Europe in 2010 and the ash cloud after the Eyjafjallajökul eruption the same year are cases in point. A crisis may be multinational in its origin, and therefore needs to be handled in a multinational, coordinated manner. However, even when the source of the crisis is national, the primary effects may quickly spread across national borders, like the ash cloud, and call for a multinational response. This will result in cross-border interdependencies between the organisations responsible for crisis management.

Crisis management is generally seen as consisting of four different phases (prevention, preparedness, response and recovery). In reality the linearity is not always obvious. Recovery actions may take place in parallel with response actions and in parallel with preventive actions. Sometimes the same organisation is simultaneously active in several phases, in other cases different organisations take responsibility for actions in different phases.

The different phases are furthermore not independent from each other. The preventive and preparatory actions will affect the conditions in the response and recovery phases. The recovery actions will, on the other hand, affect the starting point for the preventive and preparatory phases. If there are actions ongoing simultaneously in several phases the linkage may be even more direct. For instance, in a situation with recovery taking place in parallel with response actions, there may emerge competition for local and imported resources.

The need for cross-border, cross-sector and cross-phase lessons learned

In the preceding section of this Annex the cross-border, cross-sector and cross-phase (X-BSP) character of civilian crisis management was discussed. In this section the need for X-BSP lessons learned will be further explored, on the basis of the results from the interviews, from the Revinge workshop (April 2015) and the results from the questionnaires. The interviews did not specifically address the aspect of cross-phase lessons. However, cross-border and cross-sector lessons learned were touched upon in most interviews.

Interviews

On the local level, the eight respondents from five countries generally showed little interest for working with cross-border and cross-sector lessons. Although the need was recognised in some interviews, e.g. when handling new threats and incidents, most respondents emphasised the difficulties due to differences in roles, tasks, risks and structures. Differences in culture and language were also mentioned.

The regional level, represented in ten interviews from six countries, seemed somewhat more open to cross-border and cross-sector sharing of lessons learned. A couple of interviews mentioned networks and working groups as possible arenas. In some cases the regional levels already today arrange exchanges between sectors within the region, especially when common problems need to be solved. The interviews also gave some examples of regional evaluations of specific events. However, few examples of exchanges between regions were found. Two interviews underlined that cross-border learning should be focused on large scale incidents. These respondents also meant that the most likely lessons are to be found on the operational/technical level since the strategic level lessons are much more context dependent. Furthermore, two other respondents meant that transferrable lessons should primarily be found among principles and concepts. Apart from contextual differences, challenges mentioned were cultural and legal differences as well as a lack of interoperable data.

At the national level, represented in five interviews from five countries, learning from others was welcomed, however not necessarily seen as a priority. Actual exchanges seem rare, although observer missions to crisis in other countries were mentioned. One respondent underlined that the transfer of lessons from another context must be done by the learning organisation. Three respondents mentioned culture as a major hurdle to cross-border lessons learned. Two respondents underlined common structures, methodologies and processes for lessons learned as important for cross-border exchanges to function.

The telecom sector, based on six interviews from three countries (two interviews with authorities, three interviews with operators), seem to have very little of cross-sector and cross-border learning. In one case cooperation with electrical distributors was mentioned. In another case, discussions on the executive level on the principles for crisis management were said to include lessons learned exchanges. However, competition was seen as a complicating issue and several respondents furthermore pointed at differences in cultures, legal frameworks etc. as important challenges.

Within the water sector, based on four interviews from two countries, the need for cross-border and cross-sector lessons was seen as limited, at least for the core business of water production. No examples of X-BSP sharing could be identified although one respondent pointed at work done by the European cooperation (EUREAU). Another respondent pointed at difficulties in sharing due to issues regarding confidentiality.

The food sector, represented in seven interviews with producers, distributors and retail in two countries, generally seemed to have little of cross-border and cross-sector sharing and learning. International and national standards and regulations, national authorities and to some extent commercial partners (e.g. suppliers) were seen as more important sources of lessons. The interviewed national agency analysed incidents in other countries, together with other authorities and universities, to gather lessons.

Although the seminars added important information, their primary role was to add perspectives on the analysed results from the desk-research and interviews/questionnaire. During first seminar the preliminary analysis of the information collected in the interviews and in the desk research was discussed, while a second seminar was used to discuss the conclusions in the final draft of the analysis.

In addition to the above, the DRIVER deliverable *D82.11 – CM Organisations Report including Procurement Regulations and D83.11 – Policy and Legislation Report* (DRIVER, 2016) included questions regarding lessons learned functionalities in the EU countries and have been used as reference.

The Revinge workshop

At the Revinge workshop, issues regarding cross-border, cross-sector and cross-phase sharing and learning were discussed with a group of external experts/practitioners. It was noted that it is difficult to analyse what lessons, or what parts of a lesson, that would be of interest to share cross-border or cross-sector. It was furthermore concluded that lessons need to be shared together with a context to allow for adaption to other organisations, sectors and countries. Still, the cost and time necessary for transferring lessons in a meaningful and understandable way may not be justified by the potential benefits.

In the workshop, some areas were seen as especially beneficial to exchange lessons learned about: Prevention plans, risk analysis, resource information (electricity, water etc.) and geographical information. Expertise networks, for instance used for case studies and supported by social media applications, could be useful also for cross-border and cross-sector analysis. Cross-border and cross-sector sharing was seen to call for user-friendly support systems, but also for financial and human resources. Comparability of information was underlined which calls for common structures and methodologies.

Questionnaires

In the questionnaires the following question was asked:

> *For what purposes would you like to use a lessons learned system/process (choose one or several)?*

Most of the responders wanted to use a lessons learned system/process to:

1) Make observations and lessons learned available within their own organisation (27 out of 35).
2) Exchange observations and lessons with similar organisations at the same level within their own country (26 out of 35).
3) Support the process of analysing and validating observations and turn them into lessons (19 out of 35).

Options regarding sharing of information across sectors and countries were chosen less often but still a significant number of responders chose these options as well:

4) Exchange observations and lessons with similar organisations at the same level in other countries (15 out of the 35).
5) Make observations and lessons available to a large audience of diverse organisations at different levels and in different countries (14 out of 35).
6) Exchange observations and lessons with organisations in other sectors of society/crisis management within your own country (12 of the 35).

Defining cross-border, cross-sector and cross-phase lessons learned

The preceding sections showed on the relevance of cross-border, cross-sector and cross-phase interactions in crisis management, including in activities related to lessons learned. In this section a preliminary definition of cross-border, cross-sector and cross-phase lessons learned will be proposed. The definition is based on an adaption of the concept of absorptive capacity, developed by Cohen and Levinthal (1990) and refined by Todorova and Durisin (2007), explaining why some firms learn and innovate more than others.

Absorptive capacity in crisis management

Absorptive capacity is defined by Cohen and Levinthal (1990) as *the ability to recognize the value of new, external information, assimilate it to commercial ends*. Todorova and Durisin (2007) extended this concept to include the type of source of knowledge as antecedent, power relationships, social integration mechanisms, and regime of appropriability as contingent factors and moderators of the interactions between knowledge, absorptive capacity and performance.

In order to apply this concept to learning in crisis management and structure the definition of (X-BSP) concepts, the concept of *absorptive capacity for resilience* is proposed: *ability to recognise the value of new, external lesson, assimilate it to both organisational and territorial resilience ends* (cf. Figure 18).

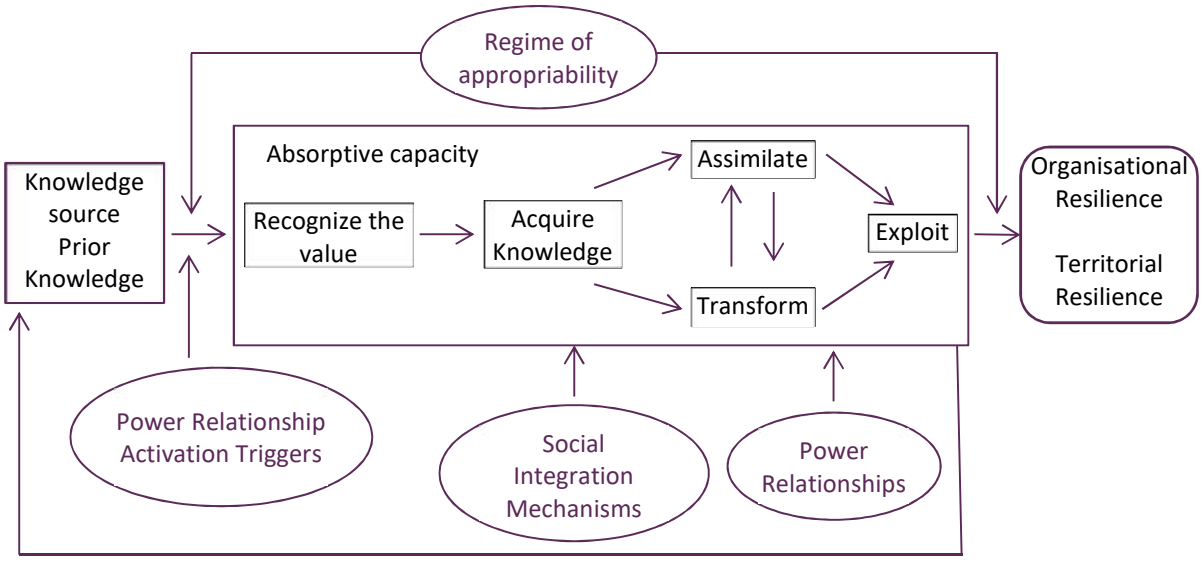

Figure 18: Model of absorptive capacity applied to crisis management.

