Development of a Virtual Community of Practice on Natural Disasters

Raquel Gimenez
Tecnun, University of Navarra
rgimenez@tecnun.es

Leire Labaka
Tecnun, University of Navarra
llabaka@tecnun.es

Jose Mari Sarriegi
Tecnun, University of Navarra
jmsarriegi@tecnun.es

Josune Hernantes
Tecnun, University of Navarra
jhernantes@tecnun.es

ABSTRACT

This research identifies from literature principles of successful Virtual Communities of Practice (VCoPs) and explains how they have been fulfilled in the development of a VCoP that aims at contributing to knowledge sharing on natural disasters. The developed VCoP involves 70 experts in dealing with natural disasters from different hierarchical levels, organizations and nationalities of Europe. The VCoP has been developed within a European project from the 7th framework program. During the project three workshops were arranged for the members of the VCoP to know each other and to develop a living document. The living document is a web based tool used by the VCoP to share documents and insights, and it helps VCoP members networking. This paper provides direction for developing a VCoP to exchange lessons learned reports among crisis managers and first responders, and it identifies barriers that hinder the use of the living document.

Keywords

Virtual Communities of Practice (VCoPs), knowledge sharing, natural disasters, crisis management, lessons learned.

INTRODUCTION

Before, during, and after major disasters, coordination of emergency response is an enormous problem due to the number of individuals and organizations involved in the response (Jaeger, Shneiderman, Fleischmann, Preece, Qu and Fei, 2007). Response organizations range from formal to spontaneous and belong to all levels of public affiliation, as well as private and voluntary NGOs (Granot, 1998). After a disaster, the organizations that have taken part make a huge effort in identifying lessons learned with the objectives of both to avoid duplicating mistakes and to be able to repeat successes (Crichton, Ramsay and Kelly, 2009; Elliot, 2008). Lessons learned reports document what happened and include accounts of actions and problems encountered (Donahue and Tuohy, 2006). In many cases, organizations prepare their own lessons learned reports, without consulting each other and ignoring the relationships and synergies among them. As a result, there are many reports available for a given incident that have not been shared among organizations (Donahue and Tuohy, 2006). In this context, the role of Communities of Practice (CoPs) as knowledge sharing and learning enabler can enhance knowledge sharing and collaborating among organizations (Wenger, 1998; Wenger, McDermott and Snyder, 2002). CoPs have been described as groups of people "informally bound together by shared expertise and passion for a joint enterprise" (Wenger and Snyder, 2000, pp. 139). CoPs provide a rich locus for creating and sharing knowledge

both within and between organizations (Brown and Duguid, 1991; Lesser and Everest, 2001). Increasingly CoPs move online and are referred to as Virtual Communities of Practice (VCoPs). VCoPs in addition to using traditional means of communication such as meetings and newsletters rely on information and communication technologies (Turoff and Hiltz, 2009).

In this paper, we explore the development of a VCoP to improve the knowledge sharing on natural disasters among European stakeholders and organizations. The VCoP is assembled around a living document and has been developed within a European project from the 7th framework program called ELITE. To guarantee the success of the ELITE VCoP and living document, first this paper revises the principles of successful VCoPs that have been identified in literature and then, it explains how these principles have been fulfilled in the development of the ELITE VCoP. This paper is structured as follows. The second section presents a literature review of the principles of successful VCoPs and groups them according to their similarities. The third section describes how the identified principles have been fulfilled in the development of the ELITE VCoP and living document. Section four describes the validation exercise of the living document and the results of a survey about the ease of use and usefulness of the functionalities of the living document. Section five presents the main barriers encountered by VCoP members to contribute to the living document. Finally, the main conclusions, limitations, and future research lines are presented.

