4.1 Final publishable summary report

Executive summary

This ELITE project final report aims to summarise the development and main results of the project. First, a summary description of project context and objectives is included. Second, a description of the main S&T results/foregrounds is explained. Third, the potential impact activities which were carried out, the objectives achieved and deliverables and milestones already submitted in each work-package are explained.

The objectives of the call with regard to knowledge gathering, categorisation, analysis and evaluation for the goal of post-crisis lessons learning and use of this learning in practice define implicitly the need of a Community of Practice (CoP) for crisis response. Therefore, the ELITE consortium has a strong representation of experienced crisis managers and responders across all phases of crises lifecycle. In addition to knowledge management experts. The role of the ELITE knowledge management experts is to secure the best acquisition, categorisation, and analysis of tacit, fragmented knowledge acquired by crisis management responders. The ELITE CoP is assembled around a web solution comprising a repository of best practices and guidelines as well as social media features (ELITE living document). During the project's lifetime, ELITE project has used a holistic method that addresses all relevant phases of major crises along with their systemic relationships. After ELITE's project period, the living document is targeted as a Wikipedia-like solution with the necessary infrastructure so as to attract and serve the whole spectrum of end-users and crisis decision makers in Europe. Finally, to promote future research on this topic, ELITE has identified major remaining gaps and deliver recommendations for future research.

Figure 1 ELITE CoP members

Project context and objectives

The overarching objective of the ELITE – Elicit to Learn Crucial Post-Crisis Lessons project is to **improve European emergency preparedness, response and recovery from disasters**. These include natural disasters such as floods, large scale forest fires and earthquakes. The ELITE project has created a **living document** containing lessons learned, not only from individual crises, but also insights that are common and apply across disaster types. The ELITE living document is a publicly available web solution which comprises a "living" repository of best practices and guidelines as well as social media features. The living document evolves collection of lessons learned nurtured by a **Community of Practice (CoP)** for mutual learning and information sharing. The ELITE CoP consists of main stakeholders in crisis management, and the project has a large group of end-users that acts as a reduced but selected representation of these stakeholders. Consequently, these end-users are the ELITE CoP, and its main roles are related to the validation of the living document and the sharing of information in the living document. Furthermore, the ELITE project delivers recommendations for future research on this topic and establishes a permanent ELITE CoP in order to permanently maintain the living document.

The relevance of the ELITE project is found when analysing the main conclusions drawn by the United Nations Intergovernmental Panel on Climate Change (IPCC). Here IPCC describes how climate changes will have an impact on the frequencies of natural disasters. The call describes how Europe during recent years has responded to several natural disasters as the human and financial costs of these disasters are huge. Other disasters, such as major industrial accidents, will, to a large degree, mobilise similar emergency preparedness resources. Therefore, ELITE project chooses a methodology that, starting with natural disasters, will generate insights applicable to a large range of disasters, whether "natural" or "man made".

The natural disasters that will be examined in ELITE project are the most devastating ones. Natural disasters differ with respect to how the crisis evolves and their consequences. However, the emergency preparedness planning process, response efforts and recovery phase, are faced with many of the same challenges. They include decision making under conditions of imperfect and incomplete information, time pressure, coordination and cooperation challenges, lack of equipment, non-operational communication infrastructure, logistical problems such as impassable roads and bottlenecks caused by infrastructure damage, and threats to public health and the environment through release of hazardous materials, lack of clean water and unsanitary conditions, or the hazardous nature of the event itself. Additionally, disaster response may be complicated by human security issues. As an example, in Haiti UN peacekeepers and local population clashed due to a cholera epidemic in the aftermath of the earthquake. Our approach capitalises on the common problems in disaster response to transfer lessons learned across disaster types.

ELITE project engages the main stakeholders in a Community of Practice (the ELITE CoP) for acquisition of relevant knowledge and dissemination of insights, and it uses a holistic approach covering all crisis dimensions (hazards, impacts, and phases along with their systemic relationships).

The ELITE living document provides a friendly and easily usable environment to share information and knowledge among members of the Community of Practice. It has been created in a wiki based platform and it allows uploading a document, ranking and commenting the available documents, it provides searching options to filter among the available documents, and direct access to social media channels of the project.

Five main objectives have been defined within the ELITE project:

Objective 1: To Establish a Community of Practice (CoP) in Crisis Management. Before the ELITE project, the current limited availability of lessons learned was caused by the way crisis management is organised in Europe. Much information exists as fragmented tacit knowledge in the heads of various responders and crisis managers, and in the civil protection agencies, NGOs, critical infrastructures, private firms and industries etc. throughout Europe. These organisations, located in different European countries, normally produce independent reports on emergency preparedness and evaluations of rescue and recovery operations. Hence, the establishment of a CoP in crisis management facilitates the sharing of lessons learned and disaster knowledge.

Objective 2: Create a tested and validated ELITE living document of crisis management. The ELITE living document is a publicly available web solution comprised of the following:

- A "living" repository of lessons learned and best practices.
- A "living" repository of guidelines.
- Social media features where authorised agents can freely operate and interact.

Objective 3: Implement the ELITE living document. The ELITE living document is a mechanism to interact and learn from each other, and to improve from insights on best practice. During the whole process the ELITE project has included and integrated the ELITE CoP (end-users) and other major stakeholders. By gathering and developing an integrated perspective, the project organised three scenario based workshops within the realms of earthquakes, floods and forest fires with a focus on interoperability challenges and a fourth one which integrates the previous ones. The participants in the workshops consisted of end-users and other main stakeholders in crisis management. Additionally, a table-top exercise was conducted within the fourth integrated workshop. Outcome of workshops apart from the living document development was also the holistic framework of lessons learned reporting.

Objective 4: Analyse the learning process from lessons learned to lessons implemented. The ELITE living document documents and encodes lessons learned from various crises across Europe. Some of these lessons learned already led to improved practice with various degree of success. Improved practice refers both to improved ability to tackle specific crisis in practice (actual improved routines and guidelines) and improved learning processes and training to prepare personnel for crisis.

Objective 5: Deliver recommendations for future research. The project delivers recommendations for future research in these topics:

- Knowledge gathering, categorisation and analysis processes.
- Best practices and guidelines for each individual analysed disaster type: floods, earthquakes and fires.
- Integration of common aspects of different disaster types.
- Use of social media for learning and cooperation purposes.

S&T results/foregrounds

In response to the objectives of the project, ELITE has been divided into six work-packages:

- WP 1: Project Management
- WP 2: ELITE Community of Practice – Workshops
- WP 3: ELITE Living document of crisis management
- WP 4: Knowledge gathering, categorisation and analysis
- WP 5: Learning process analysis
- WP 6: Dissemination of lessons learned

In each work-package, several activities have been carried out in order to reach the objectives defined initially. The main scientific and technological results obtained in each work-package will be explained below, classified by work-package.

WP 1: Project Management

The main objective of this work-package was to coordinate and manage the overall project and each work-package. Furthermore, it was the responsible for organising the Steering and Scientific Committee meetings, identifying shortcomings and monitoring and managing the financial issues.

Several activities were carried out during the project in order to ensure its proper management project. TECNUN, the coordinator of the project, was coordinating the ELITE project since its start. Although there were some short delays in the submission of some deliverables, in general, there were not significant deviations from planned activities, neither any change in the consortium. Delays only affected to deliverables from WP5, as the analysis of the learning processes needed more time than initially foreseen. Furthermore, steering and scientific committees were arranged in the kick off, in the course of the four workshops, and in the final conference. In addition to these formal meetings, work-package leaders (and any other involved partner) had regular teleconferences and e-mail correspondence. Two web-pages have been developed to manage and to disseminate the results across the consortium membership: a sharepoint system to store and share documents among partners (only available for partners of the project) and public open webpage which contains public info and includes public deliverables (http://www.elite-eu.org/).

After each steering and scientific committees, minutes of the meeting were developed. Furthermore, periodic reports were developed to explain the activities carried out and the results obtained during that period. Ethical and security related monitoring reports were also developed to verify there was not any ethical or security related problem.

WP 2: ELITE Community of Practice-Workshops

Overall, the ELITE project included four different workshops that intended to establish the Community of Practice (CoP) and create – through its content – a permanent link to the end product and between the different work packages. Thus, the workshops intended not only to create the CoP but to give the other work package operators a stage to conduct their work. The workshops allowed for the invited experts to exchange their knowledge, expertise, and lessons learnt, too. Some of these findings also resemble the first pieces of content for the latter living document. In the following, all four workshops will be summarised from an organisational and intentional perspective. The detailed findings and goals will be summarised in a different section; however, broad findings will be presented, too.

All ELITE project partners took part in all workshops. Then, partners are not included into workshops participants lists.

Invitation Process

The invitation process remained the same for all four workshops. Each consortium member pointed out particular people of interest for the CoP. The prepared invitations were sent out and a first round of registration defined. Whenever, the response to the invitations was not satisfactory, another round was initiated. Merely in the first workshop the participation was lower because of the short notice. From then on, the CoP grew continuously with particular members participating in all four workshops. Regarding the limitation of 20 participants in each workshop the consortium made a selection to decide which experts should participate.

Workshop I "Forest Fires"

Held on 16th/17th April 2013 in Weeze, Germany

The first workshop clearly served to initiate the Community of Practice, using the scenario of forest fires. At this stage, the consortium intended to use a scenario-based approach in order to develop the ELITE living document. Mainly, the first workshop defined the channels of information exchange that exist so far, the types of lessons learnt that are of interest to disaster/crisis managers, the types of learning, and the framework in which to best organise the next workshop. In a sense, the discussions held based on the scenario approach allowed for the consortium to orientate on the living document and a path along which to develop it. The research methodology could be defined.

The main findings in terms of contents are discussed in D4.2; however, the experts exchanged well on the different types of forest fires, their ignitions, and the civil protection mechanisms to prevent and/or deal with them. Room was given to individual experts to exchange their experiences in presentations and poster sessions.

Table 1. List of Participants in Workshop I "Forest Fires".