In the definition, organisational resilience refers to *the intrinsic ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected situations* (Hollnagel, 2011) and territorial resilience refers to *the capability to prepare for, prevent, protect against, respond to or mitigate any anticipated or unexpected significant threat or event, including natural disasters or terrorist attacks, to adapt to changing conditions and rapidly bounce back to a normal or a "new normal", and reconstitute critical assets, operations, and services with minimum damage and disruption to public health and safety, the economy, environment, and national security.* (The infrastructure security partnership, 2011)

This model will be used to structure the definition of the cross-border, cross-sector and cross-phase lessons learned concepts (X-BSP). For each concept, links with territorial and organisational resilience will be firstly discussed, then source of knowledge will be considered and finally challenges related to appropriability will be enunciated.

Cross-border lessons learned

A border can be defined as a *line separating two countries, administrative divisions or geographic region* (Oxford Dictionary, 2014). A border can be natural, institutional, functional or mixed (Guo, 2015). A cross border region is a territory constituted by several region separated by a border.

A first set of specifications of the resilience of cross border territories can be considered:

- The different regions of the cross border territory differ in culture, values, regulations rules, economy, natural resources, etc.
- The scale of crisis can be local, impacting only one region or global impacting different regions in the cross border territory.
- Crisis prevention, mitigation and preparation actions have to consider cross border aspects.
- Response to global crisis requires communication and coordination between actors in the different regions.

A first set of specifications of resilience of organisations located in a cross border territory can be considered:

- The social structure of the organisation can be constituted of people coming from the different regions and having different cultures and/or values.
- A threat that affects an organisation in one region may originate from another region.
- An organisation may have to communicate and cooperate with organisations in other regions in a specific crisis.

Cross border lessons learned system can be defined as a framework capturing, storing, disseminating and sharing knowledge allowing citizens, public and private organisations, and crisis management organisations of each region in a cross border area to improve their own resilience as well as the global resilience of the cross border territory with considering local and global crisis.

Four types of knowledge have to be considered by cross border lessons learned system:

- Knowledge about the behaviour of similar organisations located in the cross border area that can be assimilated and exploited without any transformation.
- Knowledge about the behaviour of non-similar organisations located in the cross border area that can be assimilated and exploited without any transformation.
- Knowledge about behaviour of similar organisations located in the cross border area requiring transformation before being assimilated and exploited.
- Knowledge about behaviour of non-similar organisations located in cross border areas requiring transformation before being assimilated and exploited.

A number of challenges related to the development of lessons learned system could be deducted from the specificities of cross border areas:

- Formalisation of knowledge about crisis management considering specificities related to cross border territories (communication and coordination between organisations belonging to different countries, impact of the type of border on crisis prevention, preparation, response and recovery, impact of the difference of cultures, etc.)
- Formalisation of knowledge related to the behaviour of the organisation during crisis response exercise or real crisis management situations.
- Recognition of the value of available knowledge by organisations.
- Capacity of acquiring, assimilating and exploiting knowledge for enhancing resilience of organisation and of territory.
- Capacity to transform knowledge for enhancing resilience of organisation and of territory.

Cross-sector lessons learned

Industrial sectors refer to the classification of the composition of economic activities. Three sectors are generally considered. The primary economic sector includes agriculture, horticulture, forestry, and fishing; the extraction of oils, minerals, and natural gas, mining and quarrying; and the water industry. The secondary economic sector is often termed the manufacturing sector or manufacturing industries. The tertiary sector includes, for example, the leisure industry, financial services, education and health

services, transport, and communication. Often this is called the service sector or service industries (Marshall, 1998).

Cross-sector lessons learned system can be defined as a framework capturing, storing, disseminating and sharing knowledge allowing organisations to improve their own resilience with the experience of organisations belonging to other sectors.

In order to be effective, organisations have to recognise the value of lessons learned involving organisations of other sectors and be able to transform lessons in order to be able to improve their own resilience performance.

The process of transformation of lessons has to consider differences between organisations. Among other dimensions, organisations differ by technology, culture, social structure or spatial organisation (Hatch & Cunliffe, 2013). Technology refers to the ensemble of means used by organisations to transform raw material in a final products or services. Culture refers to the set of believes, values, symbols, artefacts shared by people of the organisation allowing them to adapt to their environment. Social structure refers to relations between persons assuming organisational roles and groups or units they belong. Spatial organisation refers to the disposition of physical objects and activities in buildings of the organisation.

Cross-sector lessons learned systems have to be able to extract different forms of lessons, both those that can be exploited more directly and those related to the technology dimensions that will require more adaptation. Advice regarding how to adapt lessons on technologies from one sector to another could also be provided.

Different categories of lessons from a cross-border and cross-sector perspective

Although the respondents in the interviews generally recognised some need for cross-border and cross-sector lessons learned, they also underlined the challenges and in some cases questioned the usefulness. The meaning of “lessons” also differed between respondents. Some focused on issues specific to their own organisations’ day-to-day operations while others had a wider perspective. While the former saw little usefulness in lessons from others, apart than those few lessons that would directly affect their operations, the latter generally seemed more open.

Different categories of lessons clearly have different relevance to other organisations. This will affect the willingness to share, and to learn as well as the structures needed for such sharing and learning. A basic, but idealised, classification of cross-border/cross-sector lessons, derived from the answers in the interviews and from the discussions at the workshop and the model of absorptive capacity (cf. figure 12), could be the following:

1) Lessons valuable only for one single organisation. Lessons are specific for one single organisation, for instance lessons from the use of specific facilities or from a particular production process.
    - These lessons may be of great importance to the organisation itself, but often of little value to others. Lessons have to be acquired, assimilated and exploited by the organisation itself. If the information is made available outside of the organisation of origin, only a marginal number of organisations would consider it as valuable.

2) Lessons valuable for a specific sector. Lessons that are specific of a sector and could be of interest to all the organisations of the sector, for instance lessons from incident management in a telecom operator.
    - These lessons may be of interest to organisations within the same sector and with similar roles – nationally and internationally. Lessons have to be acquired and made available by the organisation itself, by a sector organisation or by a public authority. Other organisations have to recognise the value of lessons and exploit it to increase their performance. Cross-border learning is probably more frequent than cross-sector learning. In the case of any cross-border or cross-sector learning process, organisations have to transform it in order to make it relevant to their context.
3) Lessons valuable for organisations of different sectors with similar tasks and similar roles. For instance lessons regarding maintenance of distribution networks in the electricity sector and in the telecom sector.
    - These lessons may be of interest to organisations with similar roles – nationally and internationally. Lessons have to be acquired and made available by the organisation itself, by a sector organisation or by a public authority. Organisations have to recognise the value of lessons and exploit it to increase their performance. In cases of a cross-border or cross-sector learning process, organisations have to transform it in order to make it relevant to their context.
4) Lessons regarding the role of an organisation in crisis management. For instance what the organisation need to function in a specific type of crisis or what it can contribute with in a specific type of crisis.
    - These lessons may be of interest to all organisations that are dependent on the organisation of origin in a crisis, but also to those who have to prioritise the distribution of their own resources. They will be collected/analysed by either the organisation itself or by a sector organisation or a public authority, and could be of interest to share cross-border and cross-sector. Organisations have to recognise the value of lessons and exploit it to increase their performance in crisis management. In the case of cross-border and cross-sector learning processes, organisations have to transform it in order to make it relevant to their crisis management context.
5) Lessons regarding generic functions that exist in most organisations, for instance, logistics, power back-up, information security etc. Furthermore, this could also include lessons from processes such as threat and risk analysis.
    - These lessons may be of potential interest to most organisations. Generally collected/analysed by the organisation itself, and could be of interest to share cross-border and cross-sector, potentially through sector organisations and public authorities. Organisations have to recognise the value of lessons and exploit it to increase their performance. In the case of cross-sector learning process, organisations have to transform it in order to make it relevant to their context.

