CSS STUDY

Learning from Disaster Events and Exercises in Civil Protection Organizations

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Center for Security Studies, ETH Zurich
On behalf of the Federal Office for Civil Protection (FOCP)

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Executive Summary

Civil protection organizations focus their activities on minimising or preventing the impacts of hazards on the population. A central mechanism used to increase the effectiveness and consistency of civil protection processes and actions is the ability to learn from past experiences, regardless of whether these experiences resulted in positive or negative outcomes. Actually, failures can often be more important for learning processes than successes. Finding ways to systematically collect and analyse experiences, and turn the results into learning opportunities, can underpin organizational preparation in the context of disasters and emergencies.

Organizational learning is a process built on the direct and indirect (from other organizations) experiences of an organization. The organization must be able to interpret these experiences, assisted by the creation of a collective memory that is readily accessible, which in turn fosters a culture of learning. These process elements must be coupled with a purposeful modification of routine and behaviour that reflects new knowledge and the organization's stated objectives.

This report focuses on understanding how civil protection organizations learn from direct or indirect experiences (events), and planned learning processes (exercises). The work is based on information gained from desktop analysis and interviews with civil protection representatives or researchers from the case study countries concerning international events and exercises. We examined how these events were reported, evaluated, and then (if at all) acted on organizationally, and how the information was used to inform adaptive processes in the context of the national civil protection system. An implicit assumption of the authors was that civil protection organizations should be learning organizations that document and respond to operational, coordination, and planning issues if and when they are recognized. By exploring a range of international cases, this study seeks to provide recommendations on good practice, reporting and evaluation, and provide insights into how international civil protection organizations have responded to challenging events or informative exercises.

The report compares and contrasts international civil protection organizations' responses to a range of possible natural, social, and technological events. A total of four event cases and three international civil protection exercises were examined, detailing how exercise results and post-event reports were, or were not, incorporated into civil protection organization learning. Event and exercise cases used in the report specifically correspond to hazards covered in Switzerland's 2015 risk register.

The event and exercise case studies examined in this project clearly demonstrate how experiences can lead to institutional reform and improvement. However, the results also illustrate how difficult it often is to draw the right lessons from disaster events and exercises, and especially to implement the lessons identified in organizational practices. The research had four key findings:

1. Institutional flexibility is important: Civil protection and disaster management activities are by nature constantly changing. However, organizational change can happen in two ways – it can be planned, or it can be haphazard. A flexible learning organization must take strategic control of the learning process, and encourage an open, flexible and adaptive organizational culture. While each of the case studies (for both events and exercises) illustrates learning opportunities, the institutional willingness and ability to record, evaluate, and ultimately change based on a learning process built around past experiences and exercises varies greatly between the cases examined, as they are dependent on different structural and cultural factors.
2. Lessons as outcomes or processes? How learning is viewed by an organization strongly influences a lesson's integration into organizational practice. Learning (typically recommendations, past experiences, and new information) can be construed by different organizations as an outcome, or as a process. If considered an outcome, the lesson automatically exists as the end product in a process of evaluation or reporting. If a lesson is identified as an element in a continuous process, then the lesson becomes a driver of change, where the change is the endpoint in a process.
3. Knowing what and how to learn: The results highlight that knowing how to learn is strategically at least as important as knowing what to learn. The former determines the basic rules of the learning game. The latter is certainly essential, but less in a structural-strategic sense, because the content of any learning endeavour should be determined by the goal of the organization's learning process, based also on the situational context.
4. Experience has its limits: Thinking beyond experience is particularly important in a risk environment growing in complexity and diversity, characterized by new challenges and risks. Taking a proactive approach to learning can help the civil protection organization to prepare for unexperienced hazardous events (the so-called 'black swan' incidents, for example). If past experiences become the sole source of learning, organizations will only prepare for current threats/hazards, but not future possibilities.

Switzerland's modern civil protection system is itself a product of experience, changing perceptions of risks, and adaptation processes. While Switzerland has largely been spared from large-scale disasters in recent times, with sporadic events on a small to medium scale (2005 floods,

2005 rail blackout, etc.), this should not encourage complacency. The general findings presented above highlight two key implications for Switzerland:

1. A Swiss civil protection knowledge management system is needed: The necessity for strong coordination and communication between responsible authorities is a consistent challenge in the Swiss federal system, and Switzerland's composite civil protection system. In complex and dynamic civil protection contexts the need to retain intellectual capital, and to support knowledge diffusion initiatives is vital for effective organizational learning and change. How do you convert lessons into change? Knowledge must be created, it must be stored, it must be shared, and it must be used as a continuous learning resource. Given the value a well-designed lessons knowledge management system can bring to learning processes, establishing such a facility at the federal level in Switzerland should be considered. Such a facility could draw on two elements: a cantonal-level, standardized lessons-capturing mechanism; and an open access (to organizations in the composite system at federal, cantonal and community levels) knowledge management system. Where possible, it should also capture knowledge and lessons from other entities external to Switzerland's own civil protection system.
2. Continuous learning: Organizational change in civil protection seems to happen much more quickly in response to events (as opposed to exercises), when existing practices and processes are actually put under stress. These responses can be good, if reflective processes are conducted well and effectively. However, knee-jerk reactions can result in poor, non-strategic, and short-term fixes. To avoid overly hectic, event-driven adaptations, it appears essential to design and implement learning processes that are as continuous as possible. Here, effort must not be directed toward replacing response and the ability to identify and record high-quality lessons. Instead, effort must be directed toward finding the best way to benefit from the lessons, both positive and negative, identified in response processes.

1. Learning and Civil Protection Organization

Civil protection organizations focus their activities on minimising or preventing the impacts of hazards on the population. A central mechanism used to increase the effectiveness and consistency of civil protection processes and actions is the ability to learn from past experiences, regardless of whether these experiences resulted in positive or negative outcomes. Actually, failures can often be more important for learning processes than successes (Sitkin 1992). Finding ways to systematically collect and analyse experiences, and turn the results into learning opportunities, can underpin organizational preparation in the context of disasters and emergencies.

The ability to learn and adapt in the current risk environment is especially important. New technologies, emerging risks, and social changes all influence a civil protection context that is increasingly characterized by the need for flexibility. Yet, how can we learn from our previous hazard experiences, if such events are generally rare and unique? While some hazards like seasonal floods might be routine to a certain degree, rarer and more extreme events can bring new experiences to civil protection agencies. For this reason, simulated events, in the form of disaster exercises, play a central role for organizational learning in the realm of hazard management. Consequently, this report focuses both on exploring learning from real events and from planned exercises. In particular, this study examines organizational experience building and adaptation, considering these connected elements as necessary in a learning process.

1.1 The Learning Organization

Levitt and March (1988) suggest that organizational learning is a process of incorporating historical inferences (based on evidence, speculation, and circumstances) into routines that guide organizational behaviour. Rather than being an outcome, learning is construed as a process (Corbacioglu and Kapucu 2006, Levitt and March 1988, O'Keeffe 2002, Shrivastava 1983). The processes involved in organizational learning are connected to the direct and indirect (from other organizations) experiences and the interpretation of these experiences, the ability of organizations to create a collective memory and readily access this archive, and the capacity of an organization to create and support a culture of learning. These process elements must be coupled with a purposeful modification of routine and behaviour that reflects new knowledge and the organization's stated objective (Garvin 2000). Figure 1 captures the basic components of this process. Depending on whether learning experiences lead only to a modification of routine, or to more profound changes in the goals and parameters of an organization, one can differentiate between single-loop learning and double-loop learning. Both forms of learning can be explicit (e.g. standard operating procedures, incident reporting systems, etc.) or tacit, primarily through changes in the organizational culture (Argyris & Schön 1997).

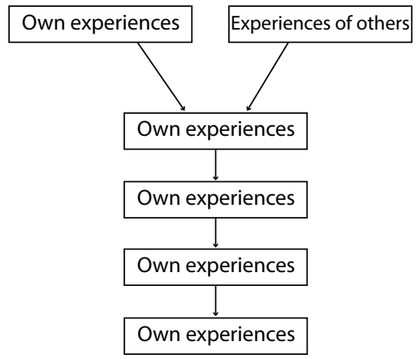

Figure 1: Basic components of a learning process.

In the context of crisis and emergency management, and relevant for civil protection, learning is a key mechanism that can prevent or reduce the impacts of future events, and permit an organization to adapt to dynamic contexts (Attorney General's Department 2013, Carmeli and Schaubroeck 2008, Corbacioglu and Kapucu 2006). The international security environment of the last 15 years has been characterized by growing scale, complexity, and frequency of disastrous events. Here the value of learning for adaptive approaches to civil protection lies in the ability to recognize that different crisis or disaster situations should be addressed using different approaches, or at the very least, that some flexibility in the structural nature of response is important.

In this context, it seems important to highlight that not all learning is helpful. While there is no doubt that the term "learning" has very positive connotations, overlearning (in effect prematurely discarding old knowledge for new) or uncontextualized learning might have serious unintended consequences. For instance, simply adopting best practices developed in other contexts (the go-to model for many organizations examined in this study) might be counterproductive, placing an organization in a worse situation in the future. This is troublesome because a static approach to learning reduces organizational response flexibility (Attorney General's Department 2013).

The ubiquitous "lesson learned" mentality in the modern crisis, disaster, and emergency management fields suggests that learning from the past to mitigate future consequences is normal practice. However, the

reality of this 'ticking-the-box' (simply recording information about an incident and superficially reflecting on that information) response to disaster management should be questioned and challenged in order to prevent the trivialisation of an important process in the adaptation of civil protection systems and hazard responses (Madsen 2009, Attorney General's Department 2013, Choularton 2001). Instead, in this study we argue that learning must to be understood as a transformative process that goes deep into the learning organization's constitution, by recognising when, and reflecting on how to, challenge well-established structures and routines when necessary.

1.2 Aims and Scope of Report

This report focuses on understanding how civil protection organizations learn from direct or indirect experiences (events), and planned learning processes (exercises). The work is based on information gained from desktop analysis and interviews with civil protection representatives or researchers from the case study countries concerning international events and exercises. We examined how these events were reported, evaluated, and then (if at all) acted on organizationally, and how the information was used to inform adaptive processes in the context of the national civil protection system.