LITERATURE REVIEW

Many organizations across the crisis management disciplines have formal procedures for identifying, documenting, and disseminating lessons from past crises with the objective of learning from experience and improving future responses (Donahue and Tuohy, 2006). On the one hand, drawing lessons for the future requires reflecting on crisis experiences and developing action plans based on the interpretations of experiences. On the other hand, lessons learned from past crisis experiences are used by organizations as a guide for current action (Wang, 2008). Lessons learned reports are applicable not only to the organization but also to other incident responses that cross organizational boundaries and involve multiple agencies (Crichton, Ramsay and Kelly, 2009). Nevertheless, lessons learned reports are often owned and written by a single organization, rather than through an inter-organization process (Donahue and Tuohy, 2006). In fact, "lessons learned from past experiences include the need for a feedback mechanism in a support system so that the processes of an event can be critiqued and further utilized to promote learning from failures" (Van de Walle, Turoff and Hiltz, 2009, pp. 376).

CoPs are considered as suitable instruments to create, nurture and manage knowledge, due to the successful way in which their members share the experiences or advice (Wenger, 1998). CoPs can evolve either from initial informal contact between members or from an official imposed grouping (Probst and Borzillo, 2008). Furthermore, they provide an appropriate structural model for cross-agency and cross-sector collaborations (Snyder and de Souza Briggs, 2004). Virtual Communities of Practice (VCoPs) are developed from the more established concept of CoPs (Tickle, Adebanjo and Michaelides, 2011) and share many of the features of CoPs (Brown and Duguid, 1991). In fact, the main difference is that VCoPs face additional challenges as their members need to be comfortable participating through the tool of the community, which involves little or no face-to-face communication (Ardichvili, Page and Wentling, 2003; Tickle et al., 2011). Herranz, Diez, Diaz, and Hiltz, (2012) consider the design of specific platforms that support VCoPs in the emergency context as a way of enhancing the participation. Other authors such as McDermott (1999), McDermott (2000), Probst and Borzillo (2008) and Wenger et al., (2002) focus on the design of effective and successful CoPs providing specific guidelines. This paper defines nine principles that help to classify these guidelines based on their similarity. Below, the explanation of the nine principles and the classification of the guidelines identified in the literature are presented (see Table 1).

- **Coordinating the CoP:** Building a community usually starts with finding coordinators who either have important specialized knowledge or who are well-connected and influential members of that network (McDermott, 2000). Furthermore, coordinators have an important role to create successful CoPs by supporting the development and sustaining the activities of the members (Cox, 2005; Snyder and de Souza Briggs, 2004; Wenger et al., 2002).
- **Developing value:** Participation in a CoP is voluntary, thus, the added value that the CoP provides is what holds members together (Wenger et al., 2002). "Rather than attempting to determine their expected value in advance, CoPs need to create events, activities, and relationships that help their potential value emerge and enable their members to discover new ways to harvest it" (Wenger et al., 2002, pp. 60).
- **Defining objectives:** Evidence suggests that setting clear and measurable objectives provides CoP members

with a concrete direction to follow. Actually, the existence of clear objectives enables a more targeted development and sharing of best practices between members, who know precisely what results are expected (Probst and Borzillo, 2008).

- **Involving a multidisciplinary group of members:** "People participate in communities for different reasons, some because the community directly provides value, some for the personal connection, and others for the opportunity to improve their skills" (Wenger et al., 2002, pp.55). It is important to develop an active group of members who not only are more likely to contribute but often feel responsible to help the rest of the members by inviting or easing participation of people they know (McDermott, 2000).
- **Building trust:** It is more likely that members feel more comfortable working in a CoP, which includes a substantial number of already known to them people (Ardichvili et al., 2003). Face-to-face interaction can play a vital role in CoPs, since it increases trust among their members to share information (Hildreth, Wright and Kimble, 1999).
- **Facilitating contribution:** The tool of the CoP should make it easy for its members to connect with each other, contribute to and use information from the community's knowledge base (McDermott, 2000). In fact, CoPs that use tools that are based on the community's evolving needs are more successful in fulfilling requirements of their members (Tickle et al., 2011).
- **Providing communication channels:** Most CoPs have many different kinds of knowledge to share such as data, documents and know-how. Thus, multiple ways to connect and share knowledge need to be provided (McDermott, 1999). In fact, successful CoPs foster relationships among their members, offering one-to-one, and group exchanges of information (McDermott, 2000; Wenger et al., 2002).
- **Receiving external advice:** Inviting external experts to the CoP's meetings and discussion where they are requested to share their ideas, insights, and experience in the field, has a positive impact on best practice development and sharing among members of the CoP (Probst and Borzillo, 2008).
- **Showing visible results***:* Showing to the members of the CoP reports shared by other members, in addition to providing information related to the community's results, news, and members is helpful to encourage participation (McDermott, 2000).