Organisation	**Country**
SARUV	Austria
DG ECHO	European Commission
South-Savo Regional Fire Service	Finland
French Fire Fighter	France
Fly-n-Sense	France
@fire	Germany
Dutch Ministry of Security and Justice	The Netherlands
National Operations Center	The Netherlands
Norwegian Fire Fighter	Norway
Catalonian Fire Fighter	Spain

Workshop II “Earthquakes”

Held on 25th/26th June 2013 in Weeze, Germany

The second workshop showed a far better response in terms of participation. The content of the workshop was more clearly defined in advance. From a methodological point of view, the second workshop served mostly to define problem areas that are of interest for experts. “Problem areas”, here, defines those strategic, tactical, and operative areas that are common among the different institutions and organisations in different countries. These problem areas are also those topics that are – according to the experts – subject to information exchange and the sharing of lessons learnt. Moreover, solutions to the problems were discussed for the first time. Methodologically, this particular set-up of the workshops allowed the scientific consortium members to generate particular criteria for the living document, the gathering of lessons learned and the development of the holistic framework.

Table 2. List of Participants in Workshop II "Earthquakes".

Organisation	**Country**
SARUV	Austria
UK-ISAR	England/UK
Consultant to UN and NATO	England/UK
I.S.A.R. Germany	Germany
Civil Protection from Province of Perugia	Italy
Civil Protection from Province of Terni	Italy
National Institute of Oceanography and Geophysics	Italy
Veiligheidsregio Groningen	The Netherlands
Police Academy of the Netherlands	The Netherlands
Polish State Fire Service	Poland
Fire Department, Generalitat of Catalunya	Spain
Directorate of Safety and Risk, Department of Education of Basque Government	Spain
General Directorate of Civil Protection Homeland Security of Spanish Government	Spain
Swedish Civil Contingencies Agency (MSB)	Sweden

Workshop III “Floods”

Held on 8th/9th October 2013 in Vienna, Austria

The third workshop added on to the methods used in the second workshop. In group work and post-it sessions, the problem areas and solutions were further defined. Naturally, the topic evolved around floods; however, this workshop clearly indicated that the lessons learnt recur across the different disaster types.

Whereas the first two workshops indicated a general direction and the basis to develop the prototype of the living document, the third one constituted a common understanding for post-crisis lessons across different crises. Concerning the creation of the prototype, this particular workshop generated important criteria to consider.

Table 3. List of Participants in Workshop III "Floods".

Organisation	**Country**
Austrian Red Cross	Austria
SARUV	Austria
Austrian Ministry of Defence	Austria
Austrian Federal Fire Brigade Association	Austria
South-Savo Regional Fire Service	Finland
Italian Civil Protection	Italy
Civil Protection of Province Perugia	Italy
Civil Protection of Province Terni	Italy
Basilicata Regional Civil Protection	Italy
Veiligheidsregio	The Netherlands
Veiligheidsregio	The Netherlands
National Operations Center	The Netherlands
Stord/Haugesund University College	Norway
Polish State Fire Service	Poland
Directorate of Safety and Risk, Department of Education of Basque Government	Spain
Spanish Civil Protection Directorate	Spain
GDACS Secretariat Emergency Service Branch	Switzerland
Consultant to UN and NATO	England/UK

Workshop IV “Holistic Analysis of Lessons Learned”

Held on 28th/29th January 2014 in Weeze, Germany

The last workshop was initially conceptualised as classical table-top exercise. Whereas the concept was used the exercise itself evolved around the usage and testing of the prototype of the ELITE living document. The participants were asked to exchange lessons learnt and to create reports in a sense they would like to search and find on the living document itself. Methodologically, the last workshop brought tangible results to the overall end-product, but also generated concrete lessons learnt. A framework was developed, tested and validated. This framework can be used by crisis managers from the different crisis fields and tactical levels. Thus, a holistic approach to post-crisis lessons learned was formed.

Table 4. List of Participants in Workshop IV „Holistic Approach".

Organisation	Country
SARUV	Austria
Austrian Federal Ministry of Defence	Austria
Austrian Red Cross	Austria
South-Savo Regional Fire Service	Finland
Duisburg Fire Department	Germany
ANPAS National Association of Public Assistance	Italy
Department of Chemistry, Physics and Environment, University of Udine	Italy
Civil Protection of Terni Province	Italy
Police Academy of the Netherlands	The Netherlands
Glerum Consultancy	The Netherlands
Skien Fire Service	Norway
Police Academy "Alexandruloan Cuza", Fire Officers Faculty	Romania
Synergies International Consulting	Slovenia
MarGins Consulting	UK
Consultant to UN and NATO	UK

WP 3: ELITE living document of crisis management

The main objective of this work package has been the design, development and testing of the ELITE living document. This living document is a web-based tool that includes guidelines, a lessons learned database, and social media functionalities. This platform covers the existing gap of information concerning reflections, best practices and guidelines to be prepared to deal with natural disasters. The document is "living" since it is continuously nurtured and updated by ELITE Community of Practice (CoP) so that the guidelines and best practices within the realm of crisis management are continuously maintained. Thus, the living document enables users to conduct retrospective analysis learning from previous expertise and a prospective analysis that will be done through the development of a set of guidelines.

From the beginning of the project, it was decided to design the ELITE living according to a Wiki philosophy, where authorised agents as ELITE CoP members, could update and maintain crisis management best practices and guidelines whenever new information are made available or if changes are in due course. To avoid comparison with other existing tools and information systems like Virtual OSOCC[2], it must be clarified that the ELITE living document is oriented to become a useful tool during the pre and post stages of a crisis, but not during the crisis peak.

The design process of the ELITE living document has been conducted according to the information system research process described by Nunamaker (1991)[3]. This iterative process, based on elaborating and assessing

[2] http://vosocc.unocha.org/ Last visited 24.06.2014

[3] *Nunamaker, J., Chen, M. and Purdin, T. D. M. (1991) Systems Development in Information Systems Research. Journal of Management Information Systems.*

successive prototypes, allows exploration of the domain in a practical and incremental manner. According to Nunamaker, each iteration is divided into the following stages:

a) Construction of a conceptual framework that addresses the issues related to the research problem.
b) Analysis, design and implementation of a prototype including the definition of its functionalities, the understanding of the studied domain, the modeling of the solution, and its final building.
c) Evaluation of the prototype by experiments.

In the case of the ELITE project, the design process carried out includes three iterations of this methodology through the development of three workshops, in which the members of the ELITE CoP have participated actively sharing their knowledge and experiences and identifying the requirements for the ELITE living document prototype. These three scenario based workshops were focused on interoperability challenges within the realms of three disaster types (fires, floods and earthquakes), and stimulated discussions on recurrent issues encountered previously during similar crisis. The ELITE CoP members also worked on reflection on the benefits that the living document can provide to their organisations and on the aspects of the living document that works and those that do not. The obtained results shed light on the main problems the organisations have to share information due to confidentiality aspects and lack of procedures to report lessons learned inside and across organisations.

The following are the relevant aspects where the ELITE consortium and CoP have focused on the development of the living document: security issues, design and functionalities, classification criteria, quality and type of information and networking.

Regarding security issues, three types of user profiles with different permissions have been defined in order to overcome restrictions related to sensitive information about disasters. Firstly, the ELITE living document has a system administrator who is in charge of overseeing the entire ELITE system and has permission to configure the system and to create, modify and remove users from the system. Secondly, ELITE CoP member profile has full access to any information uploaded in the system once they have been registered. They also can rank and add comments to the uploaded files and use the social media channels to interact with other CoP members. And finally, restricted users have restricted access to the prototype and they need to send a request to become a member of the ELITE CoP.

Concerning the design and functionalities the ELITE living document needed to meet, the following use case diagram shows the ones identified by the ELITE CoP. A detailed user manual explaining each of these functionalities has developed in D6.3.

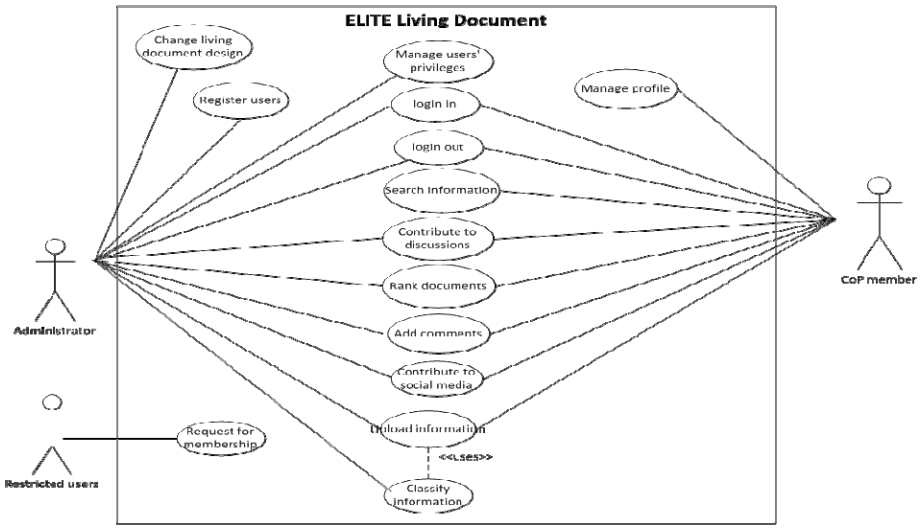

Figure 2 ELITE living document use case diagram

Guaranteeing the high quality of the information uploaded and shared into the living document and avoiding at the same time the information overload were the essential requirements for ELITE CoP members. The comments and rating system included for each file uploaded in the living document enable end-users to give their feedback about the quality of each document, guaranteeing in this way a ranking of the most interesting and useful documents.