6) Lessons on a meta-level, for instance lessons regarding crisis management concepts and principles such as the design of the contingency organisation or the distribution of authority in a crisis.
    - These lessons may be of potential interest to most organisations. Sometimes collected/analysed by the organisation itself, but more often by sector organisations and authorities, and could be of interest to share cross-border and cross-sector. Organisations have to recognise the value of lessons and exploit it to increase their crisis management performance. In the case of cross-border learning process, organisations have to transform it in order to make it relevant to their crisis management context.
7) Lessons regarding the overarching functions and concepts of the crisis management system. For instance, principles for prioritisation, division of labour, distribution of authority, distribution of resources, coordination etc.
    - These lessons are primarily found in between organisations, and need to be analysed in a cross-sector context, probably under the lead of national or regional crisis management authorities. These lessons would probably be collected in a multi-sector and possibly multinational framework. They would be shared in the same contexts. Organisations have to recognise the value of lessons and exploit it to increase their crisis management performance. In cases of cross-sector and cross-border learning process, organisations have to transform it in order to make it relevant to their crisis management context.

Although the classification above represents an idealised structure of lessons learned, some conclusions can be drawn. First of all, not all lessons need to be shared with everyone, and not all lessons are of interest in a cross-border and/or cross-sector context. As a matter of fact, it would not be rational to share all types of lessons through the same processes and systems.

Secondly, there needs to exist lesson learned processes at different levels: organisational, sectorial, national and international. These processes need to be interconnected with each other.

Thirdly, the classification above actually represents a simplification of what are in reality very complex relationships. The applicability of a lesson to a specific organisation will vary with factors such as the size, role and culture of both the sending and receiving organisations. A lesson may be easier to apply in an organisation of similar size and with a similar role in another country and in another sector than in an organisation of different size and with a different role in the same sector and the same country.

In addition, there could be a need to do an overall and encompassing lessons learned analysis of a crisis, especially large scale crisis. This would result in a mix of the above types of lessons with a focus on the latter four. The difference would be that such an analysis in most cases would be carried out not by the single organisations alone but by cross-organisational, cross-sectorial and/or cross-national groups.

Cross-phase lessons learned

Disaster risks resilience management refers to five separate though correlated key phases (Boin et al, 2010):

- **Disaster risk assessment.** Identification, analysis and evaluation of disaster risks and vulnerabilities.
- **Disaster risk mitigation and prevention.** Actions taken before a disaster to decrease vulnerability, primarily through measures that reduce causalities and exposure to damage and disruption or that provide passive protection during disasters.
- **Disaster preparedness.** Actions taken to bolster emergency response capabilities including warning systems, evacuation routes, supply chains and communication procedures established prior to disaster and emergency events.
- **Disaster response.** Actions taken immediately before, during and after a disaster to save lives remove destruction and minimise damage.
- **Disaster recovery.** Short-term activities to restore vital support systems as well as the long--term activities to rebuild properties and social and economic functions.

Cross-phase lessons learned system can be defined as a framework capturing, storing, disseminating and sharing knowledge allowing to adapt information related to one phase in order to be exploit by practitioner of other phased in order to improve the global performance of resilience. The development of such a system will require developing a matrix of relevance between information of one phase to the other phases. However, cross-phase lessons are less straight-forward to categorise than cross-border and cross-sector ones.

A first, fairly obvious observation is that lessons could be beneficial to decision-makers and operators in all phases of crisis management. Perhaps more interesting is that lessons from one phase could, and in many cases even should, be implemented in other phases. One example is lessons about infrastructural resilience. Although in many occasions collected in the response and recovery phases, they would have to be implemented in the prevention phase. The need for collecting this information may however not always be apparent for the actors in the response and recovery phases. As a matter of fact, the consequences of actions and choices in the preventive/preparatory phase may not be clear until the response and recovery phases.

When combining the different phases of a crisis with the steps in the lessons learned process – planning/directing, collecting, analysing/validating, and sharing/learning/implementing – some further conclusions can be suggested. First of all, cross-phase learning must be taken into account already in the planning of the lessons learned efforts. The needs of one phase must be considered when collecting lessons in another. Secondly, the collection and analysis of lessons in one phase may have to include experts primarily concerned with other phases. Thirdly, the sharing of lessons will involve sharing with actors primarily involved in other phases. This may include cross-sector and possibly cross-border dimensions.

Collection of observations will take place in all phases. However, while most of the lessons identified in the prevention and preparedness phases probably are “intra-phase”, meaning that they relate to activities in the same phases, a larger amount of lessons from the response and recovery phases will be “inter-phase”, meaning that the actual implementation and learning must take place in other phases. For instance, lessons from the response phase may affect the training guidelines or the acquisition of equipment in the preparedness and prevention phases.

This does not rule out intra-phase learning also in the response/recovery phases. For instance, a superior methodology that is identified during a crisis management response operation could be implemented directly. However, it is more likely that this learning will take place during training

sessions in the preparedness phase. We hence need to distinguish between in what phase learning should take place and in what phase a specific lesson should change behaviour.

Challenges to X-BSP lessons learned

From the interviews and the workshop, three overarching challenges to X-BS(P) lessons learned have been identified. First of all, there is a general scepticism towards the usefulness of X-BS(P) lessons, and sometimes even towards lessons learned processes in general. Some respondents felt that they already today have access to the knowledge they need *within* their organisations. This is sometimes combined with the view that their operations and contexts are so specific that external lessons would be of little help. For instance, several local and regional crisis management organisations saw themselves as working in contexts so specific that there was little use to try to learn from other local or regional crisis management organisations. Furthermore, a majority of the respondents lack functional *internal* lessons learned processes, which may affect negatively their interest and ability to engage in lessons learned activities outside of their own organisation. Motivation seems a key issue.

Secondly, constraints regarding time, personnel and other resources were seen as hampering X-BS(P) sharing. The lack of straightforward methods, structures and systems for sharing lessons was also mentioned.

Thirdly, the questions raised regarding X-BS(P) transferability do represent real challenges; organisational, cultural, legal etc. In many cases these issues exist also when sharing within a sector, and sometimes even within an organisation. In this section, the issues of contextual factors will be further discussed.

Examples of contextual factors – cross-border sharing

In the interviews a number of factors were raised and said to affect cross-border sharing:

1) Perceived threats and risks
    - What are perceived as the dominant risks/threats will not only affect what lessons searched for, but also how they are analysed and valued. For instance, a region threatened by flooding will focus on different roles and lessons than would a region mainly threatened by forest fires.
2) Climate/geography
    - Although closely related to threats and risks, this is also a dimension in its own right. For instance, a rural area will have different needs and conditions than an urban one. A Nordic country will have a different angle on lessons regarding extreme temperatures than would for instance a south European country. This will affect what is seen as important lessons and how these are analysed.
3) National legal frameworks
    - This is a broad factor that includes such areas as the national distribution of mandates and tasks and the use of martial laws. Differences between the

national legal frameworks will affect among other things where and how lessons need to be implemented.

4) National organisation of the crisis management system
    - Although related to national legal frameworks, this is also a dimension in its own right. Differences in tradition and policies will lead to different ways to organise crisis management. On example is the use of volunteer fire brigades, another one is the centralisation/decentralisation of crisis management leadership. This will affect among other things how and where lessons are implemented.
5) Private or public
    - The level of privatisation of critical infrastructures varies between European countries. For instance, while some countries have privatised the telecom sector, others still keep parts of it state owned. Schools, energy, water etc. are other examples. This may affect coordination aspects, but also the willingness to share lessons with others.
6) Culture
    - Culture will affect the way the world is perceived and interpreted and in general terms affect what lessons that are prioritised and how these are collected and analysed. For instance, what is seen as a lack of strategic decision-making in one culture may be seen as a perfect example of delegation in another culture. While close cooperation between the police and the military is natural in many European countries, it is for historical reasons very sensitive and limited in Sweden. Furthermore, culture also includes differences between countries, between sectors and between organisations in the willingness to openly discuss failures or mishaps. In some countries this is still very sensitive, and may have repercussions on careers or on organisational politics, and even lead to legal consequences.
7) Language
    - Although the language could be seen as a representation of culture, this is also a dimension in its own right. Context can be literally lost in translation. The term bomb scare will have very specific undertones when used by an Englishman that will be lost on a Swede. Similar, terminology may differ making any translation difficult.