An implicit assumption of the authors was that civil protection organizations should be learning organizations that document and respond to operational, coordination, and planning issues if and when they are recognized. By exploring a range of international cases, this study seeks to provide recommendations on good practice, reporting and evaluation, and provide insights into how international civil protection organizations have responded to challenging events or informative exercises,

1.3 Structure of the Document

The document is structured into six sections. This introduction provides a brief background to organizational learning and the 'learning organization', and outlines the relevance for learning in the context of civil protection. Section two details the methodology applied in the study, which is predominantly a desktop analysis. Section three uses four incident case studies to examine how international civil protection organizations respond to and learn from different natural, social, and technological incidents. Section four examines three case studies of international civil protection exercises, exploring the way exercise results were, or were not incorporated into civil protection organization learning. The cases used in sections three and four are specifically chosen because the hazards they focus on are also covered in Switzerland's 2015 risk register.

Each incident and exercise is described in general, including a brief description of the form of civil protection applied in the country where the incident of accident occurred. Secondly, the process to record and evaluate the incident or exercise is described, including the key recommendations of the process. Thirdly, the key lessons from the reporting and evaluation process are presented. Finally, the civil protection organizational responses are outlined.

Section six details the conclusions from the desktop analyses, highlighting key issues that distinguish good practice learning, and the mechanisms that support this learning. Lastly, section seven interprets these conclusions in the Swiss context, specifically discussing how these findings might be drawn on during the adaptation of the Swiss civil protection system. We describe a prospective information collection, management, and distribution system that the Swiss government could establish in support of civil protection organizational learning at the cantonal level.

2. Methodology

2.1 Case Study Approach

The study uses cases of both incidents and exercises as the central focus of analysis for understanding organizational adaptive processes in civil protection systems. To be able to capture the specific contexts of the cases, the study follows a qualitative approach. By no means does the analysis attempt to rank learning processes in different countries. Nor do the authors seek to identify best practices. In terms of the risk landscapes and the socio-political settings of the countries analysed, and the event and exercise circumstances, cases are so different that trying to distil a single 'go-to model' of organizational learning would be a futile endeavour. These parameters also create limitations for the study, making the results less easily comparable, and meaning that an interpretation of 'good practice' learning must be made in the context of these physical and governance boundaries.

2.2 Case Selection

Case selection was undertaken to ensure a broad range of both incidents (natural and technical) and exercises, from a range of countries. In the case of incidents, those where there was a clear relationship between the event and the reorganization of the institution were favoured over incidents where learning was more difficult to identify. This decision was made simply for practicality, allowing the authors to examine the relationship between the event, the reporting/evaluation process, and the organization's adaptation. The study documents and explores patterns in organization learning in civil protection over the last five years.

2.2.1 Events

Four nationally or internationally significant incidents were chosen to examine: the 22. July terror attack in Norway, 2011; the L'Aquila earthquake in Italy, 2009; the West African Ebola outbreak, 2014; and, the solar storm near-miss in 2012 (see Table 1). The Norwegian and Italian incidents were examined in the context of national level organizational responses, while the West African Ebola outbreak and solar storm near-miss are examined in the context of general international responses to the incidents. Each incident resulted in either national or international level systemic reorganization in response to identified civil protection system failures, weaknesses, or missing elements.

This selection of events aims to cover a broad range of possible event types that are included as relevant in contemporary registers of risks (Bundesamt für Bevölkerungsschutz BABS 2015). The L'Aquila earthquake and 2012 solar storm near-miss are considered natural catastrophes. The 22. July terror attacks (bombing and mass shooting) in Norway, and West African Ebola outbreak are considered to be social incidents, the former classed as a "conventional attack", and the latter classed as a pandemic. This selection aims to reflect the relatively broad risk palette that has been developed in Swiss modern disaster risk management, and which will be used to guide developments in civil protection into the next decade.

2.2.2 Exercises

As in the context of the events examined in this study, exercises were chosen based on their relevance to the risk palette discussed above. In addition, exercises with practical components and/or organizational coordination components were examined. These exercises included the United Kingdom's 'Watermark' exercise (2011) that examined a range of flooding relevant scenarios, the multi-country (Scandinavian) 'SKagEx11' that focused on a passenger ferry emergency, and the United States' on-going Radiological Emergency Preparedness Program (REP) that focuses on assessing and addressing the preparedness of REP planning in the nuclear power industry (see Table 2). In these contexts we reflect on the differences between exercising a civil protection system and practicing established civil protection activities.

2.3 Data Analysis

For incident and exercise case analyses we drew on the support of six expert referees familiar with, or directly involved in each of the cases. These referees were used for two purposes primarily: firstly to identify documentation related to the incident or exercise that detailed characteristics of the case, reported on the case, provided recommendations for civil protection organization adaption based on reporting, or illustrated 'lessons learned'[1] (we use 'lessons identified' throughout this document). This information formed the basis of desktop analyses conducted for each of the cases.

Table 1: Overview incidents included in analysis

Type of event	Location	Date	Effects	Main learning mechanism
Terrorist attack	Norway	July 2011	77 fatalities	Parliamentary commission
Earthquake	Italy	April 2009	308 fatalities	Court trial, scientific commission, self-evaluation
Pandemic	West Africa	2014	11,305 fatalities	UN-level independent review
Solar storm	Global	July 2012	–	–

Table 2: Overview exercises included in study

Type of exercise	Location	Date	Main learning mechanism
Live exercise	UK	2011	Review; conference; government reporting
Live exercise	Scandinavia	2011	'Way Forward' reporting
Repeat plan for safety	US	On-going	Detection of deficiencies in preparedness and response planning.

1 The usage of the 'lessons learned' adage has become overly used, and misused in many instances, because the lessons 'learned' are often not implemented. In this document, we replace this terminology with 'lessons identified' in order to illustrate the necessity to do something more with these lessons.

Secondly, the expert referees were engaged to assist the study team to understand exactly how recommendations made post-event or -exercise were integrated into institutional re-organization or system adaptation. In many cases, while recommendations can be easily ascertained from document analyses, actually understanding how, or if, these recommendations were acted on institutionally was more difficult. Experts who were contacted for information on incidents or exercises were also contacted by email or telephone to discuss institutional adaptation in detail, including any factors that were limiting or preventing the implementation of recommendations, and whether plans were in place, or being established, to overcome these hindrances.

In all cases, interviews and discussions with experts were conducted between June and September 2015 on the phone and by email. In most cases, where processes of implementation were reported in detail, dedicated contact with experts was not sought. Only in instances where limited information about implementation and action was available, were experts called on for additional information or clarification. Experts were identified and contacted through the authors' own networks.

3. Learning from Events

3.1 Mechanisms for Recording and Evaluating Events

Countries use a variety of methods for documenting and learning from hazardous incidents and events. While these reports come in a range of forms, two characteristics are probably the most important in the context of organizations learning from disaster events: process independence, and a legal and institutional basis. Few post-event or incident learning processes are characterized by both features, and some are neither independent nor legally institutionalized. Also influential is the establishment of a specific, and independent organization to manage or support emergency management organizations to undertake and implement post-incident evaluations. We describe four key means of recording, organization and evaluating event.

3.1.1 Commission of Inquiry

A 'Commission of Inquiry' or a 'Royal Commission' (as termed in monarchies) are independently led, but formal public inquiries into an issue or event. The commission is quasi-judicial, often led by a retired, or sitting judge, and the recommendations consequently carry significant implications for all organizations referenced or involved. The remit of these dual reporting and learning mechanisms are made within an explicit 'Terms of Reference', which provides a clear aim and scope for the process.

In most cases a Commission combines background research into the issue or event (including representations by witnesses, experts and commissioned research) with external, and public consultation (especially in hazard incidents when the public is directly impacted). The Commission of inquiry is typically initiated at the highest level of government, and consequently results in real organizational change. A recent example in the context of a natural hazard was the 'Bushfires Royal Commission' held in 2009/10 in Australia following the 'Black Saturday' fires of 2009. This Royal Commission resulted in a significant overhaul of the national approach to wildfire public communication, and the integration of civil protection services providers in Australia.

3.1.2 Legal-Institutional Reporting

Given the importance attributed to 'learning lessons' in many civil protection organizations, post-incident reporting has become an institutionalized mechanism to describe an event, and how it was dealt with. Typically these reporting processes are used to support organizational debriefing, and reflection on planning and organizationally specific procedural arrangements.

Whether or not the information generated in these institutional reporting processes is used to inform a systematic learning process depends on the organization. In Norway, the 'Way Forward' reporting process has been established both to document events and to provide a basis on which organizational learning can take place. The reports document not just the event, but also the way forward, beyond that event, While it is unclear whether this process has been utilized continuously since its introduction in 2011, it has nevertheless been used in both reporting for events (e.g. 22. July terror attacks) and exercises (e.g. SkagEx11) examined in this study.

3.1.3 Coordination Organizations and Programs

Beyond reporting and inquiry processes, some governments have also established organizations or programs specifically to collect and disseminate information about events and issues. In complex risk and response environments, these organizations are typically designed to act not just as information sources, but also to actively provide information to emergency responders to improve coordination and cooperation processes pre- and post-event.

The United Kingdom's Joint Emergency Services Interoperability Program (JESIP) provides a good example. The JESIP was itself established as the result of organizational learning post-establishment of the UK's Civil Contingencies Act, which established a legal basis for multi-agency responses to threat and hazard events in the country. JESIP was convened in 2012 after it was recognized that coordination and cooperation between emergency responders was sub-optimal. The Program sets out a joint doctrine for interoperability, focussing on processes for joint incident response, information sharing, and coordinated decision making. Initially only established as a two-year program, its success has led to the Program's indefinite extension.

3.1.4 Informal Learning

Aside from institutional processes, many organizations learn in an ad-hoc manner basis. Informal learning, typically occurring organization-internally, is perhaps the most common way that civil protection organizations adapt to new or changing circumstances. Such processes might occur if an individual or group of workers recognize an issue internally and seek to rectify it in their day-to-day practice. Such changes may not result in fundamental shifts in an organization's operations or practices, but may nevertheless represent an adaptation process.