On the other hand, a suitable system is also needed to classify the information in order to facilitate the searching process. A classification system has been defined to classify the information uploaded to the ELITE living document prototype based on several criteria or keywords. After several iterations with the ELITE CoP members, the following are the criteria used to classify the uploaded information (see Table 5):

Table 5: Criteria to classify information in the ELITE living document

Criterion	Description	Available tags
Type of disaster	This criterion can be useful to characterise (and to find) a document related to a specific kind of disaster.	Fire, earthquake, floods
Geographic location	This criterion is used to identify the country where the disaster happened.	Africa, Asia, Australia, Europe, North America, South America
Language	This criterion can be useful to specify the language used in a document and to select only documents written in a specific language.	English, Spanish, French, Polish, German, Norwegian, Italia, Other
Source	This criterion can be useful to specify the source of the information.	Government, Authority, Media, Miscellaneous...
File content	This criterion can be useful to specify the information content of the document.	Incident Report, Emergency Plan, Best Practice, Guideline, Case Study,
Type of file	This criterion can be useful to specify the type of the document and to select only particular types of documents.	Article, Audio, Document, Picture, Press Release, Video
Level	This criterion can be useful to specify the level(s) of the hierarchy that is directly related to the content of the document that is searched.	Strategic, Tactical, Operational.
Phase	This criterion can be useful to specify the phase of a crisis management that is related to a document that is searched.	Mitigation & Prevention, Preparation, Response, Recovery, Analysis.
Focus	This criterion can be useful to specify the focus of a document, or the specific topic that is relevant in a search.	Internal Communication, External Communication, Coordination, Equipment, Logistics, Protocols, Training, Education.
People involved	This criterion can be useful to specify the people involved in the document, or relevant in a search.	Volunteers, First Responders, Civil Protection, Authorities (Local, Regional,

		National and International), Army, Health Service…
Assets	This criterion can be useful to specify the assets described in a document, or relevant in a search	Human Assets, Economic Assets, Natural Assets, Critical Infrastructures, Other Infrastructures
Other context characteristics	This criterion can be useful to specify other context characteristics that can be relevant to distinguish particular disasters.	Vulnerable Population, Urban Area, Rural-urban Interface, Isolated Area Difficult to Reach, Dryness, Very Humid Context, High Wind.

Another relevant value added of the ELITE living document is the social networking capabilities that help CoP members to establish new relationships with colleagues among other organisations and that can lead to new cooperation agreements. For this purpose, the ELITE living document includes the option to develop a user profile to include useful information about each member of the CoP that enables end-users to identify members of the CoP with similar interests and background. Forums or discussion boards classified by topics and groups are also provided in the living document where end-users can discuss and share first-hand experiences and reflections on previous emergencies.

Additionally, the living document provides other social media channels such as Facebook, LinkedIn and Twitter that make easier the interaction and communication among the members of the CoP.

a) A LinkedIn group called *FP7 EU ELITE Elicit to Learn crucial post-crisis lessons* has been created to connect experts that have participated in the project.
b) A Facebook page (FP7 EU ELITE Elicit to Learn crucial post-crisis lessons) has been launched. Weekly updates including relevant news related to crisis management, important events and new ELITE reports are being published through this channel.
c) A Twitter account has been created (@EU_ELITE) with the aim of retweeting relevant articles/news, building an audience, comment and mention other emergency groups in our posts, etc.

Apart from these functionalities and networking capabilities, the ELITE living document provides a trusted environment to overcome two main limitations to the learning and sharing process such as confidentiality and public recognition of mistakes. The security levels of the ELITE living document guarantees that information stay confidential. The ELITE living document provides templates to make easier the writing of lessons learned using a positive style and it is a free criticism community that contributes to diminish fear to share information as the objective of their publication is learning and not pursuing potential responsible agents of past mistakes.

The validation of the ELITE living document was carried out during the last workshop arranged in January 2014. In this workshop, the participants carried out an exercise, which consisted of developing a report on lessons identified during and in the aftermath of the crisis in Japan 2011. The primary source of information was the ELITE living document. Nevertheless, the participants were allowed to use their own experience

within the Japanese disaster of 2011 as well as information from a teleconference with a team leader of UK ISAR, a British governmental organisation involved in the Japanese disaster relief. In this way, the participants evaluated the usefulness of the different functionalities developed in the ELITE living document such as the document rating, criteria used for searching documents, comments on documents, and the use of forums among others. At the end of this workshop, participants were asked to complete a survey concerning their personal experience to deal with information sharing in the emergency management field and the usability and usefulness of the functionalities provided by the ELITE living document. Further information about the results of this survey can be found in D6.3.

In the light of the survey results, it can be said that this tool meets the requirements identified by the ELITE CoP members. Furthermore, this living document is considered a useful tool to improve the preparation for future fires, floods or earthquakes thanks to the truthfulness of information, the avoidance of information overload and the networking possibilities. And although the key success factors of the learning and sharing process are more social than technical, ELITE project has succeeded on the one hand, in building a trusted environment to learn and share effectively, and on the other hand in building a seminal community that could launch the learning and sharing process and help to bring together disparate stakeholders into a tight-knit community.

WP 4: Knowledge gathering, categorisation and analysis

The aim of work package 4 has been to gather, systematise and analyse lessons learned from forest fires, earthquakes and floods. Throughout work package 4 a meaningful framework for lessons learned reporting has been developed. The ELITE project has gathered, systematised, and analysed challenges in crisis management with an all phases - all hazards approach, using the ELITE framework as a basis for this work.

Results from categorisation of information (D4.1)

The D4.1 details the method used to provide a set of criteria, and details this resulting set of 14 criteria. This set of criteria is useful to describe the information downloaded in the ELITE living document, and also useful to search information in the wiki. The method used in the first phase of the Myriad methodology (a multi-criteria decision-aiding approach developed by TRT), called the structuration phase consists of understanding the needs of end-users in order to identify their relevant decision criteria. During the three first ELITE workshops, we have listened to natural disaster management experts in order to provide a set of criteria (and for each a set of values) relevant to characterise all the possible information that experts may download or search for with the ELITE living document.

Results from lessons learned on forest fires (D4.2)

In D4.2 lessons learned were gathered and systematised on forest fires. From secondary literature which consisted mainly of scientific papers and evaluation reports it became clear that there was a strong link between forest fires and climate change. Research to date indicates that both the incidence and severity of forest fires will increase dramatically. It was noted that there will be:

- *longer fire seasons,*
- *larger areas will become burned,*
- *shorter fire–return intervals,*
- *a shift to a lower forest age-class distribution,*
- *a "positive feedback loop" (more forest fire leads to greater terrestrial loss of carbon to the atmosphere, which feeds into greater global warming and again more forest fires).*

The importance of creating a good environment for sharing experiences and thereby learn from these has been stated from several CoP experts, both in the workshop and in the questionnaire. The FLA process, developed and used by the US Forest Service, is a good example of how to meet these challenges and promote sharing of information.

Through the thematic workshop on forest fires (group discussions with the CoP), literature review and questionnaires we have managed to *identify the most relevant lessons learned from forest fires.* Below is a table summarizing the main lessons learned categorised according to topic (problem areas). The source is also indicated.

Topic	Lesson learned	Source
Learning; sharing	*Language barrier* to sharing lessons learned between different European operationals is a problem and in a crisis situation across borders, language barriers may have a negative effect on the level of interoperability.	(CoP)
Learning; sharing	Possible *legal restrictions* to sharing lessons learned and best practices between fire agencies at an international level can restrict the sharing of practices.	(CoP)
Learning; sharing	The operationals lacks *proper structures* to share lesson learned. To share the operationals must use their spare time to write additional elements or translate the original document in order to upload it on the web.	(CoP)
Interoperability	Difficult to cooperate with the media, one must plan how to deal with media in a proficient way before the crisis.	(CoP)
Knowledge	It is important to have educational models for children to raise awareness on fire risks and to share information about preparedness and prevention.	(CoP)
Knowledge	Educational programmes for the volunteers in Civil Protection where they have classroom education, a practical test about tools and materials of civil protection, and a final examination where the volunteers that pass receive a certification which obligatory to register as Operative Volunteers.	(CoP)
Learning before an incident	More practical exercises are needed for the fire operationals to gain skills, which can be used during real actions.	(CoP)
Learning before an incident	Table top and scenarios exercises in cooperation with the forest owners can help to decrease interoperability challenges.	(CoP)
Learning before an incident	Inside the forest platforms must be built so that the volunteers can patrol the forest and observe the landscape. When the volunteers see the smoke they call the Operative Room in order to start immediately the operations.	(CoP)
Learning before an incident	Important to define roles between firefighters and forest rangers in emergency planning in the pre-crisis stage.	(CoP)
Learning before an incident	Create new terminology to capture and specify the events that could be critical in terms of procedures of coordination in an urban rural interface fire.	(CoP)
Learning before an incident	Data base of burned areas must be developed to classify the surface where the fire happened. This can help in creating and defining indices of risk.	(CoP)
Learning during/ right after a crisis situation	Learn to use the same equipment in different situations so that it can have different applications.	(CoP)
Learning after an	Debriefings, sharing information, creating a summary of the incident are very	(CoP)

incident	good in relation to learning and improving equipment, hands and competence.	
Learning after an incident	Stress management after a crisis is important, because it is difficult to learn if one is stressed about what happened.	(CoP)
Learning after an incident	Standardise the lessons learned so that a large numbers of organisations can use it. It is also necessary to inform all the stakeholders involved in the same process.	(CoP)
Strategic decision-making	Local fire brigades often require more resources than they have. Therefore they must be strategic when a forest fire occur; when the Fire brigade receives an emergency call they would (i) use their local knowledge and create a worst case scenario, (ii) would contact relevant agencies and fire brigades from neighboring municipalities who would immediately send fire trucks. However, if it was not as bad as one expected one could call off the additional help. The Fire chief noted that it is better to call one too many times, than not make the call and suffer the consequences (better safe than sorry).	Interview with Skien Fire brigade (2013)
Knowledge	Nowadays forest fires are linked to modern models of life, increased mobility, tourism and recreational activities which increase the number of visitors in the forest.	Firesmart (2010)
Knowledge	*Human factors* triggering wildfires are most dominant in Europe (arson, sparks from railway, equipment, power line arcs or discarded cigarettes). This is something we can prevent.	Firesmart (2010)
Knowledge	Forest fuels (shrub layer, grass layer, litter) in the canopy of the trees may accumulate over time. This creates “ladders” so that the wildfire can climb up in the tree tops. How the trees are situated in the spatial arrangement may therefore influence the availability of ‘fuel’ and how the fire can spread.	US Forest Service (2003)
Knowledge	The fire activity in the Euro Mediterranean countries (EUMed) have been changing due to industrialisation and that people have migrated from rural areas.	FUME (2014)
Knowledge	Fires do not burn equally all areas in a landscape and positive feedbacks driven by fire have been documented across Southern Europe. It is important to understand how the positive feedbacks work to “prevent certain areas entering into fire-driven degradation loops”.	FUME (2014)
Interoperability	Few common and harmonised definitions with regards to the prevention of forest fires in Europe.	Forest Europe (2010)
Interoperability	Greece, Norway, France and UK have implemented Incident Command System with common guidelines on command and control. This will better the conditions for management of large scale crisis between different agencies.	EU-exchange of experts; DSB;
Interoperability	Fire departments should in their contingency planning have contact and enter into agreements with relevant people with local knowledge from the civil society that can assist during forest fires.	Interview Skien Fire brigade (2013)
Interoperability	To facilitate involvement of volunteers they must receive funding which reaches local actors (local multipliers).	Forest Europe (2010)
Preventative measures	Prevention should focus on maintaining forest vegetation to safe levels, developing safer Wildland and Urban Interface areas, and preparing	Forest Europe