Examples of contextual factors - cross-sector sharing

The contextual factors for cross-sector sharing are to some extent similar to the cross-border ones, however with somewhat different content:

1) Role of the sector in crisis management
    - Sectors will have different roles and hence perceive themselves differently. Some sectors have crisis management as their prime task, and to these the ability to manage crisis will be an end in itself. Other sectors have other prime objectives (social services, electricity production, food supply) which could

reduce the interest in crisis management and crisis management lessons learned.

2) Public or private
    - Private sectors, regardless of type/role, will have a focus on the economic profit, and crisis management will first and foremost be seen as a mean to that end. What efforts put into collecting, analysing and implementing lessons regarding crisis management will be dependent on economic deliberations. The exception would be sectors were certain crisis management tasks and roles are requested by laws and regulations. Public sectors may be crisis management oriented (rescue services, national crisis management authority), or at least guided by governmental priorities regarding crisis management. This would be important incitements to lessons learned activities in the area of lessons learned.
3) Perceived risks and threats
    - What different sectors perceive as the main risks and threats will vary greatly. For instance, while the financial sector would probably include financial risks and fraud, the health sector would instead include threats such as lack of effective antibiotics. The rescue services on the other hand would focus on the more traditional threats. What threats that a sector regards as the most important ones will affect what lessons it search for and analyse.
4) Legal framework
    - All sectors have some kind of legal framework controlling their operations and defining their room for manoeuvre. The framework may include specifications regarding crisis management issues, but this is far from always the case. However, the framework could affect an organisations' relationship to crisis management in other ways. One example could be if the framework states that another sector will overtake some responsibilities in a crisis situation. Another example could be if the framework stipulates how and in what situations a public sector may co-operate with private sectors.
5) Culture
    - Culture is a broad factor, including both the general organisational culture and how the organisation perceives its own role in society. Culture is a subtle and sometimes difficult factor to handle and will affect language, hierarchies, attitudes, etc.
6) Language
    - As is the case with cross-border sharing, language may be a major issue when it comes to cross-sector sharing. It will reflect differences in culture, but also differences in terminology. The word crisis will for instance have very different sound in different sectors.

Annex 3: A Functional User Interface

Several studies have shown that lessons learned systems have a limited impact on the actual sharing of the lessons. Different studies have searched for explanations and discussed how to increase the impact (Weber, Aha & Becerra-Fernandez, 2001; Gimenez, Hernantes & Sarriegi, 2014).

This Annex will focus on the human in these processes and on what meta-information that is necessary for an individual, a team or an organisation to find the relevant lessons. It is to be expected that the more meta-data that must be provided, the more reluctant people will be to share a lesson. However meta-data is useful to find lessons of interest and to be able to determine their applicability. What is a good set?

The willingness to share information is another aspect that will be discussed in this Annex. Lessons are sometimes considered as a weakness or a sign of failure, so more anonymity and less openness contribute to a safer 'learning environment', and a higher willingness to contribute. However, how valuable is an anonymous lesson?

The meta-information and willingness to share has been researched using a questionnaire to gather information from different organisations in different countries.

To share information across borders (national as well as sectorial) is an important role for 'the human in the loop'. Based on findings of the EU-project Elite on virtual communities of practice and the example of the "Nederlands Genootschap van Burgemeesters" (Dutch Association of Mayors) we also describe how people involved in communities can support the sharing of lessons across borders.

This Annex mainly deals with sub-task 3, *design and develop an interface and interaction method for the LLF and on an analysis of the needs of different user groups, helping different groups find relevant lessons,* and the following research questions as defined in Section 1.4:

a) what meta-information must be included in the lessons?
b) how to stimulate information sharing?
c) what role do humans play in the lessons learned process?

Challenges concerning sharing

There are some practical problems concerning the sharing of lessons learned that need to be addressed in the suggested lessons learned framework in order to make it functional. In the paragraphs below we discuss these challenges, indicated by domain experts in the interviews. Some of them have been discussed in more detail in Annex 2.

1. Willingness to share information

People are in most cases willing to share information within their own organisation. Whether they are willing to share information between organisations, sectors or countries depends on their type of organisation. From the interviews especially the commercial companies indicated that sharing information is not something they take for granted.

2. Contextual differences

A big challenge in the sharing of information across borders is to either make the lesson context-free or to describe the most binding conditions so that others can check these in order to determine the applicability.

3. Time constraints

At the operational level organisations tend to strive for returning to "business as usual" as soon as possible after an incident. Therefore the identification and sharing of lessons needs to be fast and simple.

4. Level of detail

There is a lot of information concerning lessons learned that can be shared. However, different users need different levels of detail. For lessons from one's own organisation more details and background information is usually needed since there is a will to learn from the specific incident. Between organisations, between sectors or across borders these details are however often less important. Instead the learning would generally concern a more abstract level: What was the general problem? What solutions worked? What kind of organisation worked well? A lessons learned would thus in many cases have to be formulated differently for different users.

5. Language

Another challenge might be language – between countries but also between sectors. Especially when sharing lessons between countries it is import that these lessons are documented in a language everyone understands. However it is possible that not everyone with lessons learned are able to write for example well enough English to share that lesson as well as they would in their own language. A related issue is that attention should be paid that specific details of lessons are not lost in translation.

6. Cultural differences

Each country has its own cultural aspects. Some lessons learned might be intertwined to those cultural aspects. When formulating a lesson learned that needs to be understood in another culture, attention should be paid those cultural aspects that contribute to that specific lesson learned are documented or explained as well.

7. Available resources

Different organisations have very different resources available for crisis management in general and for lessons learned in crisis management in particular. While some may have specific units responsible for evaluations and lessons learned, others may have one person working part time or even no dedicated person at all. The ability to contribute to the lessons learned processes will vary accordingly, but also the ability to find and implement available lessons learned will vary.

Preferences concerning sharing lessons learned

A questionnaire was used to collect preferences of domain experts regarding the sharing of lessons learned. Out of the 42 interview respondents, 35 also returned the questionnaire. These represented public and private organisations involved in crisis management (crisis management decision-makers, local rescue services, electricity sector, telecom sector, water and wastewater infrastructure sector, food supply chain and voluntary organisations) in seven EU member states (France, Poland, Portugal, Spain, Sweden, Germany and The Netherlands) and Israel. For most questions they had the

opportunity to select multiple answers although for in some cases they were asked to choose one alternative. The most important findings will be described below and form the basis for the suggested approach that will be described at the end of this Annex.

Meta-information

The answers given on the question "what kind of information should be available in a lessons learned system" indicate that most people would like rather detailed information about lessons learned in the system. The categories chosen the most were:

1) Meta-information on the original observations, like organisations involved, persons/functions involved (chosen by 22 of the 35 respondents).
2) An analysis of the cause behind the observations - (20 out of 35).
3) Possible actions to incorporate a lesson learned in a process (training, material to buy, etc; everything that you need to do to be able to repeat this lesson learned) (19 out of 35).

Sharing

Most of the responders wanted to use a lessons learned system/process to:

1) Make observations and lessons learned available within their own organisation (27 out of 35).
2) Exchange observations and lessons with similar organisations at the same level within their own country (26 out of 35).
3) Support the process of analysing and validating observations and turn them into lessons (19 out of 35).

Options regarding sharing of information across sectors and countries were chosen less often but still a significant number of responders chose these options as well:

4) Exchange observations and lessons with similar organisations at the same level in other countries (15 out of the 35).
5) Make observations and lessons available to a large audience of diverse organisations at different levels and in different countries (14 out of 35).
6) Exchange observations and lessons with organisations in other sectors of society/crisis management within your own country (12 of the 35).

Sources for observations and lessons

The responders to the questionnaire were interested in many of the suggested sources to extract observations/lessons learned from. The most important sources according to the responders were:

1) Training and education arranged by their own organisation (23 out of 35).
2) Large scale crisis operations carried out by their own organisation (20 out of 35).
3) Exercises arranged by their own organisation (19 out of 35).
4) Exercises arranged by other organisations (16 out of 35).
5) Daily routine operations in your own organisation (16 out of 35).
6) Large scale crisis operations carried out by other organisations (15 out of 35).