3.2 Event Case Studies

3.2.1 22nd July 2011 attacks, Norway

On the 22nd of July, 2011, right-wing extremist, Anders Behring Breivik detonated a home-made bomb in Oslo's government quarter, before conducting a mass shooting at nearby Utøya Island. The city explosion killed eight, the mass shooting took 69 lives. The incidents have been characterized as "the most shocking and incomprehensible acts ever experienced in Norway" in the Gjørv Commission Report (Gjørv et al. 2012, p. 8).

The event led to a broad political debate on the Norwegian civil protection system, which like in many other Nordic countries (including Sweden and Finland), is based on the long tradition of 'total defence' (Bossong and Hegemann 2013). The concept of total defence originated at the end of the Second World War, and integrates traditional defence (military), with civil protection, and a broad range of social functions (supply of essential goods and services) and public services (Roth and Prior 2014). Under this doctrine, responding to threats and crises lies at the centre of many aspects of public and private life.

3.2.1.1 Lessons Identified

Soon after the attacks were committed a royal commission was decreed and ordered by the Norwegian Parliament. The ten commissioners, led by Alexandra Bech Gjørv, were called to investigate the incident, focussing particularly on gaining an understanding of what exactly happened and why, the institutional response, and what features of Norwegian society could permit or encourage such acts. The overarching goal of the report was to make a critical assessment of operations in order to draw organizational learning opportunities that could then be drawn on to improve future planning and preparedness processes.

As a learning tool, the commission reviews an incident, reports findings, and makes recommendations concerning the issue under investigation. The Gjørv Commission (as it has become known) identified that the judicial system, and especially the police force, played a sub-optimal role in the response to the incidents. The commissioners indicated that the organization, planning and preparation of the police force contributed to a worsened situation. Interestingly for the broader civil protection system, while the commission's report highlighted the need for better coordination within the judicial system, they suggested that broader organizational restructuring was unnecessary given that they believed the nation's civil protection system was fundamentally successful. These positions seem directly contrary, and perhaps highlights an issue that can arise in commissions of inquiry: because these actions are independent, and once initiated, cannot be halted by governments, they are typically contained by restrictive terms of reference. In this case, the terms of reference seem to have limited the broader possibility for learning and organizational adaptation beyond the directly affected government department (police force).

3.2.1.2 Standard Incident Reporting

Tellingly, the Commission's report asserted that elements of the tragedy could have been averted. The Commission pointed out several failures in the implementation of existing regulations that hindered authorities' capabilities pre-, during-, and post-event. Most important, the Commission found that security measures established prior to the incident, may have actually prevented the tragedy, had they been effectively implemented when they were suggested. For example, already in 2004 the Norwegian government highlighted building security measures, for the building targeted in 2011, to specifically address a bomb threat, and although the work was given high priority, had not been completed seven years after the original identification of the necessity. Other issues included: the need to clarify organizational responsibilities in multi-organization responses; the ability to coordinate multi-organization collaboration; the capacity to recognize and utilize available information and communication technologies; and, lastly, different capacities between organizations to identify and acknowledge risks and vulnerabilities hindered effective implementation of whole-of-government security plans or measures.

The Commission handed down a broad range of recommendations, but generically identified that "the difference between what went well and what went poorly on 22 July was mainly related to attitudes, culture and leadership, and to how people and organizations exercised the authority invested in them." (Gjørv et al. 2012, p.

24). The key recommendation highlights the necessity to integrate and systematize identification and acknowledgement of risks, including terrorism, across governmental institutions involved in emergency preparedness and civil protection. This recommendation specifically identified the need to include national defence in a supra-institutional coordination organ. The Commission suggested that a recognition of terrorism as a civil protection issue would require a modification or complete replacement of the country's civil emergency preparedness system; that plans for civil protection and emergency management must be exercised and practiced regularly; and that results of these exercises (as well as other incidents) must be systemically recorded, shared between organizations, and acted on.

3.2.1.3 Organizational Responses

Christensen, Lægreid, and Rykkja (2013) point out that a core element of Norway's government is the individual responsibility of ministers. This results in strong partitioning between departments, and difficulty in establishing horizontal coordination mechanisms (and contributed to the fact that most substantive commission recommendations were directed at the judiciary). In addition, a strongly decentralized role for local government in emergency preparedness and civil protection creates tensions between the national government and local authorities in the contexts of security and crisis management. Both characteristics presented problems in responding to this incident, and were consequently a central focus of the recommendations made by the Gjørv Commission.

This compartmentalisation of responsibilities may have influenced the government's response to the incident to date. While the Gjørv report identified that "attitudes, culture and leadership" were at the root of many of the issues associated with the direct response, organizational change to date has extended only to structural changes, particularly in the police and justice departments. Although these changes are designed to solve issues quickly and meet the recommendations of the Gjørv report, whether they can foment broader cultural change across institutions is yet to become evident.

3.2.2 L'Aquila, Italy

Central Italy, and L'Aquila in particular, was hit by a Richter magnitude 5.8 earthquake in early April, 2009. The quake was preceded by a four-month period characterized by a seismic swarm of low-magnitude fore-shocks.[2] The quake killed 308 and displaced 144'000 inhabitants in Italy's Abruzzo province. While only considered moderate in intensity, the earthquake struck a region of particularly sensitive building stock, thus adding to the severity of the human impacts (Alexander 2010).

3.2.2.1 Lessons Identified

The most prominent post-incident process associated with the L'Aquila earthquake has been the now-concluded legal process brought against seven individuals who had conducted public communications regarding the earthquake. In a very unusual legal step, six scientists, all employees of the Italian National Institute for Geophysics and Volcanology (INGV), and the then Vice Director of Italy's civil protection service, the Dipartimento della Protezione Civile Italiana (DPC), were charged with manslaughter for providing information that was misleading. While the seven individuals were cleared of wrong-doing in 2014, the process highlighted the necessity to reorganize risk assessment and risk communication processes in Italy. Whether the individuals were coerced into moderating their communications about a possible larger earthquake that might follow from the active seismicity at the time, or whether they believed no larger quake would occur, remains the subject of some contention (Corporale 2012[3]).

Whatever the case, this issue of communication lead directly to the DPC commissioning the International Commission for Earthquake Forecasting (ICEF) to examine existing scientific knowledge about earthquake prediction, and how this knowledge is communicated to the public. The Commission was composed of an international panel of independent scientists, appointed by the then Head of the DPC,[4] to (in part) "Indicate guidelines for utilization of possible forerunners of large earthquakes to drive civil protection actions" (ICEF 2011, p. 320). Given that earthquake forecasting is an inherently imprecise and fraught exercise, some expert referees (pers. Comm, 27.08.15) suggest that the commission was established in order to justify the handling of the L'Aquila risk communication process. In actual fact, the social consequences of an earthquake forecast would be beyond the DPC organizational capacity to respond, so investing a commission into exploring such an issue effectively distracted attention away from the social and organizational limitations of the DPC. Among other points, the ICEF recommended that:

- Information should be authoritative and based on scientific fact, and that it should be consistent and timely.
- Operational processes should be evaluated both retrospectively (for skill and reliability) prospectively (to overcome path dependencies).
- Information provision should seek to build psychological preparedness and resilience.

2 "L'Aquila earthquake prefettura" by Original uploader was TheWiz83 at it.wikipedia – Transferred from it.wikipedia; transferred to Commons by User: Insilvis. Licensed under CC BY-SA 3.0 via Wikimedia Commons – https://commons.wikimedia.org/wiki/File:L%27Aquila_eathquake_prefettura.jpg#/media/File:L%27Aquila_eathquake_prefettura.jpg

3 http://inchieste.repubblica.it/it/repubblica/rep-it/2012/01/18/news/processo_maddalena_g8_terremoto_l_aquila-28302134/

4 Authorized under Article 6 of Ordinanza del Presidente del Consiglio dei Ministri no. 3757, issued on 21 April 2009.

Several academic examinations of the post-L'Aquila situation have also been conducted (see Alexander, 2010), though the recommendations from this body of work are unlikely to be incorporated into adaptation processes within the DPC. Nevertheless, this work has identified several important issues: that the precautionary principle should be invoked in the context of emergency prediction; that scientific monitoring of emergency situations should be supported directly by locally-based emergency responses; that local people-centred actions must be supported, not supplanted by national or regional resources. Alexander (2012, p. 60) pointed out that the poorly planned recovery strategy, combined with the general organizational issues reflected on here, resulted in "economic stagnation, stalled reconstruction, alienation of the local population, fiscal deprivation and corruption."

3.2.2.2 Organizational Responses

In many cases, Italian civil protection has undergone change as a response to scandal, particularly in the context of the organization's political control (Alexander 2010). In the wake of the L'Aquila earthquake, the Italian Government issued ordinance DL no. 195/2009 (an ordinance is a government decree with the status of a law, which is commonly used by Italian administrations to solve difficult problems), which in part sought to privatize Italy's civil protection organization "to ensure economical and timely interventions of the Civil Protection Department of the Prime Minister's Office" (translated from Italian). At the time of its release, this decree instigated one of the single most dramatic adaptations in the Italian civil protection system since the current system was established at the beginning of the 1990s. However, once the implications of the measure were discerned by the public (especially volunteers associated with the civil protection services) and employees of the DPC, objections to the measure mounted, and the government rescinded the offending article of the ordinance.

Between May and July, 2012, the DPC re-visited its original civil protection service legislation, which was established in 1992 (Law No. 225[5]). Decree-law No. 59 (May, 2012)[6] highlighted the necessity to reorganise the civil protection approach, particularly in relation to natural hazard events with exceptional intensity, like the L'Aquila earthquake. Several key changes were made to the National Civil Protection Service. The hazard classification system was reorganized to enable a clearer division of prevention, mitigation, and response activities between national and regional governments, where the most significant events (classified as "type c") are dealt with by the national government, using national government funds. In addition, the activities of the civil protection service have been more clearly specified in the contexts of relief to the population, emergency response and recovery. For the first time, prevention activities of the civil protection service have been extended to include early warning, emergency planning, training and exercising, dissemination of knowledge of civil protection, and information provision for the public. This Decree-law was passed into law in July, 2012 (Law 100/2012: reform of the National Service[7]), effectively centralising processes for integrated risk management of large-scale natural hazards at the level of the national government.