	sophisticated pre-suppression plans that well-trained and equipped firefighting forces can apply effectively.	(2010)
Preventative measures	Prescribed burnings in the non-wildfire season carried out by fire professionals to prevent possible future fires.	Forest Europe (2010)
Preventative measures	Prevention schemes should include *(i) maintenance of tracks, (ii) firebreaks, (iii) water points, (iv) fuel management and (v) monitoring for early detection.*	Forest Europe (2010)
Preventative measures	The need to put resources into active management of the landscape and to consider how the market could be utilised for promoting forest management.	Forest Europe (2010)
Preventative measures	Forest fire statistics are important and necessary tools for analyzing the fire problem and determining how to best manage it.	Forest Europe (2010)
Preventative measures	Municipalities with significant risk of wildfire must be prepared by (i) being able to facilitate a large number of troops, more resources and management of a forest fire over time. (ii) The municipality must have binding agreements with other fire departments, forest owners, and other people with other resources. (iii) The municipality must have adequate supply of equipment, maps etc. (iv) a practiced fire management crew.	DSB (2008)
Preventative measures	Meteorological institutes can play a role in creating a forest fire danger index which can be used as an instrument reporting on elevated risk of forest fires.	DSB (2008); UK Fire Service (2011).
Recovery	Our current knowledge on recovery from forest fires is limited, each large wildfire is an opportunity to conduct studies and expand our knowledge about post-fire management.	Pacific Northwest Research Atation (2007)
Equipment	Development of a new multi-function tool made of hardened steel with a hard wood shaft. The tool is very versatile and can be used to pick, drag, cut and dig vegetation as well as cut wire fencing.	UK Forest Service (2001).
Equipment	Replace the old fire extinguish equipment. Older air cooled fire pumps stopped during the Froland fire in Norway (2008) this decreased the security for the firefighter who had reduced protection.	Interview with Skien Fire brigade (2013)
Learning	Facilitated Learning Analysis Process (FLA) used to promote sharing of information.	Wildfire (2013)

Results from lessons learned on earthquakes (D4.3)

D4.3 has *gathered and systematised knowledge on earthquakes* based on information from experts in the ELITE CoP, through literature reviews and interviews. Different key terms related to earthquakes were described, and seismic risk and earthquake hazards in Europe were explored. Recent earthquakes in Italy, L'Aquila (2009) and Emilia (2012) were referred to and certain problem areas were identified.

The most *relevant lessons learned related to earthquakes* were identified through the ELITE workshop in June 2013, and they were categorised according to the different phases of a crisis and in the most significant problem areas:

- **Pre-crisis;** Communication (Inter-agency communication and Crisis communication), knowledge and Training experience.
- **Crisis;** Communication (Inter-agency Communication and Crisis communication), Logistics and risk assessment.
- **Post-crisis;** Lack of debrief and problems related to the recovery stage for the local population.

In the earthquake workshop the post-it methodology was introduced and used to gathering lessons learned was used, it was a good method to collect tangible lessons learned. Therefore, it was also used in floods workshop.

Through the workshops and interviews possible solutions to the lessons learned were also identified. These solutions related to the bigger problem areas; *Solutions to inter-agency communication problems*, *Risk assessment and Early Warning Systems*, *Training, Logistics & Equipment*, *Debrief* and *Recovery*. Finally, lessons learned and best practices from the ELITE CoP workshop, interviews and primary/secondary literature were systematised into categories related to actors. A compilation table of the main problem areas for each crisis phase with solutions to the problems was presented.

Some of the main lessons learned are summarised and categorised according to topic and problem area in the table below.

Problem areas for lessons learned	Lesson learned	Source
Communication; Communication to the population	To improve the communication to the population the crisis managers should establish three groups that specifically deal with communication: (i) actors who communicate with first responders, (ii) actors who communicate and informs the affected community, and (iii) actors who deal specifically with the media. It is of outmost importance to speak as simple, understandable and as short as possible.	COP
Communication; ***Communication to the population***	In the pre-crisis stage emergency and preparedness organisations must provide information to the community which will improve the overall knowledge in the population. Also informing/involving school children in awareness raising campaigns is useful.	COP
Communication; Inter-agency	Crisis managers and the response teams must overcome the language barriers through (i) practice and exercises which increases cooperation, (ii) use model exercises and create a handbook with pictures of the equipment used and different technical terms which will be illustrated with pictures, and (iii) using English as an emergency language (at least one person in the response team must be able to speak English).	COP
Communication; Inter-agency	Promoting a common understanding/approach by using common guidelines and descriptions of what different positions (especially leader positions) entail in practice.	COP
Communication; ***Inter-agency***	International emergency organisations should establish tighter coordination in the pre-crisis stage which will ensure a better response.	Interview 2013

Communication; ***Strategic level***	Countries prone to natural disasters should make specialised agreements with international humanitarian organisations before a crisis takes place. This must be done to overcome bureaucracy relating to customs etc. International organisations should also have specialised teams beforehand that are suited for the tasks.	Interview 2013
Communication; ***Inter-agency***	To overcome inter-agency communication challenges crisis managers should have a previously defined communication plans. This plan should include; (i) clearly defined communication flows with specific topic/content, (ii) one person should be responsible for each communication flow and level, (iii) identification of the best channel for each information flow; radio, web etc.	COP
Communication	Response plans must be physically available and not only stored in computers, because in earthquakes the power is often cut and computers may be damaged.	COP
Communication; media	The crisis managers should inform the journalists on the situation; however, journalists should not have access to the zones where rescue work is done as they may pose a security risk.	COP
Communication; local knowledge	Local knowledge needed when localizing waiting/emergency areas.	COP
Training; volunteers	Local volunteers must be trained to use Web Geographical Information Systems (GIS).	COP
Training; volunteers	Team competitions can be used to motivate volunteers and responders and to improve their performance.	COP
Training	More field training and international exercises are needed.	COP
Training	Through multimedia features responders can train by watching informative videos on YouTube about “how to evacuate a building” etc.	COP
Training	Train and educate intervention teams and volunteers on self-protection measures.	COP
Training	Improve the debriefing, or lessons learned from the implementation process. This is essential to improve the methods and approach for the next rescue effort.	COP
Training	Rescue teams should exchange information on lessons learned and best practices in order to improve their performance.	COP
Logistics	Having excess communication lines to guarantee free communication lines during the crisis	COP
Logistics	Creating a minimum standard on equipment and making the equipment compatible between countries used in operations is important to improve cooperation.	COP
Logistics	The responding teams should improve their self-sufficiency. For example the NORSAR teams bring 10 days of water and food.	Interview 2013
Logistics	Develop standardisation agreements, similar to the Standardisation Agreements (STANAG) in NATO for cross border assistance to increase the effectiveness for the operation.	COP
Logistics	It is important to improve training and have more exercises for logistics staff.	COP
Logistics	Updated contact list of trucks and drivers in the response team so that the responders can call/alert the drivers.	COP

Logistics	Improve transport procedures to avoid paying taxes on equipment or having sniffer dogs in quarantine.	COP
Logistics	The teams must have (i) cartography on paper, (ii) access to national emergency plans on paper, (iii) special radio channels for communication, (iv) proper transportation of equipment.	COP
Logistics	Developing Earthquake early warning systems is necessary as researchers can rapidly detect an on-going earthquake and broadcast a warning in the target area, before the arrival of the destructive waves	REAKT 2014; Zollo et al.
Risk assessment	Risk assessments and building codes need to be frequently overviewed and controlled in order to be up to date and implemented in practice.	COP
Risk assessment	Private buildings in risk zones should be reinforced to be resilient to an earthquake- awareness campaigns are needed to convince the local population to invest more money in prevention.	COP
Risk assessment	Movement control and information regarding the status of tunnels, bridges and railways is important to know before sending any rescue team to the worst hit area (Welfare/safety for responders)	COP
Debrief	Have a standardised debrief plan before the event occurs.	COP
Debrief	Have evaluations where lessons learned can be fed into changes the preparation and emergency plans.	COP
Recovery	Improve rebuilding management of critical infrastructure by identifying who should take part in the recovery phase in a 'recovery plan' before the crisis has taken place.	COP
Recovery	In the recovery phase the authorities should avoid rebuilding official buildings (especially spaces where people gather) in risky places. This cautionary approach should also be promoted for private buildings.	COP
Recovery	*Critical incident stress management (CISM) in the population.* Psychosocial problems must be dealt with and several teams have people working focusing especially on this.	IRIN (ND)
Recovery	Do not overstate the risk of disease from dead bodies after an earthquake as this leads to misallocation of resources. The real risk posed by dead bodies after natural disasters is mental illness caused by shock and grief among the survivors.	IRIN (ND)
Recovery	Restoring family bonds is essential in order to recover and return to normalcy.	IRIN (ND)
Recovery	Involve the local population in rebuilding critical infrastructures as it promotes greater continuity, the local population will be kept busy and feel in charge of their own environment.	IRIN (ND)
Recovery; partnering with local actors	Pre-arrange mutual-aid plans locally as local partners are on site and could be part of future earthquake response or recovery operations	IFRC 2012

Results from lessons learned on floods (D4.4)

The main scope of the D4.4 report has been to present the findings from the ELITE workshop on floods in Vienna, October 2013. One of the most important tasks in the workshop was to share and identify the most relevant lessons learned (problems) related to crisis management of floods and possible solutions to the stated problems. Oval mapping technique and post-it method were used in this workshop. The report has

gathered and systematised knowledge on floods based on information from experts in the ELITE CoP supported by literature reviews.