Application

The shared lessons learned would be used mostly in the preparedness phase. The options chosen the most were:

1) For the preparation on crises by means of preparation/planning of a crisis management operation (23 out of 35).
2) Development/planning of exercises (22 out of 35).
3) Development/planning of training/education (21 out of 35).
4) Development of their organisation (20 out of 35).
5) Development of standing-operation procedures/handbooks (20 out of 35).

Just 13 of the 35 responders indicated that they would like to use to lessons learned to support ongoing crisis management operations.

What do you want to share?

When given the option few respondents were willing to share a lot of the information. Only 10 of the 35 responders were able, generally speaking, to share everything (observations, lessons together with all relevant information associated with them). Most of the responders were able to share some anonymised information (singular lessons 4 of 35, singular lessons and observations 4 of 35, anonymised and summarised lessons learned 5 of 35, anonymised and summarised lessons and observations 3 of 35).

Four out of the 35 responders indicated that no forms of information could be automatically shared, but that it would be possible to share information on a case to case basis. Confidentiality of sensitive data and competition were mentioned as the main reasons for this. However, only two of the 35 responders were not able to share any information at any time. Data protection was said to be the reason.

With whom will you share?

This question also resulted in diverse answers. Most of the responders wanted to share them only within their own organisation (15 out of 35), or with the individuals who participated in the training or operations deployment that led to the lesson learned (11 out of 35). Relevant regional organisations (cross sector) were chosen by 10 out of the 35 responders. Nine of the 35 however wanted to share the information with everyone professionally interested.

Suggested approach

In this paragraph we suggest an approach for sharing lessons learned between organisations, sectors and countries to overcome some of these challenges of sharing lessons learned.

As described above a mixed pattern can be seen in the answers from the responders regarding the preferred interactions with a lesson learned system. Most of the responders wanted to use such a system primarily to document and share lessons learned within their own organisation. However there were respondents who (also) wanted to use the system to exchange information across organisations and sectors. This will affect the lessons learned systems' requirements as well as the meta-data incorporated in the lessons. A system for cross-border and cross-sector sharing will need to address more of the challenges described above.

Based on the results of the questionnaire we can furthermore conclude that it is important that the method (including the systems) for lessons learned is primarily usable for collecting and sharing

detailed lessons within the own organisations since that was what most of respondents wanted. Detailed information about the observations, organisations involved, functions involved, etc. are needed in this case in order to be able to analyse the cause behind the observations and to incorporate the lessons learned in processes and training.

However, when sharing information between organisations, between sectors and between countries you will need information with a higher level of abstraction in order to be effective. This means somewhat different requirements for the methods and systems to be used. In our opinion, based on experience, it is at the moment not suitable to develop an easy to use method usable for both types of sharing. It is instead to be expected that X-BSP sharing will be supported by a mixture of methods and systems.

For this mix we suggest a Community of Practice; an approach in which 'knowledge nodes' work together in a network to share the information about lessons learned across organisations, sectors and countries. The 'knowledge nodes' would be fed with observations/lessons learned from the organisations and should be experts for a specific sector or organisation. In order to share the relevant lessons learned outside specific organisations, they must have the ability to translate the detailed information about lessons learned to a more abstract level that can be used across organisations, sectors or countries. A Community of Practice can help build trust between organisations, sectors and countries which is important for the willingness to share lessons learned.

Often organisations have communities that are involved in lessons learned. In the Netherlands there is for example the "Nederlands Genootschap van Burgemeesters" (Dutch Association of Mayors). In the Netherlands mayors have, by law, a responsibility in crisis management. They chair crisis teams and have legislative powers for these kind of circumstances. They are not only required to make resources available for a crisis management organisation, they also have an active role during a crisis themselves. In order to prepare mayors for crisis management, training focuses on procedures and getting to know the other players in their team, Het Beleidsteam (the strategic level Crisis Management Team).

However, to go from training to an actual crisis is difficult. The situation is 'different in so many ways'. Therefore the Dutch Association of Mayors employs two counsellors, one fulltime and one part time. These counsellors *are the lessons learned system for mayors* encountering a crisis. The interface is very simple and well known to the target audience: they dial a telephone number. The counsellor on duty picks up the phone and they engage in a conversation. The mayor explains the situation while the counsellor asks questions to get a better understanding. Based on the counsellor's knowledge of previous, similar situations in the Netherlands he/she then gives the mayor advice on what to do, what it is related to, etc. Topics on which the Association advices its members vary from legal advice to crisis communications. When found suitable, the counsellor may join the mayor in the area of the crisis. However, the counsellor can also advice the mayor to call another mayor for more in-depth information on a specific experience. Mayors with experience in battling a crisis can be considered experts holding precious knowledge, including lessons learned. If the crisis is in an entire different domain the counsellor can consult an external expert, validate the expert and then connect the mayor and the external expert.

Basically, the counsellor does two things: he/she provides access to (selects) the (interpretation of) lessons learned from previous crises and he/she also provides access to other experts or communities

that might be of any help. In addition to this the counsellors can provide additional material containing more general lessons learned.

If other such communities exist in other neighbouring countries, it would be useful for the counsellors to know each other, to compare and share lessons together, specifically in a crisis that takes place near the border.

Another example of possible lessons learned communities are the branch organisations that exist in many sectors (for example within the telecom or water sectors). Since the information is often confidential and difficult to share, there is also here need for a specialist working extracting the more general lessons. These lessons could then be used to advice member organisations in time of crisis. Alternatively, the expert may help by matching expertise with member organisations in need of advice.

Last examples are the knowledge directors within the safety regions in the Netherlands. Every safety region has his own knowledge director, responsible for evaluation incidents and formulating lessons learned. These knowledge directors of the 25 different regions meet a couple of times a year to share overarching knowledge.

For such a system to be effective across Europe, existing networks and experts, active also in times without crisis, should be used. By using these existing and well known networks it will be easier to find the information needed during an emergency. In order to facilitate sharing lessons learned these existing networks could form an active community of practice for lessons learned.

Knowledge sharing communities

In order to share knowledge across borders we suggest not to create new communities of users, but rather to connect different communities that are already interested and possibly involved in lessons learned.

Connecting existing communities could be done at two levels:

1. *Bringing together the Points of Contacts (PoCs) of the existing communities.* First of all, they would need to learn to know each other to create a bridge between the communities. In the beginning they will help each other to understand what lessons can be found, how to make the interpretation, etc. Later, systems and processes for lessons learned could be linked, if and when this is seen as appropriate.
2. *Creating virtual Communities of Practice (VCoPs)* in addition to the face to face meetings of PoCs. VCoPs have the advantage that people can participate also if they do not belong to a (known) community, can be accessed when needed and take relative little time and money to join. This idea is based on the EU project Elite (http://www.elite-eu.org/).

Annex 4: Processes for Defining and Prioritising Needs for Lessons Learned

The resources available for the collection, analysis and dissemination of lessons learned are, and will always be, limited. This is true for a single organisation or country, as well as for groups of organisations or countries. However, the amount of possible observations is almost infinite. To prioritise the needs for lessons learned is therefore vital.

Furthermore, the involvement of senior leadership has been identified as a factor of success for lessons learned. Such involvement gives internal weight to the lessons learned process as well as increases the probability of its results being implemented. A process for directing and prioritising the collection and analysis of lessons learned could help developing such management commitment.

Finally, the fragmented structure of civilian crisis management means that no single organisation – regardless of its role and level – could claim to be in possession of the full truth. Instead cooperation is necessary, albeit in many cases sensitive, and processes for cooperative prioritisation called for.

There exist two basic concepts for lessons learned processes; top-down, and controlled by management at different levels, or bottom-up, and basically controlled by what is decided as important by non-management. These concepts are not necessarily mutually excluding. The bottom-up flow of observations may highlight tendencies that will trigger a management-led top-down search for new knowledge. On the other hand, the top-down approach its requests for information, could trigger wider searches resulting in bottom-up information.

Both concepts have their specific challenges regarding prioritisation. A bottom-up process is by nature growing wild, and the prioritisation will probably primarily be indirect, via gatekeepers at different levels. A top-down process, on the other hand, is dependent on processes for prioritising lessons otherwise it will lose its momentum. However, already in the definition of the DRIVER project (Seventh Framework Programme, 2013) it was decided to use a top-down perspective, without ruling out bottom-up flow of observations. The main motive was that this will be a more cost-efficient way to go about lessons learned, focusing on those lessons that are needed. The prize to pay is that some of the breadth in the observations and lessons reported will be lost.

This Annex discusses the need for prioritisation and different forms for such a process. It primarily deals with sub-task 4), *design a process for decision-makers to define and prioritise their needs for Lessons Learned* and its subtasks as defined in Section 1.4:

a) what are the needs for decision-makers to direct and prioritise the lessons learned process?
b) how should such a process be designed, and who should be included?