The Organization for Economic Cooperation and Development conducted a review of the DPC in 2010 (OECD 2010). This process was conducted as a self-evaluation with members of the DPC, and findings from the report reflect mostly positively on the system, especially citing the positioning of the DPC directly under the Prime Minister's Office as a significant improvement. The pattern of positioning the civil protection organization as its own ministry, or directly associated with the Prime Minister's Cabinet Office, is a pattern that is emerging in many countries (Italy, Russia, UK, Japan, etc.), and the OECD (2010) recognize this structure can improve co-ordination between the safety and security instruments of the government.

Beyond these measures, the DPC has adopted a government-wide push for transparency in order to address many of the post-disaster issues that arose in responding to the L'Aquila earthquake. This measure aims to build integrity across the Italian administration, especially in the context of the dissemination of information from government sources. Specifically in the context of the Italian civil protection system, the push for transparency opens the administration's records on general administration, staff, information relating to directives and ordinances (in the eight years prior to the earthquake, the Chief of the DPC had signed 587 ordinances, dispersing approximately €10 billion), and information on grants, tenders, subsidies and other economic benefits. While itself a marked advance, it is not clear what further operational or organizational adaptations this push for transparency will bring in the next years.

3.2.3 Ebola Outbreak 2014, West Africa

The West African Ebola outbreak of 2014 was first reported to the World Health Organization (WHO) on the 23rd of March, 2014. In September, the WHO declared the outbreak and epidemic as a "public health emergency and international crisis" (World Health Organization 2014). By the end of August 2015 28109 cases had been reported,

5 http://www.protezionecivile.gov.it/jcms/en/view_prov.wp?contentId=LEG1602

6 http://www.protezionecivile.gov.it/jcms/en/view_prov.wp?contentId=LEG34388

7 http://www.protezionecivile.gov.it/jcms/en/view_prov.wp?contentId=LEG34883

with 11305 deaths[8], representing a fatality rate of 40%, which has decreased since September 2014, when it reached almost 71% (World Health Organization 2014). Five West African countries (Guinea, Liberia, Nigeria, Senegal, and Sierra Leone) were affected by the epidemic, and cases were recorded (primarily from volunteer medical workers returning home or being evacuated) in nine countries outside of West Africa (Ashkenas et al. 2015). The Ebola outbreak was the largest recorded.[9]

The relative geographic restriction of the Ebola outbreak excluded its labelling as a pandemic. Nevertheless, several characteristics associated with the virus have spurred broad international attention in the context of civil protection. These characteristics include: the fatality rate, uncertainty concerning the virus reservoir (the virus' host between human outbreaks), and why 'spill-over' (from non-human host to human) occured. In addition, containing the outbreak in West Africa has been a key consideration, especially because of the large numbers of voluntary humanitarian health workers that have been associated with the international response to the outbreak.

3.2.3.1 Lessons Identified

The WHO is fundamentally an organization of technical specialists providing on-the-ground technical guidance and building networks of expertise. In outbreak situations, the WHO coordinates with government health organizations to support local district outbreak response activities. WHO does not coordinate humanitarian responses in outbreak situations, maintaining its technical advisory and support role. However, in the West African Ebola Outbreak of 2014, this traditional approach was eschewed in favour of a combined technical and humanitarian response, though the reasoning for this approach is not readily clear.

In order to assess this response, the Director General of the WHO commissioned an independent assessment panel to examine all aspects of the organization's response to the 2014 (and ongoing) Ebola outbreak. The panel viewed the process as a "learning exercise" (Stocking et al. 2015, p. 9) that could document how the response was effected, and to advise on organizational structural and cultural changes that could improve WHO outbreak responses in the future.

The assessment panel made recommendations to improve the WHO's emergency response capacity and to better incorporate its activities into wider health and humanitarian systems. In the context of the first point, the panel identified the need for the WHO to act as the lead agency in international emergency health responses, and to develop an organizational culture (through human resource policy changes, changes in organizational focus to include emergency preparedness, addressing member state financing, etc.) that can deliver this necessity. In the context of the second general recommendation, the panel highlighted the need for WHO to improve its operational capacity and understanding of humanitarian processes, and to integrate risk assessment and management approaches between the WHO and the wider humanitarian system.

3.2.3.2 Organizational Response

The WHO has responded to this assessment by establishing a "unified programme for outbreaks and emergencies" (WHO 2015, p. 5). This entails adapting the WHO organizational structure in order to facilitate rapid decision-making, staffing, and financing. The WHO also sought to revise its Emergency Response Framework in order to establish a multi-hazard approach that accommodates the necessary specifics associated with disease outbreaks. More concretely, the WHO has begun to develop mechanisms for effective community engagement and strategic risk communication to assist the broader community to prepare for outbreaks and other health emergencies.

3.2.4 Solar Storm Near-Miss, 2012

In late July 2012, a huge coronal mass ejection (CME) erupted from the sun. The CME is a burst of gas and geomagnetic field from the sun that can disturb 'space weather' and result in major disruptions in Earth's magnetic field. Most significantly for the global society, CMEs can have catastrophic impacts on Earth-based technical electro-magnetic systems, like the electricity grid (Baker et al. 2013). Fortunately, the CME of 23rd July 2012 was directed away from the Earth, and although estimated to have been as severe as the worst solar storms of the 20th Century, few impacts were registered on Earth. Had the CME have occurred just one week earlier, Earth would have stood directly in the path of the eruption.

3.2.4.1 Lessons Identified

While severe space weather has been a known issue since the beginning of the space era, this particular near miss, coupled with the technological state of modern society, would have resulted in catastrophic consequences. The US National Academy of Science estimated that a severe solar storm of the same intensity as the worst recorded to date (1859) could cost up to USD two trillion (in the first year alone), and may take between four and 10 years for full recovery.

In addition to the expected consequences, recent research has suggested that a severe CME occurring has a probability of 12% (Riley 2012). Research also highlights significant vulnerabilities to solar storm in many countries, particularly in the context of intra-national and international communications, in electrical power networks, in aviation, and in electronic control systems. Particularly sensitive infrastructures include high-voltage power systems that cover long latitudinal distances (e.g. in the United States, Scandinavia and Germany), and satellite infrastructures. Higher latitude countries are particularly sensitive to CMEs, and the Norwegian Meteorological service has provided regular public space weather forecasts since 1995.[10]

3.2.4.2 Organizational Responses

Due to the exposure and sensitivity of high-value, complex technical infrastructures to CMEs, severe space weather is now inscribed on the risk registers of many national civil protection organizations, including Switzerland. While the risks associated with a solar storm are generally known, predicting their occurrence and magnitude are extremely difficult. As such, understanding and adequately preparing for solar storm activity is a subject of ongoing consideration.

The UK is currently basing its CME response, within the existing civil protection planning processes (across government, devolved civil protection organizations, and emergency responders), on the 'Carington' event of 1859 (named for the British astronomer who observed the event) (UK Cabinet Office 2013). This event was considered to have been at least as severe as the 2012 near miss, and significantly disrupted telegraph communications of the time (Baker et al. 2013). While the Cabinet Office recognizes that recent CME activity has been on average lower than in the 20th Century, it nevertheless notes that planning for possible occurrences is becoming more important because almost all aspects of technological life are vulnerable to extreme space weather.

The United States is addressing space weather risk by gaining a better understanding of what causes CMEs, and thereby helping to improve forecasting capabilities. The Science and Technology Division of Homeland Security[11] is seeking to improve local impact forecasting in order to provide infrastructure operators with early warning advice to protect technology. In addition, through its ready.gov site, FEMA provides detailed before, during, and after advice to improve public preparedness and response for a CME incident.[12]

Switzerland has also included CME in the most recent national risk register (Bundesamt für Bevölkerungsschutz BABS 2015). While the risk is considered relatively likely (a severe event every 50 – 70 years), the expected consequences have been rated as relatively minor (approximately one billion CHF in damages) compared to other countries, like the United States (which estimates damages could be as high as four trillion USD (National Academy of Sciences 2008)). While these cost discrepancies clearly reflect the scenarios used to estimate consequence, it is important to illustrate the connection between CMEs and power outages, particularly in the case of Switzerland, where a power outage is considered both likely and is predicted to result in significant economic and social impacts. In addition, in the case of a severe CME, the US National Academies of Science (2008) points out that recovery may take four to 10 years, significantly disrupting power supply over the long-term.

4 Learning from Exercises

Although real disasters can never be fully simulated, from the perspective of organizational learning, there is no fundamental difference between disaster exercises and real disaster events. In fact, whether simulated or real, both types of events provide the chance to identify what the strengths and weaknesses of existing structures and processes are, offering a first step toward improvement. While learning based on daily routine might be sufficient in fields where processes and challenges are frequent and similar, for all other conditions exercises are irreplaceable for testing civil protection mechanisms.

Figure 1 illustrates the relationship between the cycle of continuous organizational improvement in an emergency management organization, and the process of exercise management as established by the Australian Institute of Emergency Management (AEMI). While the incident loop of the cycle (hopefully) is brought into action relatively regularly, the exercise can be substituted more frequently to ensure that the organization can test and manage emergency operations and processes in a controlled situation.

This concept highlights that in a continuous cycle the exercise should replace an incident as a primary learning tool (AEMI 2012). If well organized, and well-trained, an organization should be capable of switching seamlessly between regular exercise cycles and a real incident without procedural or operational disruption.

4.1 Exercises with a Variety of Aims

One common problem for emergency managers, identified in post incident reporting, has been the difficulty of enacting planned responses. For example, in the case of the Norwegian terror attack, the Commission established that while planning was sufficient pre-attack, agencies did not follow procedures effectively or properly. As Lord Cullen noted following the public inquiry into the Piper Alpha oil platform disaster in 1988, "the safety policy and procedures were in place, the practice was deficient."