The main lessons learned shared by the ELITE workshop participants, categorised into the main problem areas, are summarised and presented below.

Problem area for lessons learned	Lessons learned	Sources
Awareness	Some lessons learned include; making laws or guidelines regarding where one is allowed to build, or that organisations must gather information after a flood and have lesson learned seminars etc. Keep the awareness alive through (i) school education for children and young people to change their mind-set and promote self-protection, (ii) printed documentation and risk guides for adults, (iii) arranging 'Risk management days' to communicate to the public, (iv) exercises or simulation activities about risk management, (v) regional apps regarding risk management related to specific crisis.	CoP
Communication	A lesson learned is to inform the population and always include it in the plan, and it must be prepared and practiced. One should use the same tools of communication that one uses on a regular basis. First responders should have a network dedicated for only emergency services to overcome communication collapse. Create laws stating that emergency services must share information about the crisis. Standardise data bases containing relevant information which can be available for the internal and external network for the scientific community and the crisis management community.	CoP
Planning	Some lessons learned are (i) specialists assist organisations in creating risk assessment plans, (ii) establishing a cycle of personnel that can work shifts during the crisis, (iii) adding more personnel during the crisis, (iv) create proper contingency plans and conduct exercises and simulations to become familiarised with the plans, (v) carry out an analysis after a crisis to change the procedures or confirm good procedures.	CoP
Training	Lessons learned included; (i) creating laws where it is clear who has the responsibility and is accountable, (ii) through training one can make people feel responsible and promote private responsibility	CoP
Coordination and interoperability	Lessons learned included; (i) to have simpler and clearer laws to facilitate interoperability between different crisis management actors, (ii) ensure that all relevant agencies participate in coordination before, during and after a flood, (iii) the EU should play a key role in coordinating cross border floods, (iv) flood-prone countries should have standing cooperation agreements with neighbouring countries.	CoP

Holistic (System) learning	The experts argued that creating local resilience forums which can make decisions on (i) how to improve our response efforts (ii) increase the local resilience building process. A best practice was from the UK who had local resilience forums that made the stakeholders have regular meetings where they conduct table-top exercises every three months.	CoP
Information management	'Information management' is essential in all phases of a crisis; whether it is (i) crisis communication to the public about recovery, (ii) information about the crisis, and (iii) dissemination of lessons learned. The person managing the current information is responsible for integrating and editing documents to make them understandable for both individuals and public agencies. However, the workshop participants argued that it is important to produce more good quality information, instead of a lot of documents and to standardise documents, even though this is difficult.	CoP
Equipment and infrastructure	Experts noted that one must update national databases of equipment in the country and abroad. This is important in order to know what type of resources that one can use in a crisis. In some countries one should expand the rescue resources; for example more high efficiency pumps, high power generators, sand bags, big bags and other useful equipment. If one were able to integrate all the rescue resources into a single system this would have solved many problems relating to equipment.	CoP
Decision-making and financing	In the contingency planning one should have cash reserves or a flexible mechanism for resource allocation. Laws should be implemented to establish a minimum quantity that should be invested in contingency planning. This is to ensure that money is actually used on contingency planning.	CoP

The report also contains a background chapter, based on literature reviews and presentations in the Vienna workshop, with examples of recent floods in Poland (2010) and Central Europe and Norway (both in 2013), where certain problem areas were pointed out.

Finally, some best practices regarding volunteers, public communication and educating children are presented. Problems related to organizing people coming to help in crises, lack of communication (both inter-agency and to the public) and learning from crises are all important features of emergencies and have been mentioned not only in the floods workshop, but also the previous ones on forest fires and earthquakes (Maal and Grunnan 2013[4,5], Maal et al. 2013[6]).

[4] Maal, M. and Grunnan, T. (2013). Forest Fires Lessons Learned Report. Deliverable 4.2. EU FP7 ELITE (Elicit to learn crucial post-crisis lessons). Contract No: 312497.
[5] Maal, M. and Grunnan, T. (2013). Floods Lessons Learned Report. Deliverable 4.4. EU FP7 ELITE (Elicit to learn crucial post-crisis lessons). Contract No: 312497.
[6] Maal, M., Grunnan, T., Gallipoli, M.R., Piscitelli, S., Masi, A. and Mucciarelli, M. (2013). Earthquake Lessons Learned Report. Deliverable 4.3. EU FP7 ELITE (Elicit to learn crucial post-crisis lessons). Contract No: 312497.

Results from holistic report (D4.5)

This report D4.5 gathers lessons learned and best practices from cases provided by the ELITE consortium based on their expertise within various fields of crisis management, and the example cases were also mentioned by the CoP in the workshop. The report includes three chapters with lessons learned from countries in Europe, America and Asia.

- The lessons learned from forest fires are gathered from cases in Italy (2002), Portugal (2001 and 2003), Spain (2005), Greece (2007) and France (1997). The main areas for lessons learned (or problem areas) identified in the forest fires cases are interoperability, knowledge, prevention, communication, risk assessment, management, training and logistics, and the lessons learned are categorised according to these.
- The lessons learned from the recent floods are gathered from cases in Europe (2013), Poland (2001 and 2010) and a major flood in Panama (2012). The lessons learned are categorised according to the main problem areas identified in the cases of floods; interoperability, knowledge, management of volunteers, communication, risk assessment, coordination, recovery and logistics.
- The lessons learned are gathered from earthquakes in Turkey (1999), Italy (2009), Haiti (2010), China (2008) and Japan (2012). The main problem areas identified in the earthquake cases are related to knowledge, communication, logistics, interoperability, coordination, risk management, risk assessment, prevention/preparation, training and recovery, and the lessons learned are categorised in line with these.

The selection of cases is not representative nor an exhaustive list of incidents. Thus, it is not possible to draw any wide reaching conclusions based on our findings from the different cases. Yet, the lessons learned in this report provide insights into problem areas where disaster managers can learn from each other. The examples of tangible lessons learned based on problems revealed by first responders and other crisis managers in the different phases of a crisis; prevention, mitigation, preparedness, response and recovery. In the final chapter of D4.5 all lessons learned are summarised in three tables, one for each disaster type. In the tables the sources are indicated and they are also available in the ELITE living document. End-users have been involved to validate the results in all stages.

Through work package 4 a lesson learned process has been tailored and shaped by disaster managers and the stakeholders involved. This has resulted in a framework which has been validated by the ELITE CoP. Social media networks, such as Facebook, Twitter and LinkedIn, has been used to keep in touch with the CoP and create a platform for exchanging information. The living document has been promoted to other EU projects, like BRIDGE, and through a wider network of stakeholders. In this sense one has attempted to advance the state of the art.

The holistic framework

A holistic framework for lessons learned reporting was developed based on the findings from the three workshops on forest fires, earthquakes and floods. The use of a post-it method and oval mapping technique proved to be good for sharing, identifying and collecting lessons learned and categorizing the findings into larger problem areas. A draft framework was presented, tested and validated at the fourth and final workshop through a reporting exercise with members of the CoP. It has been an iterative process and it is important that the insights and comments from the ELITE CoP through the validation process are incorporated in the framework. The framework was therefore modified and a final version is presented in

D4.5 and titled “a holistic framework for lessons learned” (Figure 3). The framework takes into account all phases, all hazards and topics that are specific for certain phases. Eight topics have been proposed as the main categories.

Some categories have been added; *knowledge* and *prevention*. *Knowledge* includes *awareness* and *learning*. *Prevention* merges the topics of *preparation*, *training* and *education.* Crosscutting categories has been identified; *communication, knowledge, coordination and decision-making* and *logistics*. *Coordination and decision-making* incorporates the topic of *management*.