The bases for the analysis are the results from the interviews and questionnaires.

Prioritisation in the interviews

The interview generally displayed very little active prioritisation. Of 40 interviewed representatives from organisations in different sectors and at different levels only six said that they had some kind of structured process for prioritisation. Although somewhat more respondents stated that they had some recommendations for when to carry out information collection (certain types of incidents, certain size of incidents) these had no direction for what functional areas to collect information about. Instead "all information may be of interest" was a reoccurring answer.

The *local crisis management actors* (eight respondents from five countries) generally had little or no direction for their lessons learned activities. They either expressed that they would collect everything they could, or that each individual is in practice responsible for the prioritisation, sometimes based on some general directives from management levels or authorities (such as *strategies for the fire safety of individuals*). Some respondents expressed that they would like to see more direction, for instance through a developed methodology or predefined key topics and assessed potential damage.

The *regional level crisis management actors* (ten respondents from six countries) basically displayed similar views. In several cases it was predefined that certain types of incidents should be evaluated, although there was still few or no instructions regarding what aspects or functional areas to evaluate. In practice this was left to the local or regional officer to decide. In some cases a *de facto* selection of incidents to study was expressed, based on e.g. perceived risks.

The *strategic/national level crisis management actors* (five respondents from five countries) were quite vague regarding direction and prioritisation in the LL-process. To some extent this could be a result of a sensitive position for this level in some countries, being expected to deliver direction but in reality lacking a clear mandate to do so. The lack of early-warning capacity and difficulties in discerning trends at an early stage were also mentioned as a reason for not being able to direct the lessons learned processes. It is interesting to see that although the strategic level is hesitant to discuss direction, the regional and local levels to some extent actually seem to extract such direction from texts published by the strategic level.

The respondents from *food production and distribution sector* generally did not see the need for a directed lessons learned process, neither on a sector level, nor within their own organisations. They would in some cases see laws and regulations regarding food safety as a *de facto* direction. However, in one case – a large food distributing firm – a certain size of incidents or patterns of small incidents would trigger lessons learned investigations, in accordance to an explicit, structured process.

The respondents from the *telecom sector* (six respondents from three countries) generally did not see direction and prioritisation of lessons learned as an issue. It is mainly about incident reporting and in many cases regulations would direct when collection and sharing of information need to take place. However, in one case a group of users or a security team could raise issues, for instance based on potential (or actual) impact. In one particular interview with a service provider (company) it was expressed a wish to have both proactive (looking into identified areas of interest before any incident) and reactive (looking into an occurred incident) prioritisation. Prioritisation based on criticality or threats/risks were also mentioned as desirable in three interviews. In one case it was said to be the basis for choosing among potential case studies, but it is unclear if this choice included choosing what functional areas to study.

The respondents from the *water/waste water* sector (four respondents from two countries) indicated that they will collect information (both daily routine information and incident information). However, apart from what was stipulated in laws and regulations, there was very little direction. In one case training objectives (revised on a yearly basis) were mentioned, together with the design of the reporting form.

Prioritisation – some preliminary conclusions

The overall conclusion from the interviews is that direction/prioritisation is either lacking (all lessons found are collected or no lessons at all collected) or programmatic (all lessons of a specific predefined type and/or size are collected, in some cases based on laws and regulations). Very few of the interviewed actors seemed to have a structured and management led process directing the search for observations and lessons.

Another conclusion is that few respondents saw the role for branch organisations and authorities in directing lessons learned processes.[41] The lack of both horizontal and vertical flows of observations/lessons to and from the organisations was apparent in the interviews and the questionnaires.

Finally, the overall impression is that the incentives for lessons learned and thus what types of lessons learned that are of interest differ between the respondents. Although the economic incentives naturally are strong within the privately dominated sectors, the brand management incentive is probably at least equally strong.

Hence, to answer the question *what lessons to look for* becomes essential. This does not mean that there should be one process involving all actors in all sectors and at all levels for defining the needs for lessons learned, as it would not be functional in the heterogeneous and non-hierarchal system of systems called civil crisis management. Although the need for lessons learned will be similar, what lessons learned you specifically need may differ greatly from level to level, from sector to sector, and from country to country. Furthermore, while some lessons are of such a character that they can and should be implemented immediately within the existing norms and cultures (single-loop), others may have much bigger impact on the basic norms and principles (double-loop). Also this may vary from level to level, from sector to sector, and from country to country.

Although no single process could embrace all these different needs, a common framework could help different processes for prioritising to support and enhance each other. These processes will exist on different levels.

[41] In some cases it was also unclear what *general* roles, if any, the respondents acknowledged for the branch organisations.

Who should prioritise the lessons learned processes?

Prioritisation of the lessons learned processes in a system allowing for cross-border, cross-sector and cross-phase learning, need to take place at different levels simultaneously. At each level, a supervising function should prioritise what efforts to put into the lessons learned analysis and what focus those efforts should have.

Within a single organisation, prioritisation would be decided by the management. The character of this decision would however differ from organisation to organisation. In the small firm, it would be a simple CEO decision while the large public agency would need to have an in-depth preparatory process. The large organisation would probably also have processes working at different levels.

The issue of "who directs" becomes more complicated when more than one organisation is involved. Lessons learned co-operation between organisations of similar type within a sector could be bilateral. Both organisations would then jointly decide on the priorities for any joint analysis.

However, more often either a branch organisation or a regional or national public agency would need enforce, encourage, initiate and/or facilitate such co-operation and direction. If an international co-operation on lessons is foreseen, this would probably include an international branch organisation as a facilitator or a multinational organisation (such as EU DG ECHO) as an interlocutor.

Since the branch organisations are made up by its members, any co-operation would need to be based on the principles of self-determination (no single member could be forced to co-operate) and self-differentiation (every single member participating would decide themselves what to contribute with). In the case of a public agency co-ordinating the lessons learned within a sector or a group of sectors, the co-operation could be compulsory, for instance as a condition for concessions or regulated in laws. Then the lead agency would decide what areas and issues the co-operation should focus on. However, it is likely that voluntary co-operation, based on self-determination and self-differentiation, would be the default also in many of these cases since many areas of interest would not be covered in conditions and regulations.

Co-operation between sectors is potentially complicated. In some cases there exists a well-developed co-operative interface, for instance through commercial relationships. Co-operation on lessons learned would then be on a case-to-case basis between single organisations, and the management would jointly decide on the priorities. However, these interfaces may not always be functional for lessons learned co-operation and instead branch organisations may play a role for a more structured and continuous cross-sector lessons learned co-operation, including formulating priorities.

Although it is management who decides on the lessons learned priorities, this does not mean that the resulting lessons are necessarily implemented at that same level. What the management level does is basically to prioritise the resources available for lessons learned process. This could be done with the objective to improve a specific production process as well as to improve the knowledge base for future management decisions.

Furthermore, the group who is going to use the lessons may not be the same group that collects and analyses them. Instead, a specific organisation will in many cases be set up for handling lessons learned and for an ongoing crisis management operation a specific task force could be used to identify and collect observations/lessons.

Processes for defining and prioritising needs for lessons learned

A conclusion from the interviews was that very few organisations, regardless of type, role or level, seem to have discussed the need for directing the lessons learned process. In some cases this could be attributed to the fact that the organisations simply did not recognise themselves as working with lessons learned. However, even among organisations that did acknowledge the role of lessons learned, there was little evidence of structured processes for direction. A further explanation, especially in the private sector, could be that the scope of many organisations' operations is quite narrow. As a manager you may simply not see the need for a process to make you understand in what areas you need to search for lessons learned.

A challenge to lessons learned prioritisation for cross-organisational, cross-border and cross-sector lessons learned, is that the same type of decision is taken in different contexts and at different levels in different organisations, countries and sectors. To find an interface, a search for a "least common denominator" is necessary.

For instance, most countries have similar types of schools for the rescue services. These schools are responsible for the training of rescue service personnel and for the development of such training, based on *inter alia* experience. A possibility would be to use this type of level for the co-operation both on prioritising lessons learned processes and on collecting/analysing lessons. Branch organisations could also co-operate on cross-sector prioritisation, and play an important role especially for privately dominated sectors. Of course this would not rule out a need to involve the senior, strategic leadership in the decision on the prioritisation.

National authorities, and possibly also EU institutions at the international level, could also play a role. To some extent these authorities already today offer guidance regarding crisis management priorities, although not explicitly for the lessons learned processes.