Principles	Mc Dermott (1999)	Mc Dermott (2000)	Wenger, McDermott and Snyder (2002)	Probst and Borzillo (2008)
Coordinating the CoP.		-Find a well-respected community member to coordinate the CoP.		-CoP leader must have a promoter role. -Having a CoP leader to guarantee activity.
Developing value.	- Build CoPs on strategic important topics.		- Focus on value.	-Stick to a clear mission to develop and share practices.
Defining objectives.			- Design for evolution.	-Divide objectives into sub groups.
Involving a multidisciplinary group of members.	- Build enough background context for people to understand each other.	- Involve thought leaders. -Develop an active passionate group.	- Invite different levels of participation.	-Form governance committees with CoP leaders.
Building trust.		- Maintain personal contact among members.	- Combine familiarity and excitement.	-Overcome hierarchy related pressures so that members are not judged.

Facilitating contribution.	- Help people pull insights from each other when they need it, rather than pushing it out of them.	- Make it easy to contribute and access the CoP's knowledge and practices. - Make sure people have time and encouragement to participate.	- Create a rhythm for the CoP.	
Receiving external advice.			- Open a dialogue between inside and outside perspectives.	- Feed with external expertise. - Provide access to other networks.
Providing communication channels.	- Use both face-to-face and information systems to share insights. - Use multiple forums to sharing knowledge.	- Create forums for thinking. - Create dialogue in the CoP forums.	- Develop both public and private spaces.	
Showing visible results.				-Illustrate results to members. -Measurable performance.

Table 1. Principles of successful CoPs.

The following section describes the development of a VCoP that groups together crisis managers and first responders to facilitate the collaboration and exchange of knowledge on natural disasters through the living document tool. In particular, the actions carried out to ensure the accomplishment of the nine principles in the development of the VCoP are explained.

DEVELOPMENT OF THE ELITE VCOP

ELITE (Elicit to learn on post crucial lessons) is a European project funded by the 7th framework program from January 2013 to June 2014 that aims at contributing to the knowledge sharing on natural disasters. The ELITE project has grouped together within the ELITE VCoP 70 experts interested in mutual learning and exchange of experiences and information on natural disasters such as fires, earthquakes and floods. The ELITE VCoP involves a group of multidisciplinary experts such as first responders, researchers, consultants, agents from civil protection, government and training organizations. Moreover, these experts come from different organizations and countries of Europe, which increases the potential knowledge about why things are done differently in particular countries.

The development of the ELITE VCoP was done according to a multi-stage research program that included three scenario-based workshops, a validation exercise, and a final survey. The methodology followed in the scenario-based workshops consisted of presenting a hypothetical scenario in the form of a written case that was used as a starting point of brainstorming activities. As a result of the brainstorming activities, the functionalities for the living document to be a useful tool for searching information, developing and sharing lessons learned reports were identified. The living document is a web-based tool used by the ELITE VCoP members as a repository of lessons learned and best practices reports. It is maintained according to a wiki philosophy, where the members of the ELITE VCoP, update and maintain crisis management best practices and lessons learned. The living document is available at www.elite-eu.org/wiki/ and maintains the VCoP members connected through social media channels providing as well a source of knowledge. Figure 1 shows the interface of the living document.