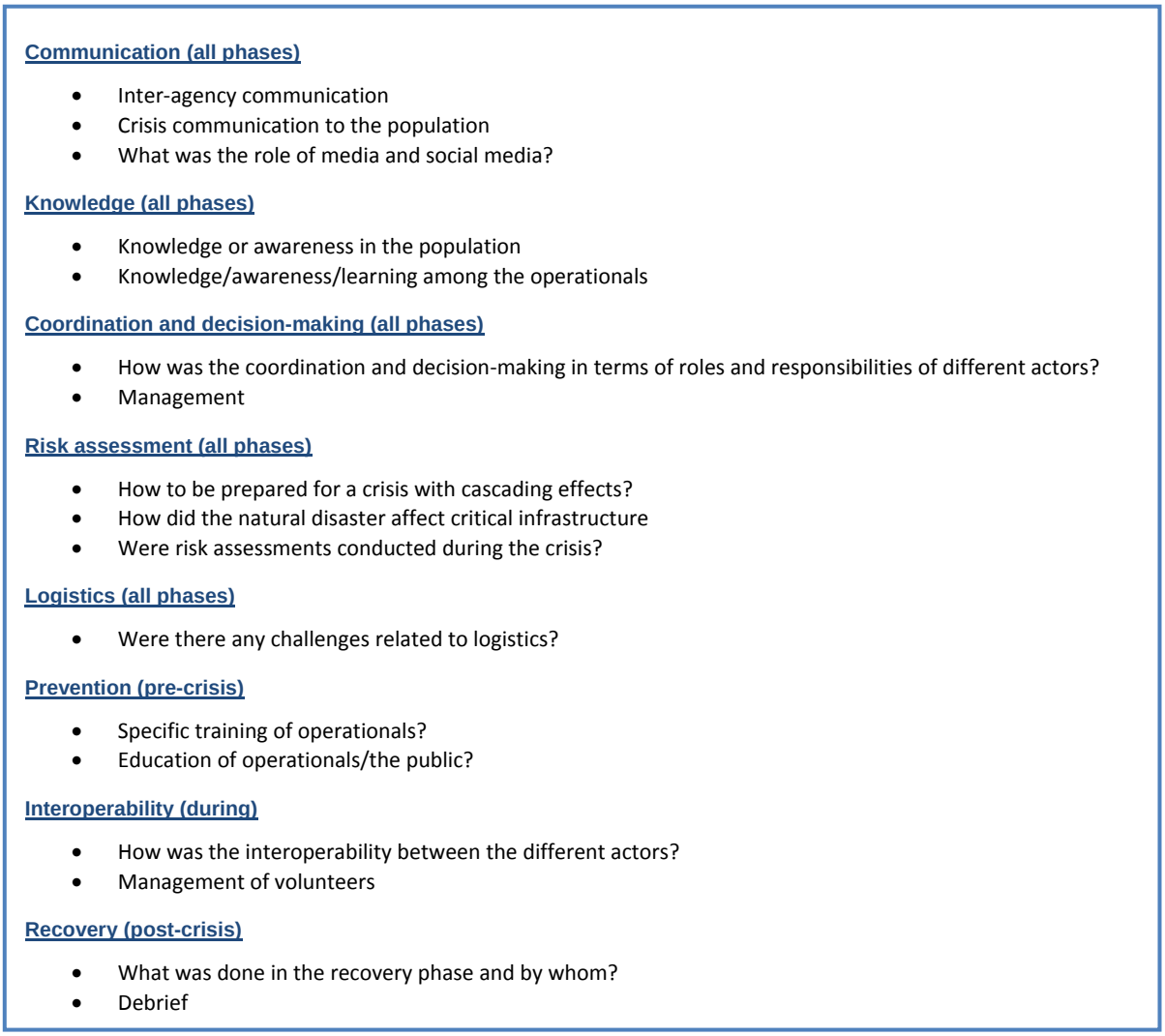

Figure 3: A holistic framework for lessons learned

The categories of *prevention, interoperability* and *recovery* can be regarded as problems that are specific to a certain phase. This ensures that no phases are “forgotten”. During the ELITE CoP workshops several experts argued that the topic of *recovery* in the post-crisis phase is forgotten.

Within each category examples of questions are provided. Since the categories are very broad, these questions can help in the lesson learned reporting process.

We recommend that the holistic framework developed in the ELITE project is used as guidelines for lessons learned. It is especially relevant to use in order to connect the learning process, i.e. going from lessons identified in the post-crisis phase to lessons learned and implemented in the pre-crisis phase. The relevance

of these guidelines was stated by several CoP members in the final workshop, as one expert claimed: "*This framework is suitable for all types of crises, and is a very helpful tool for us to sort out all areas and topics that we must consider when writing lessons learned reports*."

WP 5: Learning process analysis

In a crisis context, the definition of learning is extended to compass the acquisition of knowledge, skills, ways of thinking, or models of social organisation in a particular context or level (Stern 1997)[7]. There appears to be no common agreement among researchers in crisis management on a definition of learning. However there does appear to be a general agreement that learning can be seen from at least three dimensions or levels: personal, interpersonal and institutional. (Stern 1997: 70[7]; Sommer et al 2013[8]). In the crisis management literature there are several definitions of learning that stems from different disciplines. In order to be able to operationalise the concept some authors, like Dixon (1999)[9], argue that learning must distinguished between "individual learning" and "organisational learning". There are several definitions of organisational learning. Dixon (1999:6)[9] defines it as the intentional use of learning processes at the individual, group and system level continuously to transform the organisation in a direction that is increasingly satisfying for its stakeholders. The organisational learning process is described by the following four steps; (1) Acquisition of knowledge, (2) sharing of knowledge, (3) constructing meaning, (4) organisational memory.

It is well known that individual learning is a complex cognitive process (Bloom 1956)[10]. Organisational learning appears to be even a more complex process than individual learning (Levitt 1988)[11]. Donahue and Touohy[12] point out that since disasters are infrequent and often unique in nature, learning from disasters and communicating the lesson learned to other organisations is hard and complex.

Boin et al. (2005)[13] introduces competence or skill based learning. This implies that during and after the crisis new expertise and technology is created to handle a similar crisis in the future in a better manner. This means that one detects a knowledge gap in specific areas. An example from Norway is from the swine flu pandemic in 2009 where it was necessary for health professionals to learn about new technologies and acquire new skills in order to deal with the pandemic.

Other theories deal more with 'the quality of learning' and whether the actor/organisation 'acts upon' new knowledge. For example after a crisis the national authorities should begin evaluating what has happened. This type of learning involves "detecting and correcting deviations and variances from standards" (Pearn 2013)[14]. This is often termed single-loop learning. In order to achieve double-loop learning one must reflect on the "appropriateness of underlying practices, policies and norms". This approach addresses the basic

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[7] Stern, E. (1997) 'Crisis and learning: a conceptual balance sheet', Journal of Contingencies and Crisis Management 5 (2): 69-86.

[8] Sommer, Morten (2013). *A model for learning in emergency response work.* Int. J. Emergency Management, Vol. 9, No. 2.

[9] Dixon, N. (1999): The organizational learning cycle: How we can learn collectively (2nd ed.). Aldershot: Gower Press.

[10] BLOOM B S (ed.) (1956) Taxonomy of Educational Objectives, the classification of educational goals – Handbook I: Cognitive Domain New York: McKay

[11] Levitt B,. March J., "Organizational Learning," Annual Review of Sociology 14 (1988): 319-340.

[12] Donahue, Amy, and Robert Tuohy. "Lessons We Don't Learn: A Study of the Lessons of Disasters, Why We Repeat Them, and How We Can Learn Them." Homeland Security Affairs 2, issue 2 (July 2006) http://www.hsaj.org/?article=2.2.4 Access Feb 2014

[13] Boin, Arjen, Paul `t Hart, Eric Stern and Bengt Sundelius (2005). The Politics of Crisis Management. Public Leadership under Pressure. Cambridge: Cambridge University Press

[14] Pearn, T. (2013). "Organisational learning". Presentation at 2nd ELITE workshop, Weeze, Germany, June 25th

aspects of an organisation, such as the same things are not done in response to changing contexts. In other words, “did I understand the problem and did I do it right?” Finally, triple loop learning is recognised as the highest form of organisational learning. This involves self-examination. This can be done through de-briefing, analyzing and acting on the lessons learned. This knowledge can feed it into real changes on the ground or involve radical transformations in the internal structure, culture and practices in an organisation.

The learning process in the ELITE project

Workshops are a fruitful approach to gather information and knowledge among experts. The major lesson learned in the first workshop was when members of the community met they often started sharing information about new tools and equipment they found effective when dealing with a crisis. Several of the participants brought equipment brochures from the manufactures. Some of the participants brought lessons learned reports, but could not really share them with other participants since most were written in local languages.

In the second workshop an attempt was made to get the participants to go beyond discussions on equipment used in a crisis. The invited speakers were asked specifically to talk about learning processes. A presentation was given by Edward Pearn about the triple loop learning process (in Van Santen and Illing 2013[15]). Although most of the participants were familiar with the concepts, Pearn presented none of the participants thought that the model of the triple learning process was possible due to culture and structural conditions of the organisation and systems used in crisis management. One way that best practices, or to be more precise “minimal practices”, are able to be implemented in the organisations is by setting a so call “minimal standards”. It seems that the best way to drive change at the organisational level in crisis management is to establish, as a community, a baseline or minimal practices to follow. The International Search and Rescue Adviser Group (INSARAG) was used as an example of how minimal guidelines can be used to help organisations with the double loop learning process.

In the second workshop, the concept of triple loop learning and the lack of it in the disaster management community were presented to the community of practice by one of the experts. One of the hinders identified to achieve triple-loop learning in the community is how information is categorised or labelled. Nevertheless, successful learning relies upon a set of rules. The labelling of things may restrict information to particular audiences, whereas the lack of a label may attract a more diversified audience. However, this approach requires the usage of a language that everyone understands and types of information that everyone can handle. In addition, idiosyncrasies in information sharing and dealing with its dissemination need to be respected.

In the third workshop the participants were specifically asked to discuss learning in the community and what were some of the barriers to learning. They were split into 4 groups to answer these questions:

- What are the models of learning in your community?
- What are some of the major socio-technical barriers to the adoption of the “Living Document” in the community? By taking (a) culture, (b) structure, (c) methods/process, and (d) machines into account.

Learning happens in all phases of a crisis but it is only modelled on the individual level. The experts argued that there is a lack of holistic or systemic learning and when learning occurs it is isolated, often geographical. This geographical isolated learning can be optimised however by creating local resilience forums that can

[15] van Santen, Rikus and Illing, Mareike (2013). Interim Progress Workshop Report – Lessons Learned Forest Fires. ELITE project. FP7-SEC. Contract no. 312497. Last visited 30.09.2013 http://www.elite-eu.org/documents/ReportW1.pdf

make decisions for the local resilience building process. These forums can help to see how we should improve responses to different types of disasters. A local resilience forum in the UK make all the stakeholders take part in these forums and they have regular meetings where they conduct table-top exercises every three months. Consequently by focusing or structuring the living document in a local context one can take away the barrier to for it use and adoption.

In the fourth workshop the participants were asked to use the "living document" to produce a lesson learned report about one lesson identified during and in the aftermath of the Crisis in Japan 2011. The topics that needed to be covered in the report were communication, interoperability, coordination and decision-making, risk assessment, logistics, and recovery in the pre-crisis, implementation and post-crisis phase. Group leaders were assigned by the project.

The three groups were observed to approach the task of using the ELITE wiki to produce a lesson learned report very differently. In one group the participants were assigned individual tasks and interacting occurred mostly through the wiki and there was very little discussion within the group. In another group, there was a great deal of discussions about what the end result would be and they produced an excel spread sheet that cross referenced the document in the wiki. In the third group there was a balance between the individual activity and the group activity.

All groups commented that they had difficulty in learning how to use the living document but group 2, by producing the spread sheet model, where able to go beyond single loop learning to double looping learning. That is to say, they first started to reflect more on the how they should do the task of producing a lesson learned report with the living document than actually producing a lesson learned report.