Within an organisation the different levels of management, strategic and operational, would direct the resources available for lessons learned. This process would need to start in a series of questions:

1) What are the main external challenges (risks and threats, as well as for instance changes in the environment including changes in legal frameworks and effects of dependencies) that the organisation face?
2) What main internal challenges (risks and threats, as well as for instance production quality) does the organisation face?
3) What decisions will these challenges trigger?
    a. Short term decisions for mitigating or preventing.
    b. Long term decisions for changes in structures and procedures.
    c. Etc.
4) What experiences could help making those decisions?
5) Where could these experiences be found – internally and/or externally?
6) What resources are necessary to collect these lessons?

In a large organisation a staff function would work with these questions and suggest a prioritisation to the management level. In small organisations this process could instead be part of the management group's tasks.

However, a process for prioritisation at the organisational level is not enough. Certain lessons are of interest to several actors/organisations or to several sectors. Sometimes these lessons will be identified and analysed by a single organisation and shared with others. However, weak sharing processes could hamper this (see Annex 2). Furthermore, lessons that are seen as of less interest to a single organisation, or as too expensive to analyse and rectify for this organisation, may still have severe implications for the overall crisis management system. An example could be lessons concerning the interdependence between organisations.[42]

This means that processes for prioritising lessons learned must be present at the sectorial level as well. However, these processes will operate under somewhat different conditions. *Within a sector* there are, as noted above, two main alternatives for the direction of lessons learned. One is the branch organisations; the other is a public agency (a regional, national or multinational crisis management agency or a sectorial agency, such as a telecommunications authority, with crisis management tasks). In some cases, and within some specific areas such as incident reporting, the branch organisation or the authority may *demand* information from the "subordinate" organisations. This will however not always be the rule. Within public sectors, such as the rescue services, a hierarchy between the local, regional and national levels may exist in some countries. However, not even in these cases will the hierarchy always allow for demanding information from or decide on actions for the subordinate organisations. In most cases the process must include mechanisms for ensuring support and active involvement from the subordinate or member organisations.

The processes at the sectorial levels will need to answer the same types of questions as the organisational level, with some additions. For instance there would probably need to be a stronger emphasis on interdependencies between organisations and between sectors. Furthermore, the sectorial level (branch organisation or public agency) would need to take the lead in an overall lessons learned analysis of a major crisis event.

Basically the situation will be the same for the national and multinational levels as for the sectors. The process of defining will seldom be authoritative and most participative efforts would be on a voluntary basis. At the European level, any process for prioritising lessons learned would need to be directed by either an EU institution or a supranational branch organisation. Within the EU there are both the DG ECHO that has an overarching role in European civilian crisis management and other DG such as DG Agriculture and DG Health and Food Safety. Furthermore, decentralised EU agencies such as the European Centre for Decease Control (ECDC) could also have a role to play in defining needs for lessons together with their national counterparts.

The questions at the national and multinational levels would include a strong emphasis on the development of the overall crisis management system together with cross-sector and cross-border

[42] Another example, raised in the interviews is that a private firm may find it economically less interesting to investigate challenges that are very seldom occurring – it is a conscious choice not to invest in any expensive preventive and preparedness actions and that firm will take the loss if and then the event occurs. Although logical from a business standpoint, this may not be acceptable from a societal perspective.

aspects. As is the case at the sectorial level, the national and multinational levels will also be responsible for large scale analysis of events.

Annex 5: Interviews

Interviews are an important source of information for the development of a harmonised LLF. Therefore, during the period from December 2014 to June 2015, 46 semi-structured interviews were carried out by the consortium.

The interviews basically had four purposes. First of all, to gather information about the current frameworks and systems for Lessons learned at different levels from the EU to the local rescue services. Secondly, to further investigate the need for Lessons learned systems and what features such systems must include. Thirdly, to identify such differences in structures, policies and approaches that may affect the layout of a Lessons Learned Framework. Finally, to identify a group of decision-makers, experts and end-users that later on participated in the expert seminars of task T53.1 and may participate in forthcoming WP530 experiments.

It was decided that the interviews should include both the strategic level decision-makers and the levels directly responsible for handling the crisis, since both have strong interests in a Lessons learned framework. The aim was to interview representatives from these levels in all countries represented in the consortium, to ensure a broad understanding of both the opportunities and challenges concerning a Lessons learned framework at the European level. However, the availability and accessibility of respondents turned out to vary from country to country which affected the resulting outcome.

Furthermore, it was recognised that since crisis management concerns more than the rescue services, a selection of other sectors should be interviewed. The choice fell on water (distributed public sector with broad impact), food (distributed private sector with a broad impact) and telecom (centralised and primarily private sector). In addition, interviews were carried out at the EU institutions and NATO JALLC, as well as with volunteer organisations.

In the project group seven countries plus the European Union were represented. The aim was to interview representatives from the different levels of public crisis management in all these countries represented while the EU institutions, and specific sectors (telecom, food supply, water production and distribution) would be distributed among the participants in the group.

Each participant in the project used their respective organisation's network to identify suitable and willing interviewees, within the public crisis management organisations and in the sectors allocated to them. However, there were considerable national differences in the willingness to participate in these kinds of interviews and questionnaires which meant that the result was not complete. Altogether, 46 interviews were carried out with representatives from public and private sector organisations active in crisis management.

Respondents

- Five interviews with strategic level national crisis management organisations (Israel, Netherlands, Poland, Portugal and Sweden).
- Ten interviews with the regional level crisis management organisations (two in Israel, one in France, two in the Netherlands, two in Poland, one in Portugal and two in Sweden).

- Eight interviews with the local level crisis management organisations i.e. rescue services or local community security officials (one from Germany, two from the Netherlands, two from Poland, one from Portugal, two from Sweden).
- Six interviews from the telecom sector (one from a German company, one from a Dutch company, one from a Dutch government entity, two from Polish companies and one government entity).
- Four interviews from the water sector (two from the Netherlands (two companies) and two from Sweden (one government agency and one branch organisation)).
- Seven representatives from the food supply chain (four from Poland (two producers, one distributor and one retail) and three from Sweden (one producer, one distributor/retail and one government agency).
- Two representatives from voluntary organisations (France, The Netherlands).
- Three interviews at the EU institutions.
- One interview at NATO JALLC.

Interview template

Interview templates were developed for the different categories of respondents. The template was meant to be a help and a checklist, rather than an exact recipe for the interview. The differences between national contexts and cultures also meant that the interviews differed in nature – from a conversation to a strict question and answer session. Each interview took between 45 and 90 minutes.

Below is the template adapted for regional crisis management organisations.

Regional level decision-makers/rescue services

In Sweden this would be the officer responsible for crisis management at the landshövdings office (office of the head of the County Administrative Board).

Introduction

- Name, position and affiliation (if not already clear).
- Signing of the informed consent form (should be emailed in advance).
- Background to DRIVER/SP5/WP530 (will be sent out in advance, but a short recap is perhaps necessary).
- Explain that we will be interviewing local and national levels as well. This means that we in this interview are interested in the use of LL at the regional level.

Lessons learned in your context

- What do you think is/should be the role for lessons learned in the regional crisis management system?
- What types of lessons could help regional level decision-making regarding crisis-management?

(These questions aim at establishing the respondent's view on the importance and role of LL at the regional level)

Current systems

- Do you currently use any process and/or systems (for rescue services or crisis management in a broader sense) *at the regional level* for collecting, analysing and/or disseminating observations/lessons learned?
    - If yes, please describe these processes/systems (below are follow-on questions if needed – you do not need to ask all of these, rather these questions are a checklist)
        - Who controls (in the sense "owns") the systems?
        - Who directs (in the sense "decides" what types of information to handle) the system?
        - Who manages (in the sense "runs" the system on a daily basis) the system?
        - Who are the main "customers"/target group of the system (i.e. who benefits from the lessons)?
        - What types of information/observations does the process/system include? Only rescue services or all functions involved in crisis management?
        - How (and possibly by whom) is the information collected?
        - How (and possibly by whom) is the information analysed?
        - How and to whom is the information disseminated – internally and externally (to other organizations that are subordinate, superordinate or at the same level as you)? Who controls/direct the dissemination?
        - How do you follow-up on dissemination and the quality of implementation?
        - To what extent do you use IT/database support tools for collecting, analysing and/or disseminating lessons and what are your experiences from using these?
        - To what extent do users in the crisis management system feel that the LL-system/process is adequate and give them the information that they need? How could this be further improved?
        - What are the gaps in the current systems/frameworks? *(areas/types of lessons not covered)*
        - What are the strengths and weaknesses of the current systems? *(other than the ones under "gaps", for instance in user-friendliness)*

(These questions aim at finding out if there are any processes/systems at the regional level for lessons learned and what these processes/systems look like. Important is that even if they do not use any

databases or other information management systems to handle LL, they may have functioning processes for identifying and handling important observations/lessons).