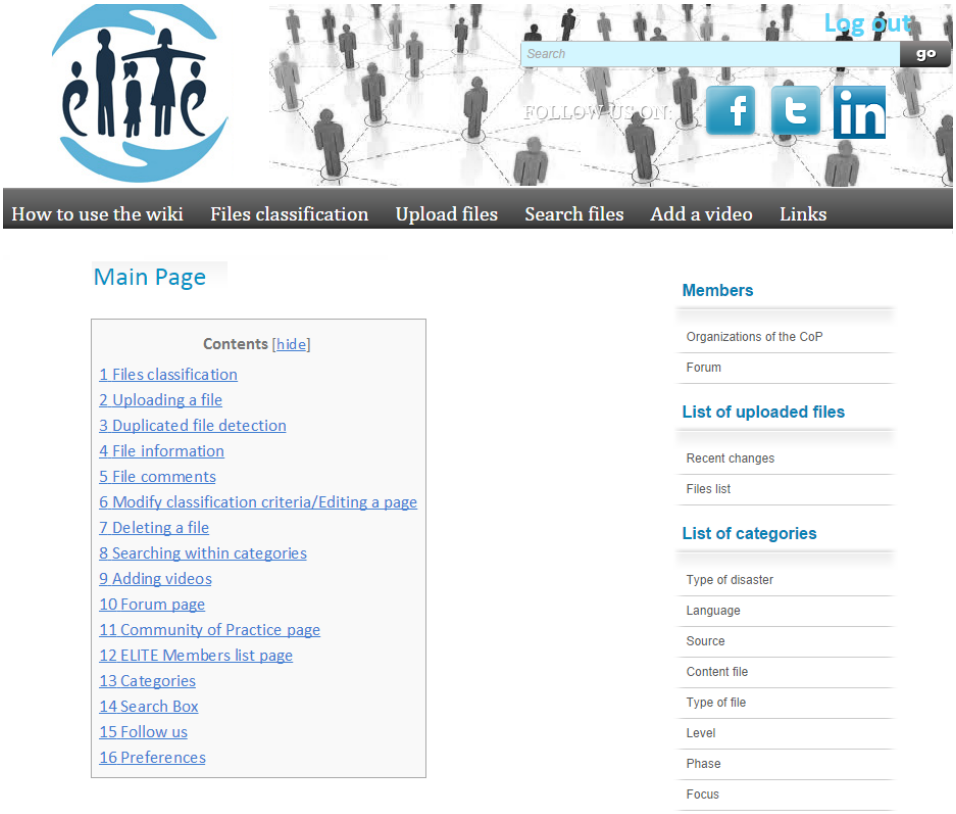

Figure 1. Interface of the living document.

Following is an account of how the nine principles presented in the literature review section have been fulfilled in the development of the ELITE VCoP. In particular, the actions that have been carried out to ensure the accomplishment of each principle are explained.

- **Coordinating the CoP:** The ELITE consortium is formed by nine partners, five of them are end-users and the other four researchers (Table 2). The consortium members have good relations with a multitude of end-users and experts all over Europe and are specialised in crisis management. The consortium was in charge of coordinating the ELITE project and the development of the ELITE VCoP. First, the consortium contacted experts to invite them to be part of the ELITE VCoP. Second, it organized the ELITE project's workshops and developed the living document. Concerning the living document, the ELITE consortium validated and reviewed the documents uploaded in it and promoted its continuity, informing the ELITE VCoP about the latest uploaded reports.

Consortium member	Country
Red Cross Vienna	Austria
International Search And Rescue I.S.A.R.-Germany	Germany
Main School of Fire Service	Poland
Department of Earth and Environment of the National Research Council	Italy
National Association of Italian Municipalities – Umbria	Italy
Tecnun University of Navarra	Spain
Norwegian Defence Research Establishment	Norway
Gjøvik University College	Norway
Thales Research & Technology	France

Table 2. Consortium members of the ELITE project.