8 http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa

9 http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/index.html

10 http://www.kriseinfo.no/en/Natural/Extreme-weather/Extreme-weather-forecasts

11 http://www.dhs.gov/science-and-technology/solar-storm-mitigation

12 http://www.ready.gov/space-weather

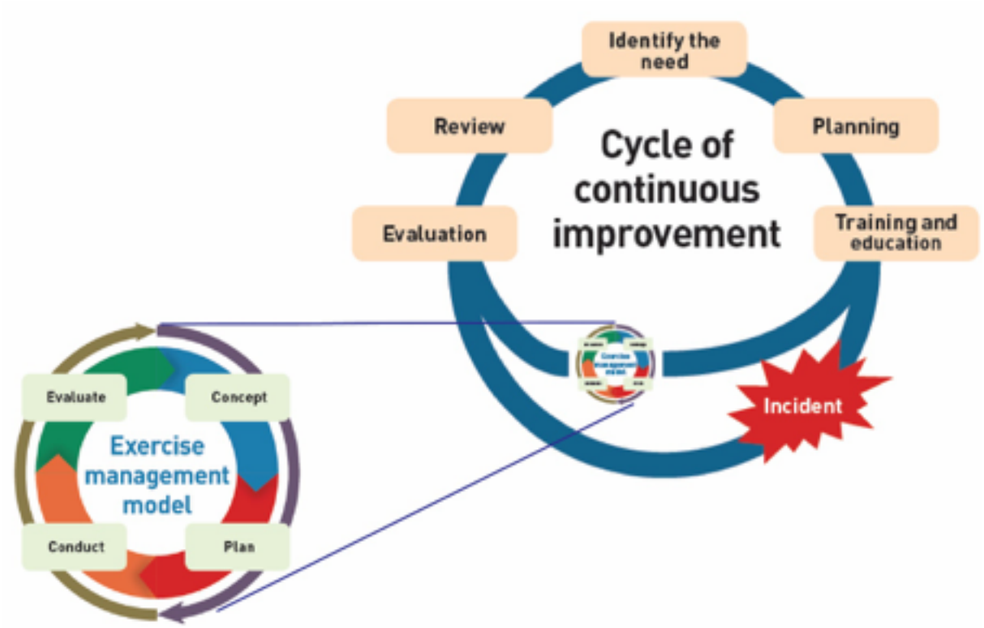

Figure 2: The relationship between continuous improvement and exercise management in civil protection. Adapted from AEMI (2012).

Disaster training exercises provide a controlled mechanism to test implemented organizational arrangements and procedures. They can be used to assess the utility gained from exercise outcomes, and to internalize plans into organizational practices. The issue of regular exercises was raised directly in the post-Hurricane Katrina lessons learned report, which highlighted the necessity to establish a common methodology and regularity of reporting across all homeland security-related activities of government (Townsend et al. 2006). Given that in modern organizations (including civil protection organizations) personnel turnover can often be high, maintaining consistency in practices, and ensuring hard-one knowledge about incidents and exercises is open and available are especially important.

Disaster training exercises often attempt to replicate historical events as realistically as possible. Given that the consequences of real incidents can be disastrous, and should be avoided at all cost, exercises enable a civil protection organization (for example) to simulate situations they would seek to otherwise avoid. Key benefits of exercising the disaster response include:

- Ensuring organizational responses to incidents follow planning guidelines.
- Identifying capability gaps.
- Assessing whether planning guidelines for incidents are appropriate for specific contexts.
- Enhancing capabilities and contributing to continuous improvement.
- Identifying areas of organizational, community, or economic vulnerability.
- Discovering incidences or sources of difficulty in coordination and miss-communication.
- Driving changes in legal frameworks.
- Assessing performance or protection levels.
- Fostering international cooperation.

The goal of the exercise should be used to determine the style of exercise used. In Switzerland, exercises are often conducted as desktop activities. In these cases, building efficiency into coordination is a key objective, and this can be most effectively done in controlled activities conducted as scenarios in operation centres. On the other hand, testing international cooperation processes in trans-border search and rescue activities can be most effectively achieved using practical operational exercises.

This section uses examples from the international literature to examine the way organizations collect lessons and information from exercises and use this information to improve their incident management and response procedures. We draw on case studies of several types of exercises, broad categorisations of which are provided in section 4.1.1, below.

4.1.1 Types of exercises

There are four general forms of exercise, each designed to suit different organizational aims and objectives. Exercises are listed here in order of growing organizational intensity and investment.

1. Discussion platforms or seminars are designed to provide information on procedures and organizational plans.
2. Table-top exercises are designed to engage participants in realistic situations to understand and imagine the application of procedures.
3. The control post exercise typically engages lead communication and coordination personnel in simulated incidents conducted in actual command post facilities.
4. Live exercises allow organizations to test responses in realistic situations.

4.1.2 Exercise Documentation and Evaluation

As discussed above, learning from disasters and from disaster exercises should not be considered vastly different. Therefore, planning of documentation for evaluation should be considered an equally important element of the exercising process as it is in the incident response, reporting, and learning process.

Effectively communicating the outcomes of an exercise to participants and external parties has a direct bearing on the ultimate utility of the exercise. The contents and structure of a post-exercise evaluation report should consequently be established in the exercise planning phase. The AEMI (2012) suggests that a post-exercise report should include a description of the exercise itself, a narrative of key events, a summary addressing the attainment of the exercise aim, objectives and standards, key observations and possible treatment options. The UK Home Office highlights the importance of participants keeping an accurate log of actions and decisions during the exercise. Summaries of the UK and Scandinavian exercise cases used here have been drawn from such reports. The US Radiological Emergency Preparedness Program uses a different basis for reporting, which is nevertheless standardized across all US radiological facilities, and is described in section 4.1.5.

4.1.3 United Kingdom, 'Watermark'

The summer of 2007 was the wettest recorded in the history of the British Isles. Many parts of the United Kingdom experienced severe flooding that killed 13 people and caused over £3 billion in insured losses. At times during the event, almost half a million citizens were without electricity and mains water. The handling of the floods by the authorities was subject to widespread criticism. An independent review (the so-called Pitt Review) especially singled out poor coordination between the different organizations involved in the mitigation and recovery as inadequate and ineffective (Pitt 2008). The review demanded numerous changes in the UK disaster management system, of which many were implemented in subsequent years.

In 2011 the UK government conducted the flood exercise "Watermark", in order to test whether the reforms recommended by the Pitt Review had actually been implemented, and if they had raised protection levels. It was the largest emergency exercise conducted since the end of the Second World War. The event involved ten government departments and emergency services, local communities, and private businesses (see Figure 2). Beside a Ministerial level table-top exercise for decision-makers, the exercise included 35 local exercises across England and Wales conducted by local emergency managers. These live exercises included actual response measures, such as school and household evacuations, in order to give the exercise a maximum of realism. Finally, the exercise included numerous community-based activities that aimed to raise the risk awareness of the general population. Overall, around 20,000 people were involved in Watermark, which costed approximately £1.8 million.

4.1.3.1 Lessons Identified

The exercise led to the identification of several key lessons, which were agreed upon by all major participant bodies at a large conference that followed the exercise (Defra 2011). In addition, the Environmental Agency collected several lessons learnt for their organizational activities (UK Environmental Agency 2011). Among the main findings of the exercise was that the disaster management structures should be more strongly geared towards emergencies that continue to worsen after their initial onset. In the preparatory phase, such scenarios necessitate integrated planning processes, especially in terms of broad, multi-area, and multi-jurisdictional evacuations. During the event, as the situation worsens, an escalation of management to higher levels of governments may be required, as the normally sufficient resources in a subsidiarity-based response become exhausted. For such escalatory steps, clear rules and standard procedures are essential.

In addition, the review criticized the way that assets and resources required for the disaster response were scattered. This issue was particularly heightened when basic forms of coordination among central actors were lacking. For instance, the exercise showed that assets for flood rescue were held by numerous actors on national and local levels, with little sharing of information about where these assets were actually stored, slowing their activation dramatically. The large-scale of this disasters exacerbated this issue.

Finally, the exercise revealed significant room for improvement in the management of information and knowledge. The review team found that reporting processes in place were not sufficient to guarantee a fast and comprehensive information exchange among the actors involved. For instance, there existed no common information platform that would allow the sharing of

hazard maps and other essential data among the different agencies involved in complex emergencies. To overcome this shortcoming, the Pitt Review recommended a decisive investment in IT infrastructures, visualization tools and location-based communication services. Moreover, it urged all government departments and emergency responders to step up their public communication efforts and embrace new communication technologies, such as social media, which proved to be effective channels for public communication during the exercise. At the same time, the exercise revealed that many authorities were overwhelmed by the amount of inquiries for information by the public, while public warnings and evacuation messages were not sufficiently integrated into the larger crisis management processes (UK Environmental Agency 2011: 6).

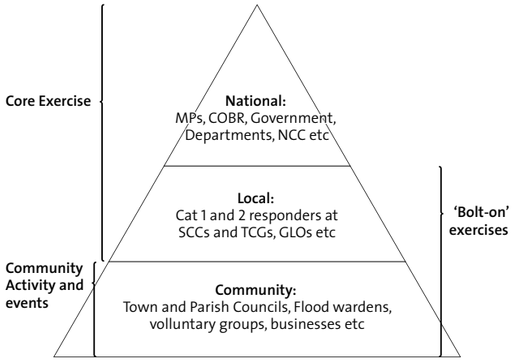

Figure 3: Structure of Exercise Watermark. Source: UK Environment Agency (2011: 1)

In 2012, D the Department for Environment, Food & Rural Affairs (Defra) responded to the final report of Watermark exercise, laying out its intended steps to incorporate the report's recommendations (Defra 2012). As a first concrete outcome from the exercise, the East Coast Flood Emergency Framework was established by the key partners along the east coast of England, organized under the auspices of the newly formed East Coast Flood Group (ECFG). The framework and group were established to improve coordination and mutual aid during large-scale disasters. Beyond this, Defra, the Welsh government, and regional agencies initiated processes to update their flood management plans, especially relating to improved information flows to the population. To this end, the UK government, together with the Civil Contingencies Secretariat (CCS) and the Department for Communities and Local Government (DCLG), have started to invest in communication structures between national and local levels. For instance, the DCLG began promoting the development of strategic alliances across neighbouring local jurisdictions with regard to emergency evacuation and shelter in order to a ensure coherent responses to disaster events (Defra 2012: 7).