- If no, do you see the need for such system? Why? (or why not?)
- Could you describe what, in your opinion, should be the main features of such a regional LL system (below are follow-on questions if needed – you do not need to ask all of these, rather they are a checklist)?
  - Who should control (in the sense "own") the systems?
  - Who should direct (in the sense "decide" what types of information to handle) the system?
  - Who should manage (in the sense "run" the system on a daily basis) the system?
  - Who should be the main "customers" of the system (i.e. who should benefit from the lessons)?
  - What types of information/observations should the process/system handle? Only rescue services or all functions involved in crisis management?
  - How (and possibly by whom) should the information be collected?
  - How (and possibly by whom) should the information be analysed?
  - How and to whom should the information be disseminated – internally and externally (to other organizations that are subordinate, superordinate or at the same level as you)? Who should control/direct the dissemination?
  - How would you like to follow-up on dissemination and the quality of implementation?
  - To what extent would you like to use IT/database support tools for collecting, analysing and/or disseminating lessons?
    * What features should these tools include to be helpful for you?

(If there is no such system, the follow-on questions aim at investigating if the respondent would like to see such a system and what that should look like).

Need for direction of collection and analysis

- In what way, if any, are you (or would you like to be) able to direct the collection and analysis of lessons/observations (to decide what subjects/issues the process should focus on)?
- Is there a process for defining your needs for lessons?
  - If yes, could you please describe this process?
    - Who owns the process? Who has the final say?
    - What does it look like?
    - How, and on what grounds, do you prioritize needs?
  - If no, would you like to see such a process?
    - Who should own it? Who would have the final say?

- What should it look like?
- How, and on what grounds, should the needs be prioritized?

(These questions aim at establishing to what extent the respondent see a need for a directed collection and analysis of observations/lessons, i.e. a top-down approach, and the process for this)

Challenges in learning

- What do you think are the biggest challenges when it comes to learning from experience in the crisis management system at the regional level?
    - From one's own experience? (from one part of the regional system to another - between similar entities, between sectors, between phases)
    - From the experience of others (from other regions, from the national level, from other countries)?
    - What could be done to improve the possibilities of learning? What could be done to translate lessons from one context to another (from one country to another, from one sector to another, from one phase to another)?
- What barriers/negative attitudes (if any) towards lessons sharing have you encountered?

(These questions aim at investigating the respondents view on what hinders sharing/learning.)

Annex 6: Questionnaire

A questionnaire was used to collect information on how respondents wish to work with LL, including where to collect observations and with whom to share lessons. The questionnaire was distributed to the same representatives that were interviewed. Of 42 delivered questionnaires, 35 were returned. These were distributed as follows:

- Strategic level public 2 (out of 5)
- Regional level public 8 (out of 10)
- Local level public rescue services 8 (out of 8)
- Food production/distribution 7 (out of 7)
- Water 4 (out of 4)
- Telecom 4 (out of 6)
- Volunteer organisation 2 (out of 2)

The questionnaire

Introduction

Being able to learn from each other is important, but not always easy. It is difficult within an organisation, and even more so between organisations, between sectors and/or between countries.

This questionnaire aims at exploring what specifications you would like to see in a future lessons learned system. What is necessary for such a system to be of use to you?

Definitions:

In this questionnaire, an observation means 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 lesson (or a lessons identified) is 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. A lesson learned is a lessons identified that has been endorsed by appropriate levels and implemented with verifiable results.

Questions

1) What kind of information should be available in a lessons learned system?

   ☐ Meta-information on the original observations, like organizations involved, Persons/functions involved (in the context that these are the experts of this lesson learned) **[22]**

   ☐ Analysis of the cause behind the observations **[20]**

   ☐ Possible actions to incorporate a lesson learned in a process (training, material to buy, etc.; everything that you need to do to be able to repeat this lesson learned (and the result) **[19]**

   ☐ Indication that a Lessons learned came either from a training, exercises or operational situation/deployment **[10]**

☐ Other: … **[2]**

2) For what purposes would you like to use a lessons learned system/process (choose one or several)?

☐ To store observations and lessons **[11]**

☐ To make observations and lessons available within my organization **[27]**

☐ To exchange observations and lessons with similar organizations at the same level within your country **[26]**

☐ To exchange observations and lessons with similar organizations at the same level in other countries **[15]**

☐ To exchange observations and lessons with organizations in other sectors of society/crisis management within your country **[12]**

☐ To make observations and lessons available to a large audience of diverse organizations at different levels and in different countries **[14]**

☐ To disseminate observations and lessons to subordinate organizations **[10]**

☐ To send observations and lessons upwards to superior organizations **[8]**

☐ To support the process of analysing and validating observations and turn them into lessons **[19]**

☐ To identify patterns of observations/lessons using different contexts/sources (within country or across countries) **[10]**

☐ To follow-up the implementation of lessons in your or subordinate organizations **[10]**

☐ Other: … **[1]**

3) From what sources would you like to be able to extract observations/lessons (choose one or several)?

☐ Training and education arranged by your own organization **[23]**

☐ Training and education arranged by other organizations, please exemplify:… **[12]**

☐ Exercises arranged by your own organization **[19]**

☐ Exercises arranged by other organizations, please exemplify:…**[16]**

☐ Daily routine operations in your own organization **[16]**

☐ Daily routine operations in other organizations, please exemplify:… **[6]**

☐ Large scale crisis operations carried out by your own organization **[20]**

☐ Large scale crisis operations carried out by other organizations, please exemplify:… **[25]**

☐ Other: … **[0]**

4) In what activities would you like to use lessons (choose one or several)?

☐ Development of doctrine **[9]**

☐ Development of standing-operating procedures/handbooks **[20]**

☐ Development of interoperable (in an EU context) procedures and processes **[2]**

☐ Development of your organization **[20]**

☐ Development/planning of training/education **[21]**

☐ Development/planning of exercises **[22]**

☐ Preparation/planning of a crisis management operation **[23]**

☐ Support to ongoing crisis management operations (for instance decision support) **[16]**

☐ Processes for acquisition of equipment and supplies **[6]**

☐ Other: … **1**

5) Would you like to know who looked at specific lesson coming from your organization? (Please answer yes/no)

Yes **[21]**, No **[12]**, No Answer **[2]**

6) Would you like others to know that you looked at specific lesson from your organization or other organizations? (Please answer yes or no)

Yes **[19]**, No **[13]**, No Answer **[3]**

7) What types of information regarding observations/lessons would you, generally speaking, be able to share with others (choose *one* option)?

☐ Everything – observations, lessons etc. together with all relevant information associated with them. Please explain why:…**[10]**

☐ Anonymized singular lessons only. Please explain why:… **[4]**

☐ Anonymized singular lessons *and* observations. Please explain why:… **[4]**

☐ Anonymized *and* summarized lessons only. Please explain why:… **[5]**

☐ Anonymized *and* summarized lessons *and* observations. Please explain why:… **[3]**

☐ No forms of information will automatically be made available, only on a case to case basis. Please explain why: … **[4]**

☐ No information will be made available at any time. Please explain why: … **[2]**

☐ Other: … **[4]**

8) With whom would you want to share lessons learned through a lessons learned system?

☐ Only available to your own organization **[15]**

- Read
- Add experiences from others (based on other situations) relevant for this lesson

☐ Individuals who participated in the training or operational deployment that led to this specific lessons learned (but not necessarily limited to your own organization) **[11]**

- Read
- Add experiences from others (based on other situations) relevant for this lesson

☐ Training staff of related relevant organizations or (national) training organizations **[6]**

- Read
- Add experiences from others (based on other situations) relevant for this lesson

☐ Related relevant international training organizations **[6]**

- Read
- Add experiences from others (based on other situations) relevant for this lesson

☐ Relevant regional organizations (cross sector but your own country) **[10]**

- Read
- Add experiences from others (based on other situations) relevant for this lesson

☐ Governmental monitoring organizations (quality of safety and security; Inspectorates in your own country) **[6]**

- Read
- Add experiences from others (based on other situations) relevant for this lesson

☐ Everyone (publicly available for all, scientists, vendors, government, …; not limited to any border) **[9]**

- Read
- Add experiences from others (based on other situations) relevant for this lesson