- **Developing value:** The value of the living document relies on the nature of the information such as other members' developed lessons learned and best practices reports on natural disasters. Thus, the living document does not compete with common search engines (e. g. Google, Yahoo, Bing) where a search produces a huge list of documents from numerous sources that have not been validated, and therefore, a major effort needs to be done in order to reach conclusions (Turoff and Hiltz, 2009). In contrast, a search of information in the living document provides the user with a list of qualified and verified documents that have been commented on and rated according to ELITE VCoP members' opinions. This information is valuable as an indicator of the

usefulness of each document. Furthermore, the type of information is another major distinction of the living document. While other information systems in crisis management (e. g. GDACS, VOSOCC) are oriented to be useful during disaster peak, the living document is mainly focused on documents for the pre and post stages of a disaster.

- **Defining objectives:** Although the ELITE project's main objective is to contribute to sharing knowledge on natural disasters, the ELITE VCoP has focused on contributing to the information on the most common natural disasters in Europe (fires, earthquakes, and floods) and insights that are common and apply across these disaster types. This has been done in several ways, through participation in three scenario-based workshops and through sharing documents and interacting in the living document.
- **Involving a multidisciplinary group of members:** During the ELITE project several European experts in disaster management were invited to be part of the ELITE VCoP and participate in the development of the living document. There were experts from tactical, strategic, or operational levels so, while some of them were interested in operational knowledge, others wanted more strategic advice. For this reason the living document needed to contain information from different approaches such as technical instructions, training guidelines, best practices and lessons learned reports, in addition to pictures and videos. Thanks to the variety of countries from which the experts came, diverse approaches and insights about the different policies and actions implemented in each country were gathered. Notwithstanding, this diversity of nationalities also brought language barriers since there were some experts who had difficulties in speaking in English and in communicating their ideas.
- **Building trust:** The ELITE VCoP aims at being a criticism-free community that contributes to diminishing fear of sharing information, as the objective of their publication is learning and not pursuing potential responsible agents of past mistakes. In order to build trust among the ELITE VCoP members, they were invited to participate in three scenario-based workshops on fires, floods and earthquakes where they had the opportunity to present members to each other. The first workshop was based on fires and took place on January 16th and 17th 2013. The second workshop focused on earthquakes and was held on June 25th and 26th 2013. Finally, the workshop based on floods was held on October 8th and 9th 2013. Each workshop lasted two days and consisted of small group exercises and brainstorming sessions in which members of the VCoP participated actively, sharing their knowledge and experiences and identifying functionalities that might be useful for the living document. In addition to contributing to the development of the living document, workshops also provided a networking opportunity for participants as they were able to introduce their agencies, organization or institutions.
- **Facilitating contribution:** The living document was developed according to an agile methodology. Agile methodology approach is useful for supporting the evolving needs of the VCoP members (Tickle et al., 2011). In each workshop, the living document and its functionalities were explained to the VCoP members. After the explanations, participants of the workshops tested the functionalities so they could suggest improvements and new functionalities to be included. All of the experts that form the ELITE VCoP are provided with a personal account and a password that allows them to upload and classify new documents according to ten categories. Categories were defined by the ELITE VCoP members during the workshops and enable them to search and classify documents in a straightforward way. Category 1 determines the type of disaster on which the documents focus on and category 2 the language in which they are written. Category 3 classifies documents according to the type of file (document, picture, article…) and category 4 according the content (best practice, case study, guidelines…). Category 5 specifies at which level the document is oriented (tactical, operational, and strategic) and category 6 specifies the phase (analysis, preparation, response, recovery). Category 7 groups documents according to their focus (situation awareness, logistics, communication…) and category 8 according to the assets involved (human, economic…). Category 9 provides information about the people involved and category 10 about the geographic location. Moreover, the living document provides templates to make easier creation of structured and well-completed reports and a commenting and rating functionality. In this way, VCoP members can give their feedback about the quality of each of the uploaded documents and can view the comments made by other members.
- **Receiving external advice**: The three scenario-workshops arranged within the ELITE project included demonstrations and relevant lectures from keynote speakers such as from the United Nations Office for Coordination of Humanitarian Affairs or from the Union Civil Protection Mechanism.
- **Providing communication channels:** The living document integrates with social media channels to strengthen professional and personal relations among the members of the VCoP. Three different social media channels are used to disseminate the knowledge and the results of the ELITE 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 is posted in the channels to inform the community about the events within the project, the updates, and the main results obtained. Moreover, the living document allows members of the VCoP

to create a user profile and to contribute to discussion boards. The social profile includes personal and professional information about each member and facilitates the identification of members with similar interests and background. Discussion boards are used to discuss, share experiences, and receive information from different points of views.