A key critique of the exercise review was confusion regarding emergency level definitions. This issue severely hampered the way disaster responses could be escalated as the extent of the flooding broadened because responsibilities tended to be unclear in such situations. In response, and in collaboration with stakeholder groups, the federal government initiated a review process to identify triggers for different levels of emergency.

Finally, the government acknowledged the shortcomings in relation to the coordination of resources and assets identified in the review. To meet these challenges, the government sought to employ mainly non-binding, flexible instruments to increase the knowledge about the availability and location of resources held by the various emergency response actors. At the same time, the government increased its efforts to make the allocation of its own assets more transparent and understandable for its partners.

4.1.4 Scandinavia, 'SkagEx11'

The SkagEx11 exercise was an international exercise coordinated by the Norwegian Directorate for Civil Protection with assistance from the Swedish Civil Contingencies Agency and the Danish Emergency Management Agency. Representatives from Finland were also involved in the exercise. Key tasks of planning and management (Norway), evaluation and reporting (Sweden), and dissemination (Denmark) were shared between the three key partner countries. The exercise was conducted in 2011 the Skagerrak Basin situated between Norway and Sweden, north of Denmark, and was supported by the European Commission's Exercise Program.[13]

4.1.4.1 Concept

The exercise aimed to test a multi-jurisdictional response to a cascading emergency situation. A fire on board a passenger ferry travelling between Sweden and Norway leads to a collision with a second ship, creating a situation where both distressed vessels must be simultaneously dealt with. The Skagerrak Basin is one of the busiest waterways in Europe, valued highly for its environmental characteristics, and bordered by a densely populated coastline. Given the level of shipping activity in the Skagerrak Basin an incident of this type can be considered likely, though the exercise itself is not based on a precedent.

4.1.4.2 Outcomes and Recommendations

A key benefit identified by the participants in the post-exercise evaluation was the value of training internationally, and inter-organization responses. In particular, evaluators recognized the simple act of working together, and building working relationships between country civil

13 http://ec.europa.eu/echo/what/civil-protection/simulation-exercises_en

protection organizations, and across emergency response sectors, was a major benefit. Although the exercise was considered successful in training multi-jurisdictional emergency response, several important issues were highlighted in the context of international collaboration (DSB 2012a). Three factors stood out for the evaluators:

a. The lack of a cross-organization, international situation picture. Participants were often frustrated by the difficulty of obtaining up-to-date information from other participants during the exercise, and suggested the necessity of pre-arranged representatives from each organization acting as information sharing points. The lack of such a practice resulted in inconsistent information and information sharing. A common situation picture was highlighted as a reason why horizontal collaboration at the operational and strategic levels was hindered.

b. Vertical communication within organizations was effective and met requirements, but horizontal communication between organizations and across emergency response sectors was deficient. Within-sector responses and information sharing was efficient, largely because these mechanisms are well-established and understood. In complex, multi-sector emergency response this particular exercise required, cross-sector collaboration was limited. This negatively influenced the coordination of actions and resources between sectors, reducing the interdependent operation between sectors, and slowed response times.

c. Collaboration between on-ground emergency responders was fundamentally successful, yet collaboration at the operational and strategic command levels was lacking. The government ministry level was not involved in this exercise, which may have limited the high-level strategic collaboration, and the development of a workable whole-of-exercise situation picture. In particular, the existence of a joint emergency management centre was cited as a missing element, especially because of the complex, multi-jurisdictional nature of the exercise.

4.1.4.3 Organizational Responses: 'Way Forward' reports, Norwegian DSB

The Norwegian Directorate for Civil Protection (DSB) recognises that evaluating an exercise is not the last step in this activity. The agency has established a (somewhat haphazard) 'way forward' reporting process that is used to guide the way in which points of learning from exercises (and events) are incorporated into emergency preparedness. The 'way forward' report from the SkagEx11 exercise highlights "changes and initiatives in the areas where weaknesses or room for improvement have been pointed out" (DSB 2012b, p. 2). This reporting process was established following the 22. July attacks (section 3.2.1) when the government of Norway determined that a good culture of experiential learning must be developed in the civil protection and security sector. This approach also recognized, alongside the European Commission's Exercise Program, that exercises provided valuable opportunities to gain response experience and identify systemic shortcomings.

The SkagEx11 way forward reporting process represents an intermediary step between the exercise evaluation and the desired organizational response. The report is short and seeks to promote improvements or adjustments to organizational plans, procedures, etc., to political and administrative actors in the emergency sector, which have been identified during the exercise evaluation. The development of the Way Forward report was spearheaded by a syndicate of Scandinavian civil protection representatives, consisting of a core group (12 members) and an expert advisory group (25 members). Figure 3 illustrates the deliberative process of input that was used to draft the way forward report.

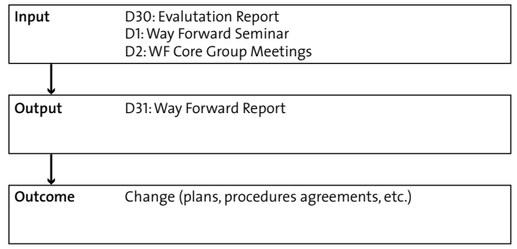

Figure 4: Post-exercise 'Way Forward' process. Illustrates path from exercise evaluation to organizational change. Source: DSB 2012b.

However, direction from this reporting mechanism provides recommendations only, rather than connecting the reporting process to an institutionalized process of organizational adaptation. The way forward report provides suggestions only in relation to organizational change: some of which are generic, while others are more concrete.

4.1.5 United States, Plume Exposure Pathway Emergency Planning Exercise

This case study examines a radiological plume emergency exercise carried out at the Indian Point Energy Center in New York State[14]. The exercise was used to test and evaluate the effectiveness of off-site local and state emergency planning processes within a 10-mile emergency preparedness zone. The exercise was conducted under the FEMA's

14 It is important to note that while this particular case is focussed on one single radiological facility, the REP program is undertaken periodically at all radiological facilities in the US. The process has the same goals, and uses the same (HSEEP) evaluation methodology across all facilities. This particular facility was chosen as a focus because of the mixed positive and negative feedback the evaluation yielded for the facility operator.

Radiological Emergency Preparedness (REP) Program, which utilizes a standardized recording and evaluation methodology employed across all homeland security related agencies and processes (the Homeland Security Exercise and Evaluation Program). In order to contextualize this exercise within this complex organizational framework, we begin by describing the Homeland Security Exercise and Evaluation Program (HSEEP) and the REP program, both of which are informative in the broader discussion about learning from exercises.

4.1.5.1 Homeland Security Exercise and Evaluation Program methodology

The US Department of Homeland Security established the Homeland Security Exercise and Evaluation (HSEEP) methodology in 2006/07 to streamline emergency exercises with a standardized approach (United State Department of Homeland Security 2007). Processes for conducting and reporting within the US Radiological Preparedness Program (REP) are conducted under the broader, 'whole-of-community' exercising approach that has been established in the Homeland Security Exercise and Evaluation Program (HSEEP). The HSEEP aims to both standardize exercise and evaluation across both the hazard palette and organizational landscape of security and preparedness in the US. In doing so, the whole-of-community approach to exercising seeks to challenge established preparedness goals and operations by incorporating non-traditional actors in exercises, in order to force innovation in preparedness strategy. Beyond the four general exercise approaches outlined in section 4.1.1, HSEEP highlights a more specific, capability-based exercise program designed to gradually build capability through training and planning (Figure 5).

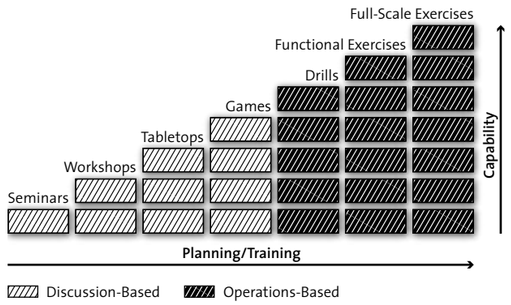

Figure 5: Homeland Security Exercise and Evaluation Program (HSEEP) capability-based exercise management. Adapted from (United State Department of Homeland Security 2007).

FEMA recognizes that "success with the REP is heavily dependent upon our ability to communicate, coordinate, and work closely together building on the strengths of local communities and citizens and integrating the public as a critical resource." Since 2002 when the HSEEP was implemented, the program has undergone a number of changes resulting from regular exercise and evaluation actions across a range of protection issues and geographic areas. In general these changes have been made to increase the ability to standardize exercise approaches regardless of exercise scale, scope, scenario or organising agency. In addition, standardized reporting and evaluation templates are provided to exercising organizations in order to ensure reporting consistency between exercises and organizations, and allowing information from disparate agencies to be easily and quickly compared. In section 4.1.5.2 we present and discuss the recurring United States national Radiological Emergency Preparedness Program that is undertaken within the guidelines of the HSEEP. The HSEEP has evolved within the post-9/11 US security environment, in which the Department of Homeland Security has sought a unified national, all-hazards effort for improved preparedness and response (FEMA 2015).

4.1.5.2 Radiological Emergency Preparedness Program Concept

The REP program is a nationally coordinated effort to assist state, local and tribal governments with practical exercise guidance in all aspects of the risk cycle relevant to commercial nuclear power plant risk management. The program was established following the Three Mile Island nuclear accident in 1979, when whole-of-community (i.e. beyond the facility perimeter) nuclear emergency preparedness responsibility was transferred to the Federal Emergency Management Agency (FEMA). While nuclear power safety on-site remains the jurisdiction of the U.S. Nuclear Regulatory Commission, and focusses on technical operational safety of the plant itself, the FEMA's responsibility focusses on education, preparedness, prevention, response and recovery within the broader community living in the vicinity of a plant, and aims to address civil health and safety concerns in the event of a nuclear accident.