Consequently, the analysis of the working group activity using the socio-technical approach indicates that the structure of the group can be a major factor in affecting the learning outcomes. This suggests that a structure analysis should be evaluated in the next deliverable.

All of the experts were concerned about the appearance of the terms strategic, tactical and operational saying that these terms are used differently among different communities in the crisis management area. Consequently, classifying or naming the learning processes with these terms might cause more confusion in the community than needed. It was suggested that may be by using the terms, lesson learned for long term decision making, medium term decision making and short term decision making might cause less confusion and create more consensus on the terms used in the community. It was pointed out by one of the experts that agreeing on a common terminology in the crisis management community takes a long time but is very important. He gave an example, to reach agreeing on the terminology used in the INSARG handbook (INSARG 2014)[16] took in some cases 6 years of discussion.

Main results

Figure 4 is a socio-technical model of the ELITE learning system. The layered approach has been used in this figure to refer to different levels from individual to international organisations. This figure has been created adapted to a large extent from Rasmussen earlier model of risk management in a dynamic society (Rasmussen 1997)[17]. The development and analysis of the model is presented in D5.1 and D5.2. The model

[16] International Search and Rescuer Group, Process and Guidelines, http://www.insarag.org/en/iec/process-a-guidelines.html Access Feb 2014

[17] Rasmussen, J. (1997), Risk management in a dynamic society, A modeling problem, Saftey Science 27, 182-213)

originally identified four learning measurements but, after discussion with experts in the field, two new measurement points where added.

Learning measurement point 1 in Figure 4, outlines the community of practice relationship to the living crisis experience and the living document. Here members of the community learned by either participating in a crisis or in crisis exercises and shared their lessons learned as individuals or teams using the filtering and categorisation systems agreed upon in the living document. They were also asked to upload and rank these documents.

Learning measurement point 2 in Figure 4 shows the individual or the team connecting back to the official hierarchical structure of their organisation with the different echelons or layers of power structures.

Learning measurement point 3 and 3a in Figure 4 show the interaction between the individual, team and organisation on operational, tactical and strategic lessons learned.

Learning measurement point 4 and 5 attempt to describe how lessons learned at the organisational level are moved up through the socio-technical stack from the sector level, national level and international level. At point 5 (at levels above the team level in the socio-technical stack) the lessoned learned should have been officially endorsed by a respected organisation or body. This endorsement should be done through some function in the living document.

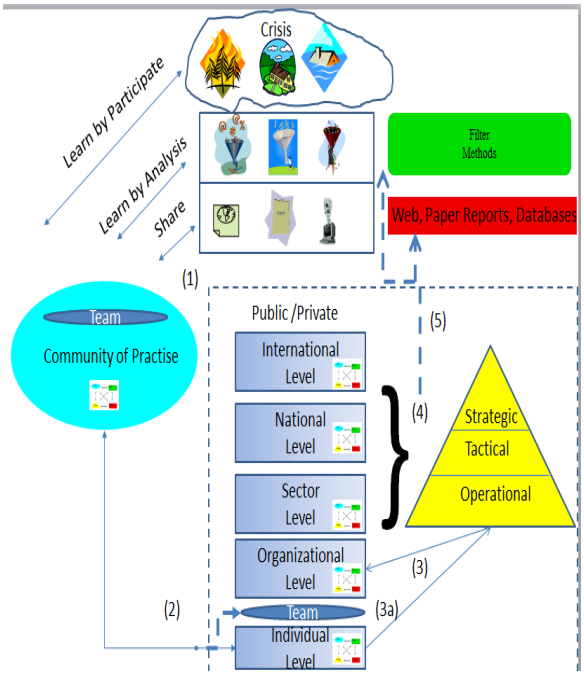

Figure 4: Model of Learning Measurement Points.

WP 6: Dissemination of lessons learned

Several activities were carried out during the ELITE project to disseminate and communicate the results of the project. Below, the activities carried out and the outcomes achieved will be described.

Communication strategy

In order to reach relevant end-users for the living document, keep in touch with the CoP and have a scientific impact, the ELITE project developed a communication strategy. The main objective of this communication strategy was to spread lessons learned and best practices from the ELITE project to the broader emergency preparedness, contingency planning, and crisis management community.

The ELITE project maintained the involvement of the ELITE CoP in this project, and reach other relevant end-users in the broader crisis management community that wanted to utilise the final output of the project; the "living document". The other objective was to spread research strategies, methodologies, outcomes and technological development in the ELITE project to the broader scientific community.

The key stakeholders in this project are the people working in the emergency preparedness, contingency planning and crisis management community. The crisis management community involves different actors

ranging from emergency management organisations (first responders such as police, fire departments, SAR, ambulances), volunteers, governmental organisations, NGOs, local governments and education centres for crisis management (fire schools etc.).

In order to facilitate the internal communication within the ELITE consortium, two tools have been created: a sharepoint that that provides a central storage and collaboration space for documents, information, and ideas and teleconferences among work-package leaders every two weeks to update the status of the project and prepare the upcoming events.

Externally, several tools and activities were developed to communicate the project results.

The end-product of the ELITE project, the Living document (http://www.elite-eu.org/wiki/), is a platform where people working in the field of emergency preparedness, contingency planning, and crisis management can share experiences, lessons learned, knowledge, and best practices. They can contact each other, comment on reports from others and use multimedia features.

The ELITE project also has a public web page (http://www.elite-eu.org/) where the reports (deliverables) produced during the project are published.

Finally, after each workshop, newsletters were sent by-email to each member of the CoP who participated in the workshop. The newsletters are used to inform, maintain contact, and engage people who have participated in the workshops or shown interest in the project.

Furthermore, through different social media channels (LinkedIn, Facebook, and Twitter), ELITE groups have been created to connect people from different workshops. Social media allows easily engage with other experts from the scientific community and the crisis management community.

Dissemination plan

A dissemination plan is crucial to organise the activities realised in the framework of a project in order to promote the project's results, development of the project, and the dissemination of the scientific work produced in the project.

The ELITE project expects to have several target groups interested in the results of the project: crisis managers and first responders (end-users), researchers and the general public. The main target groups are in Europe, however, the findings may be of interest to actors outside the European community. Therefore, it is important to establish an effective, wide reaching communication strategy and a detailed dissemination plan.

The dissemination plan has been divided into several phases: in the first phase the project results were disseminated within the CoP. In the second phase, the results were available for a broader crisis manager community through the web-page and the living document and finally, the project results have been published in several journals and conference to guarantee that the international research community validates the scientific results achieved by the project.

In order to disseminate the results, the ELITE project used different tools and channels of dissemination. The most important channel is the project web-site where it contains all the deliverables and results obtained during the project. Workshops and the final conference were also handled to disseminate the project results. Flyers about the project were also distributed in the ELITE conference as well as the handbook with the

articles of the conference and some information regarding training exercises. Finally, through social media news and results about the project have been constantly published.

Regarding the scientific dissemination, several articles concerning the ELITE project have been published in various scientific journals and presented in several international conferences. Furthermore, ELITE Project consortium has developed dissemination activities in order to create synergies with similar research projects funded by FP7 programme such as BRIDGE, HARMONISE, ACRIMAS, RAMSES, and CIPRNet.

Handbook

A handbook has been developed with the papers presented in the conference and some training exercises. The handbook is divided into two parts:

- The first part collects the papers presented in the ELITE conference in Warsaw. The papers were developed by partners of the ELITE project as well as by the members of the Community of Practice. The papers are related to crisis management issues and preparation and training for natural disasters. Furthermore, some papers developed by partners of the ELITE explains the project results.
- The second part provides several training exercises carried out in past events and they can be useful for future events.

Association Establishment

The project consortium targets the exploitation of results after ELITE project's lifetime. Two main alternatives for project continuity were identified:

- Transfer project results to some already existing institution. Several potential institutions such as GDACS-Virtual OSOCC, European Mechanism of Civil Protection and ELITE CoP individual members were requested about this but without achieving success.
- Build up a new association based on project partners and ELITE CoP members. This last alternative was seen as more sustainable and realistic. Based on partners of the project, members of the ELITE CoP, other current research project partners and advisory boards, and international, national and regional stakeholders involved in crisis management, the Society of the European Crisis Management Community of Practice (SECriMaCoP) will be established.

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There will be several milestones in the SECriMaCoP constituting process. All the consortium partners and the members of the ELITE CoP will be invited to take part in this association. Other European crisis management agents will also be invited to take part in this association subsequently. All the members of this association will periodically (every two years) elect their representatives. This association will hire staff responsible for both technological and content management of the living document.

Three different income sources will be established to get funding for this association: sponsoring, donations, and fees for membership or attendance to physical or virtual conferences.

Potential impact and main dissemination activities and exploitation of results

During 18 months of project realisation, all partner institutions gathered within the consortium undertook a number of various activities. All previously planned activities were successfully realised. Moreover, partners contributed to dissemination of ELITE project even more intensively, than it was previously planned.

As ELITE project was to reach two different types of audiences, thorough external dissemination was developed. Both types of audiences were supposed to receive slightly different messages:

1. The community of crisis managers were to be convinced, that the results of the project, especially the living document and the access to the Community of Practice, are important and useful in their work.

2. Scientific community were to be convinced, that the results of the project might be a solid foundation, but also reliable and valuable source of knowledge concerning our common goal, which is the improvement of European emergency preparedness, response, and recovery from disasters.

Below, dissemination strategy is described, outlining particular actions taken to disseminate the knowledge concerning the project within heterogeneous group of potential end-users. Undertaken dissemination activities contributed to Community of Practice establishment and development, which will guarantee the living document actually to 'live' after the project is finished.

Workshops

ELITE consortium has organised four separate workshops, during which invited experts had the chance to contribute to the creation of the living document. Also, after the prototype was ready, consortium had the chance to listen to first feedback from potential end-users attending the workshops. The living document was constantly validated afterwards both by consortium members and created Community of Practice, which was another added value. During workshops, experts had the chance also to meet each other, to share experience and listen to lessons learned presented by others.