The REP program has existed for many years, but incidents in the last 15 years have seen significant programmatic changes. Aside from the establishment of the Department of Homeland Security, the 9/11 terror attacks and Hurricane Katrina have influenced a national approach to hazard preparedness (FEMA 2015). The national approach encompasses a range of cross-hazard, cross-organization initiatives including: the National Incident Management System (establishes a common basis for incident management), the National Preparedness Goal (NPG), Core Capabilities (critical elements necessary for achieving the NPG), the National Preparedness System (focussing on coordinating whole-of-community preparedness), National Planning Frameworks (sets the strategy for delivering core capabilities), and the Comprehensive Preparedness Guide (guidelines for emergency planning). The HSEEP approach was established in addressing a key recommendation of the Hurricane Katrina

incident review, which highlighted the need for a standardized, but versatile, hazard management exercise methodology.

In order to ensure civil safety and security in areas surrounding nuclear power plants, FEMA engages in a continual planning and preparedness assessment process based on the HSEEP methodology. Any significant operational and planning changes occurring at a plant must be reviewed by FEMA. In addition, FEMA conducts ongoing evaluation and observation of plant activities (all types of exercises, drills, seminars, and training), and employs an on-site specialist to reflect on the implications for off-site preparedness and planning. Within the REP, after-action reports assess areas based on whether preparedness criteria are being met, require corrective action, are in some way deficient, or there exist some form of planning issues.

4.1.5.3 Case: Plume Exposure Pathway Emergency Planning Exercise, Indian Point Energy Center, New York.

The Indian Point Energy Center (IPEC) is the closest nuclear power plant to New York City (NYC), located on the banks of the Hudson River, 40 kilometres north of the city. The plant is scheduled to be decommissioned, and the Nuclear Regulatory Commission (NRC) is currently assessing an operation renewal application by the operator. Given the plant's proximity to the city, renewed operation is opposed by the Mayor of NYC.

Under the REP, exercises are defined as actions that are used to test the effective integrated functioning of critical elements of emergency preparedness or organizations. In the case of the IPEC, regular REP training exercises had demonstrated a range of 'deficiencies' and 'areas requiring corrective action' (ARCA) during the 2000s, including a leak of heavy water in 2005 from a spent fuel pool, and in 2007 a failure to upgrade the emergency siren plan and infrastructure (since addressed). Both incidents incurred significant fines from the State of New York and the NRC, respectively.[15] These incidents likely influence the NRC's current determination process concerning the plant's future operation.

A detailed set of policies and regulations specify when and how exercises should be undertaken, but in general, exercise periodicity under REP is determined based on necessity (if planning, operational, or structural changes are made to a facility, for instance) (FEMA 2015). This particular exercise was conducted in 2008 outside of normal sequence activities (FEMA 2010). Whether the exercise was initiated as a result of the plant's poor safety record at the time is not specified in the report.

15 http://www.nrc.gov/reading-rm/doc-collections/enforcement/actions/reactors/i.html#IndianPoint

The key focus of the exercise involved assessing the levels of local and state preparedness in responding to a radiological emergency. The exercise used a simulated radiological plume to examine organizational preparedness responses in the 10-mile plume pathway emergency planning zone (EPZ). This zone covered parts of four New York state counties, all of which took part in the exercise, as well as representatives from a broad range of state and federal agencies (FEMA 2010).

4.1.5.4 Lessons Identified

Following this plume exercise in 2008, no deficiencies in the off-site preparedness planning processes were identified. However, nine ARCAs were identified during this exercise. Included in these ARCAs was a recognition that the emergency operations centre of one of the neighbouring counties (Orange County, to the west of the plant) was unable to provide sufficiently accurate public alerting information. In another case, a responding ambulance service that transported an injured emergency service worker was not equipped with the necessary equipment specified in the county's (Winchester County, east of the Hudson River, the IPEC is located within this community) radiological emergency response procedure. Beyond these ARCAs, the plant continued to address unresolved issues from a previous exercise in 2006, with six remaining at the time the reporting for this exercise was completed (FEMA 2007).

4.1.5.5 Organizational Responses

Reporting and evaluation processes under the HSEEP have been standardised for ready comparison across and between hazards or security threats. Also, within the REP, reporting is standardized in order to compare states of preparedness surrounding all nuclear power plants in the United States. The reporting mechanism used is designed to provide the responsible agency around a plant to identify and rectify issues quickly and effectively.

Organizations must prioritize their responses to exercise results based on the significance of the issues. Deficiencies in emergency plans or responses must be addressed immediately, and successfully demonstrated before an operator can assure public safety and security in the plant's vicinity. By contrast, because issues classified as 'areas requiring corrective action' are not considered to have significant implications for offsite public health or safety, ARCAs can be addressed over longer period of time.

5 Conclusions and Implications: Patterns in Comparison

Organizational learning must be a fundamental aspect of a functioning civil protection system, not at least since the civil protection organization must remain flexible and continuously adapt to a changing threat landscape. The event and exercise case studies examined in this project clearly demonstrate how experiences can lead to institutional reform and improvement, but also how hard it often is to draw the right lessons from disaster events and exercises and especially to implement the lessons identified in organizational practice. In this section we explore the key patterns in recording and learning from incidents, some of which are clearly more effective and appropriate than others.

5.1 General Results and Conclusions

5.1.1 Institutional Adaptability and Change Management

The learning organization is one capable of effectively distilling past experiences into adaptive new directions for its structures, systems and culture. Indeed, the history of civil protection organizations internationally is illustrative of a policy instrument at times assumed dead or irrelevant, but which is consistently reinvigorated with new meaning from trends, events and changing political priorities in the organizational environment. Roth and Prior (2014) describe how modern systems have evolved from post-World War II civil defence systems, changing to suit a dynamic threat environment (from the perception of threat from military attack, to broader threats from natural hazards, terrorism, and industrial accidents, etc.), and changing social, economic, and political drivers. However, as discussed in this document, change can happen in a number of ways: it can be planned, or it can be haphazard. The learning organization must take strategic control of the learning process, and encourage an open, flexible and adaptive organizational culture.

While each of the case studies (for both events and exercises) illustrates learning opportunities, the institutional willingness and ability to record, evaluate, and ultimately learn from past experiences and exercises varies greatly between the cases examined, as they are dependent on different structural and cultural factors. The learning process entailed in Norway's response to the terror attacks of 2011 provides a useful case in point. Expert interviews conducted with researchers from the University of Bergen highlighted the institutionalisation (and subsequent fragmentation) of responsibility within government departments of the nation. Department heads and ministers held absolute responsibility for their area, meaning inter-departmental cooperation and information sharing was dramatically hindered. This may have also impacted on the development of measures that could have ensured the security of the building destroyed by the bomb – because plans for improving the security of the building (established prior to the attacks in 2011) may have been more effectively shared and acted on if cooperation and cross-department coordination processes were more appropriate. While the lesson had been identified, strong institutional compartmentalisation of knowledge about the issue prevented its sharing, and action being taken to implement the lesson.

This also raises a significant issue in learning processes: that implementing lessons identified from experiences and exercises is actually the goal of the learning process. A 'learning organization' not only recognizes the importance of collecting experiences and drawing lessons from them, but also transfers the recommended changes into actual changes in organizational practice and structures. By contrast, not implementing recommendations highlights either an unwillingness to adapt, or illustrates the need to adjust an organization's culture so that learning opportunities are taken, and actively sought. In the cases of the Norwegian terror attack, the L'Aquila earthquake, and to some degree, the SkagEx11 Scandinavian exercise, many recommendations, made across a range of formal and informal platforms, are yet to be adopted. There are several factors that can prevent the implementation of changes, and some of these are discussed in section 5.2.

By contrast, in other cases, recommendations from lessons were implemented and civil protection organizations and structures showed excellent adaptability. Two examples are useful here: the US Radiological Emergency Preparedness Program, and the 2012 solar storm near-miss. Firstly, the solar storm near-miss seems illustrative of a fast and significant international re-organization in response to a potentially severe risk that just recently had gained attention beyond a narrow circle of experts. The concern about the potential consequences of a severe CME event clearly stimulated action to at least include the hazard of CME in risk registers, and to improve forecasting practices. Secondly, the US REP program illustrated strong implementation of recommendations – principally because of the regulatory ramifications for a facility operator if safety recommendations were not implemented. Here, regulation incites adaptive processes, while a recommendation as a suggestion for action only, without binding necessity, is less effective. Independence of evaluators or commissions, and the use of judicial processes can improve the chances of implementation, and this type of implementation pressure is fundamentally more palatable than regulation. While strong regulation to support implementation can help organizations change, it should not be seen as a fundamental necessary, especially because it can encourage very mechanistic, box-ticking responses from organizations, and this can be observed in the US REP case study (whether or not facility safety standards are maintained).

5.1.1 Integrating Lessons into Organizational Practices

How learning is viewed by an organization strongly influences a lesson's integration into organizational practice. Learning (typically recommendations, past experiences, and new information) can be construed by different organizations as an outcome, or as a process. If considered an outcome, the lesson automatically exists as the end product in a process of evaluation or reporting. Having the lesson as the product then limits the implementation of the lesson into a purposeful modification of routine or behaviour, because the organization associates knowledge of the lesson with success. If viewed as a process, by contrast, the lesson is simply considered a single element in a complete learning process, where a collective memory supports organizational adaptation.

In many of the cases examined in this project, learning processes were mainly ad-hoc and associated with weak institutional standing – having the lesson typically seems more important than dealing with the lesson as part of a learning process. The case of the L'Aquila earthquake is particularly useful to illustrate this issue. Given the international media attention dedicated to the trial of the scientists, evaluations of the institutional response to the hazard were conducted from a number of perspectives (from the public sector, through the Organization for Economic Cooperation and Development, from the non-government community, and the academic community). In all cases, these evaluations were haphazard (in that they served a range of disparate objectives), disconnected, and consequently yielded piecemeal learning opportunities for the Italian Department for Civil Protection (DPC). While organizational change did occur in the DPC, it was unclear which drivers (from experiences and evaluations), beyond the political, influenced changes within the institution.

The weak institutional positioning of evaluations, and the resulting recommendations can be sufficient to solve problems in the short term, but longer-term structural or strategic organizational changes are rare with such an approach. In organizational theory this represents a form of single-loop learning (modifying routines and basic organizational behaviour: what organizations do), in contrast to double-loop learning (fundamental adjustments in goals, frameworks or structures: why organizations do what they do), which is certainly a more ambitious form of learning (and goal for the learning organization), appears to be longer-lasting, and is therefore more desirable.

Clearly post-incident reporting and evaluations, and conducting exercises to improve the effectiveness of services plays an increasingly prominent role in many civil protection organizations. However, given that these activities require significant time, personnel, and financial investments, this investment appears to be wasted if the recommendations (most of which are clearly useful) are not implemented. Avoiding the implications of political short-termism, encouraging information (documented lessons) storage, sharing and retrieval, and institutionalising learning as a process in organizational development of a culture of learning, more effective integration of evaluations, reporting, and experiences.

5.1.3 How to Learn versus What to Learn

This project has focussed specifically on exploring how civil protection organizations from the international community approach learning and systemic adaptation. In this context, we acknowledge that knowing how to learn is strategically at least as important as knowing what to learn. The former can determine the basic rules of the learning game. The latter is certainly essential, but less in a structural sense, because the content of any learning endeavour should be determined by the goal of the organization's learning process based on the situational context.

Establishing good organizational learning processes is central because they ensure organizational flexibility. Flexibility permits organizations to observe and adapt to dynamic circumstances: to continuously evolve. However, in none of the cases examined in this project were activities explicitly associated with a dedicated knowledge management system that could support systemic learning. In many of the cases examined here lessons were clearly identified, but as highlighted in section 5.1.3, the identification of lessons and the resolution of these lessons as outcomes in organizational adaption were rarely evident.

The Australian Emergency Management Institute (AEMI) suggests that without a systematic procedure or tool for organizational knowledge management, which addresses the creation, capture, sharing, and leveraging of lessons, then resolving identified lessons becomes difficult. As such, a dedicated knowledge management system should connect what to learn and how it should be learnt. The non-institutionalised nature of most of the post-event and post-exercise learning activities examined in this project highlight the potential value of a centralized, de-identified, and open knowledge management system. Certainly, such a structure can foster an organizational culture of learning and openness, while at the same time limiting passing of blame between organizations in a civil protection system where failures or inadequacies are observed. One recommendation shared across all of the cases in this project was the value of

better information coordination and sharing, highlighting the value of establishing an institutionalized knowledge management system that can support the learning civil protection organization.

There are many examples of organizations conducting exercises periodically, and identifying the same issues or lessons repeatedly. The establishment of an effective knowledge management system can help to negate the necessity to waste resources re-identifying issues or repeating experiences to push learning and drive organizational adaptation. Only new experiences then add worth to the learning organization.

5.1.4 The Limits of Experience

While drawing on past experiences is a fundamental element of the organizational learning process, it should never be the only source of learning. If past experiences become the sole source of learning, organizations will only prepare for the (proverbial) last war, but not the next war.

Thinking beyond experience is particularly important in a risk environment growing in complexity and diversity, characterized by new challenges and risks. Taking a proactive approach to learning can help the civil protection organization to prepare for unexperienced hazardous events, the so-called 'black swan' events (Taleb 2008). Proactively thinking about complexity can assist the civil protection organization to anticipate risk interdependence (or cascades), changing relationships between society, hazards and authorities, international relations (especially in the context of trans-border incidents and exercises), and the interaction between natural and technical hazards (so-called NaTech incidents, like the Fukushima disaster). O'Keeffe (2002) highlights the importance of the learning antecedent, pointing out that a narrow experiential culture constricts learning opportunities to traditional areas (repeated threats or hazards). In order to overcome this issue, the author notes that organizations should seek to undertake 'generative' learning in order to innovate beyond traditional activities. Determining whether or not actual incidents could provide more 'generative' learning opportunities than exercises was beyond the remit of this project. Based on the cases examined in this project, and the broad literature discussing organizational learning and change, events and exercises yield different benefits.

Near-misses, like the CME event near-miss examined in section 3.2.4, also highlight the need to think beyond just drawing on past experiences to guide learning and adaptation. This is particularly so in the context of large exercises that are conducted irregularly and therefore typically and understandably focus on the most prevalent, or prominent hazard scenarios. If an organization's experiential history creates a path dependency that narrows the focus of learning activities, then the organization is increasingly likely to miss or overlook risks that it has previously not experienced. The recognition of the potential consequences of a severe CME event affecting a large urban, or highly industrialized area, was such that action to better plan for or forecast this threat was taken very quickly. Indeed, this type of experience should foment an organization's interest in establishing future-oriented exercise planning – for instance, by using advanced scenario techniques or other foresighting methodologies at the design stage of exercise planning. However, it is important to keep in mind that even with sophisticated scenario and foresighting techniques, it will never be possible to fully predict future developments.

5.2 Implications for Switzerland

Switzerland's modern civil protection system is itself a product of experience, changing perceptions of risks, and adaptation processes. As the threat landscape altered from the middle of the last century, through to the 1990s, Switzerland's civil protection focus shifted from war, to nuclear threat, to population protection from natural and technical hazards. Similarly, the historical steps towards stronger coordination, and in some regards also integration in Switzerland's traditionally strongly decentral civil protection system, can be understood as a decades-long institutional learning and adaptation process.

While Switzerland has largely been spared from large-scale disasters in recent times, with sporadic events on a small to medium scale (2005 floods, 2005 rail blackout, etc.), this should not lead to complacency to potential hazards that might affect Switzerland in the future. Instead, civil protection in Switzerland should use both national and international experiences from the emergency management sector – both scenario exercises and disaster events – as learning opportunities that enable it to achieve or maintain the highest protection levels achievable.

Like the international emergency management sector, civil protection in Switzerland is complicated not just by the events that partner organizations respond to, but also the nature of the composite five-partner system. The nature of this system, and the decentralized approach to civil protection, internalize the need for broad collaboration and cooperation in dealing with complex issues – also exaggerating the need to share learning and learning opportunities.

5.2.1 A Swiss Knowledge Management System

The necessity for strong coordination and communication between responsible authorities is a consistent outcome across the learning processes examined in this project. Also the Bundesamt für Bevölkerungsschutz (BABS) recognizes that these issues will pose major challenges in the Swiss composite civil protection system in coming years. In complex and dynamic civil protection contexts (in Switzerland this would include pandemic, an earthquake in a populous area, cross-border cooperation, etc.) the need to retain intellectual capital, and to support "knowledge diffusion initiatives become[s] a vital consideration for organizational learning and effectiveness" (O'Keeffe 2002). It should also be seen to directly support communication and coordination, an especially tricky process in a federal system based on subsidiarity, like Switzerland.

Developing ways of creating knowledge from learning processes is of utmost importance. In many cases, this is the missing link in the story of 'lessons learned'. The lessons are certainly identified, but if these lessons are not converted into organizational knowledge, which can be used by the members of an organization, and partners, to improve the way they work, then the lessons alone are useless. The question then is: how do you convert lessons into change? Knowledge must be created, it must be stored, it must be shared, and it must be used as a continuous learning resource.

Given the value a well-designed lessons knowledge management system can bring to learning processes, establishing such a facility at the federal level in Switzerland could be considered. Such a facility could draw on two elements (Figure 5): a cantonal-level, standardized lessons-capturing mechanism; and an open access (to organizations in the composite system at federal, cantonal and community levels) knowledge management system. This two-part system would rely on contributions from both cantons and federal organizations.

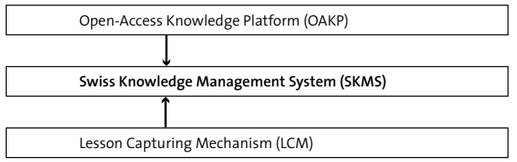

Figure 6: Outline of a possible lessons knowledge management system for Switzerland.

Separation of roles in this knowledge management system between cantons and federal departments should reflect competencies and established roles. As the organizational level responsible for operational civil protection in Switzerland, cantons must be responsible for identifying lessons (from incidents and exercises) and passing these lessons (both positive and negative) into a centralized knowledge management system. Federal agencies should provide the resources necessary to establish and ensure the longevity of the knowledge management system. This would also include supporting the cantons to develop standardized practices to create high-quality lessons that can effect change (that concisely capture context, attribute responsibility for implementation, and are supported by a plan of implementation).

Clearly, the framework in which such a system operates must be governed by a set of agreed principles. These must include a recognition of the value of sharing information, trust (that lessons identified are not used or shared inappropriately or judged by users), cooperation, and the need to establish an organizational memory. Lastly, actions that create knowledge from learning processes should not be side-lined as support functions, but must be systematically incorporated into organizational activities and processes.

5.2.2 From response to Organizational Preparedness

Organizational change in civil protection seems to happen much more quickly in response to events, when existing practices and processes are actually put under stress. In this context there is political, and public pressure to right failures, to understand responsibilities, and ensure a similar situation does not happen again. These responses can be good, if reflective processes are conducted well and effectively.

However, knee-jerk reactions result in poor, non-strategic, and short-term fixes. In the cases of the L'Aquila earthquake and following Norway's terror attacks, knee-jerk post-event responses seem to have resulted in organizational stagnation (Italy: public outcry resulted in a re-think of actions) and complicated ministerial relationships (Norway: department of justice and police seem to have suffered most blame, and most change, whether or not it was warranted).

To avoid overly hectic, event-driven adaptations, it appears essential to design and implement learning processes that are as continuous as possible. A standardized system of recording or evaluating incidents and exercises across cantons will be a great way to draw off responses in order to inform more effective organizational preparedness between regular events, and before irregular or unforeseen events. Here effort must not be directed toward replacing response and the ability to identify and record high-quality lessons. Instead, effort must be directed toward finding the best way to benefit from the lessons, both positive and negative, identified in response processes. In this way, civil protection systems will be capable of responding not just to the shock waves large-scale events cause, but also to the weak signals sent by more common incidents and exercises.

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