During the workshops, some further crucial results were achieved, which were later described in details in other deliverables:

- Common understanding of possible cooperation on the field of civil protection was established
- Tangible results, e.g. lessons learned, best practices were identified
- The model of learning process was described

The workshops provide a direct channel to make the project known by the practitioners and disseminate the main results of the project.

Living document

Living document is one of the most important outcomes of ELITE project. It should be understood as an online repository of knowledge and lessons learned (e.g. documents, reports, evaluations) connected with crisis management, especially focused on forest fires, floods and earthquakes. The objective of the living

document is to share knowledge and experience between experts and stakeholders from various countries in Europe that are members of the Community of Practice.

Although the living document is publicly available, the access to the repository is limited only for the Community of Practice members. After requesting the access to the living document, experts may download and upload the documents, comment them and evaluate their quality. The most important types of the documents are reports of lessons learned, guidelines and best practices, which are the tangible effects of ELITE project. In the last workshop of the project, the tool was used by members of the community of practice to develop an exercise and everybody was given an account to use it in the future.

What makes the database different from other tools is the social context. Community of Practice – a network of experts from different parts of Europe but similar interests, with their professional and personal dependencies will guarantee the living document actually to be 'living'. The living document has been created basing on guidelines gathered during the workshops described in detail in previous section. As the structure of the living document was created, it was validated afterwards by the experts during following workshops. Also classification criteria were based on the opinion of experts. This classification criteria describes every uploaded document, so requested information might be found much easier.

Finally, this tool has been also used as a dissemination channel since all deliverables developed in the project are also available in the living document.

Public webpage

At the beginning of the project, official website of ELITE project was created. It is one of the most important mean of communication with wide audience, as it presents most crucial information about the project itself, about involved partners, activities taken etc. The content of the website is as follows:

- News concerning activities of the project.
- Crucial information of the project and the founding.
- Links to most important websites explaining the background of the project.
- Information about partners involved in the project.
- Gallery of activities of the project.
- Description of the Community of Practice and involved institutions.
- Results – publicly available published newsletters, deliverables and other dissemination activities taken.
- Conference – detailed information about the final conference: conference agenda, logistics, registration form, etc.
- Private – access to the living document (for the Community of Practice), but also to the share point (only for the consortium members).
- Links to several social-media channels: Facebook, Twitter and Linked-In account.

Newsletters

After each workshop and the final conference, newsletters were sent to members of the community of practice. In total, 5 newsletters were published. The documents were to inform consortium members and the Community of Practice about most crucial activities that were realised within the project, to share first result, and to inform about dissemination activities. The newsletters were also published on the ELITE website.

Social Media

During the project, among various dissemination activities, social media were supposed to strengthen professional and personal relations among the members of the Community of Practice. Three different social media channels were used to disseminate the knowledge and the results of the project (Facebook, Twitter, and LinkedIn). The group in the three channels is called FP7 EU ELITE Elicit to Learn crucial post-crisis lessons. Regularly, information about the project was posted in the channels to inform the community about the events within the project, the updates, and the main results obtained so far.

Final conference

Final conference was held in Warsaw (Poland), in the Main School of Fire Service between 25th and 26th June 2014. The consortium, members of the CoP and others interested in the topic of crisis management presented their research, experiences and/or products, shared the knowledge and experience gained through 18 months of the project. As one of tangible results of the project, the living document was presented. All attendees were also encouraged to join Community of Practice.

More than 30 different institutions (including consortium members) from whole Europe were represented by 100 registered participants.

Handbook

The handbook was published to disseminate the knowledge presented during the conference by various experts, to share experience, guidelines and lessons learned gained through the project realisation, but also to provide ready to use material for different kinds of trainings connected with fires, floods and earthquakes. 300 copies of the handbook were printed. All attendees of the conference have received the handbook within post-conference materials. . For wider dissemination the remaining copies of the handbooks will be distributed within the consortium and partners will redistribute own copies among Community of Practice in particular country.

Visibility of the project

As to ensure proper visibility of the project, logo of ELITE and logo of European Union was displayed on the websites of all the partners involved in the project. Also some activities were described and published on the websites.

The Science, Technology and Innovation Projects Magazine has published an article about ELITE Project in its special edition focused on leading research projects across Europe. The leaflet was distributed among all conference attendees. Furthermore, the French School of Fire Fighters (ENSOSP) mention the ELITE project in its newsletter as “Meilleures pratiques et enseignements tires des catastrophes naturelles”.

Another tangible result – the handbook described previously and the leaflet – will also be distributed among Community of Practice and external institutions (not involved in the project realisation) that might be potential end-users of the project outcomes.

The Annex A2 summarises all the dissemination activities carried out in the ELITE project.

Establishment of the Community of Practice (Association)

To guarantee the living document to actually 'live' after the project is finished, the creation of an association called (SECriMaCoP) based on project partners and ELITE CoP members is proposed. How this association will be constituted and the milestones to be done are widely explain in the D6.5.

Publications

During the project, some articles concerning the ELITE were published in various scientific journals and presented in several international conferences. Preliminary results were presented to wide audiences by different types of activities.

Publications prepared by the leading institution are presented below:

- Neuruhrer, M. & G. Lang (2013). ELITE – Aus Naturkatastrophen lernen [ELITE - Learning from natural disasters]. Vorrang intern 2013, 1, 31.
- Lang, G. (2013). ELITE: Elicit to learn crucial post-crisis lessons (Vorschau). Intellectual capital and activity report 2012 of the Research Institute of the Red Cross. Vienna, Research Institute of the Red Cross, 22.
- Lauge, A., Hernantes, J., and Sarriegi, J. M. (2014). Las infraestructuras críticas, más críticas en tiempos de crisis. Ingeniería e Industria (DYNA), (in press).
- Lang, G. (2013). Forschungsinstitut: ELITE-Workshop in Wien erfolgreich verlaufen [Research Institute: ELITE workshop in Vienna was successfully implemented]. Vorrang Intern Newsletter (VIN. 1.
- Lang, G. (2014). ELITE: Elicit to learn crucial post-crisis lessons. Intellectual capital and activity report 2012 of the Research Institute of the Red Cross. Vienna, Research Institute of the Red Cross. 16.
- Gimenez, R., Hernantes, J., Labaka, L., Sarriegi, J. M., and Laugé, A. (2014). Developing a Community of Practice to Learn, Share and Improve in Emergency Management. To appear in Proceedings of the 15th European Conference on Knowledge Management (ECKM 2014).
- Gimenez, R., Hernantes, J., Labaka, L., Laugé, A. and Sarriegi, J. M. (2014). Guidelines to Develop a Successful Virtual Community of Practice in Emergency Management. Paper sent to Information Systems for Crisis Response and Management in Mediterranean countries (ISCRAMMed 2014).
- Gimenez, R., Hernantes, J. and Sarriegi, J. M. (2014), Developing Communities of Practice in emergency management. ELITE final Conference. Warsaw
- Goujon, B. (2014), Determination of criteria to describe best practices. ELITE final Conference. Warsaw

All abstracts of the articles presented during the conference were sent for review to International Journal of Disaster Resilience in the Built Environment (IJDRBE). Chosen articles will be published in the journal, after successful review process. Editors accepted following abstracts to be reviewed afterwards:

- Maal M., Wilson-North M. (2014) Social media in crisis communication. The “do’s” and “don’ts”
- Dolce M., Goretti A. (2014) Lessons learned and preparedness in international interventions on post-earthquake building safety assessment
- Rainone M., Vessia G., Weaver C., Signanini P. (2014) The 2009 L’Aquila earthquake: a wasted opportunity to improve the seismic risk management from Italian strong earthquakes
- Grunnan T., Maal M. (2014) Creating a holistic framework for lessons learned reporting in crisis management
- Labaka L., Hernantes J., Sarriegi J.M. (2014) Resilience Framework for Critical Infrastructures
- Lauge A., Hernantes J., Sarriegi J.M. (2014) Disasters impact analysis for crisis management improvement
- Kowalski S., Grunnan T., Maal M. -(2014) A socio-technical Model of Post Disaster and Crisis Management Learning Process

After the project is over and all tangible results are available, consortium members will also prepare articles in national languages and publish them in magazines in their countries to reach wider audiences, which might not hear about the project before. It will encourage first responders, stakeholders and experts to join the Community of Practice, especially knowing they might find some materials written in their national languages within the living document.

Each partner will be responsible for identifying appropriate magazine of national or regional impact. Preliminarily identified magazines are as follows: Przegląd Pożarniczy (Fire Protection Review) – Poland; Emergency and/or Civil Protection Magazines: "La Protezione Civile Italiana", "Protezione Civile - Magazine del Dipartimento Nazionale di Protezione Civile", "112 Emergencies", "Anci Rivista" – Italy; On line magazines or web site: "Il Giornale della Protezione Civile", "Portale Sistema Protezione Civile", "Web Site Disater Manager", "Web Site of National ANCI" - Italy; “Samfunnssikkerhet” (Societal Security) issued by Norwegian Directorate for Civil Protection (DSB) - Norway etc.

Dissemination activities with other projects

ELITE Project consortium has developed dissemination activities in order to create synergies with similar research projects funded by FP7 programme.

Coordinators of projects such as BRIDGE, HARMONISE, ACRIMAS, RAMSES and CIPRNet have been contacted and all of them have been provided with a username and a password to share their deliverables and articles through the ELITE living document.

ELITE consortium contacted the coordinator of BRIDGE project Dag Ausen. His answer was very positive since they committed to use the ELITE living document as a dissemination channel to publish this project deliverables. Two members of this project consortium (Pär Eriksson from FOI and Michel Tanas from ITTI) registered to attend the ELITE final conference in Warsaw.

Erich Rome, as coordinator of CIPRNet project, showed interest in collaborating with ELITE Project and as a result, the link to ELITE Project has already inserted on CIPRNet's website, in the Links section (https://www.ciprnet.eu/links.html).

A narrow relationship exists between ELITE project consortium and HARMONISE project. TECNUN as coordinator of ELITE Project, carried out a presentation of the results of the ELITE Project in the City of Bilbao (partner of the HARMONISE project) and opportunities for future collaborations were also identified in this meeting.

Contact details

The project web-page can be accessed from: http://www.elite-eu.org/

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