- **Showing visible results:** During the ELITE project newsletters were sent to members of the VCoP. In total, 5 newsletters were published. Newsletters informed members of the ELITE VCoP about the evolution of the project's results as well as information regarding dissemination activities that were realized within the project. Furthermore, the ELITE project includes a web page http://www.elite-eu.org/results.html in which the reports and newsletters developed during the project are published.

VALIDATION EXERCISE OF THE LIVING DOCUMENT

After carrying out three scenario-based workshops, on January 28th and 29th 2014, 18 members of the ELITE VCoP were invited to participate in an exercise in order to test and validate the living document. The exercise consisted of completing a report from the 2011 Japanese disaster for which the primary source of information was the living document. The aim of the exercise was to evaluate ease of use and usefulness of the living document for searching information, developing and sharing lessons learned reports. In order to successfully complete the exercise, three groups were set up. Groups were formed by experts of different background and from different levels in the crisis management hierarchy.

In the first part of the exercise, each group had to agree on the structure of their report and then, a responsible person from each group presented the chosen structure to the rest of the participants. In the second part, the groups had time to search for information in the living document in order to elaborate the report. The living document functionalities used by the participants were uploading, classifying, rating and commenting. Participants considered that uploading and classifying documents in categories is useful as they could then search for documents based on their interest. Regarding the possibility of commenting on and rating documents, some participants expressed their concern about the possibility that some comments posted by other members could contain useless information. Nevertheless, as other participants argued, the possibility of commenting on documents is necessary to justify the rating given to the documents.

At the end of the exercise, each group presented their report and uploaded it in the living document in order to share it with the rest of the groups. The three groups managed to upload the report successfully and they all agreed that the templates included in the living document enhanced the creation of structured reports. Once the reports were uploaded, experts were asked to give their feedback and propose improvements for the living document. The main problem that participants detected was the lack of a category that specified the source of the documents. For this reason, participants suggested to include a category to classify documents depending on the source and credibility of the information contained in them. This new category would specify if the source of the documents is from the government, agencies, or from other parties involved.

Afterwards, a survey about the ease of use and usefulness of the living document was sent to the 18 participants. In total 16 responses were received. In the survey, participants were asked to use a 4-point scale (4-very clear, 3-clear enough, 2-slightly clear, 1-not clear) to evaluate the ease of use and usefulness of the functionalities included in the living document. Figure 2 presents the percentage distribution of the answers of the survey. 94% of the responses considered the uploading functionality very clear or clear enough. Furthermore, the experts provided several comments regarding this option. "*Lesson learned reports need to be implemented in the procedures of the organizations and they should be uploaded in a web in order for other organizations to review and improve their content. For this reason the possibility that provides the living document to upload documents is a good idea*". Concerning the classification of the documents, 56% of the responders considered the way of classifying documents very clear or clear enough. On the one hand, participants revealed that one of the inconveniences of the classification of documents is that it is not immediate and the person who uploads a document has to spend time deciding which categories apply to the document. On the other hand, another issue related the classification of documents is the fact that the categories that have been assigned to a document can only be modified by the person who has uploaded it. Regarding this issue, participants suggested that there should be a possibility to send an e-mail to the person who uploaded the document suggesting the changes.

Finally, 63% of the responders considered commenting on and rating documents very clear or clear enough. Some participants were concerned about the subjective evaluation of the documents, as it depends on the interests of each person. A participant commented that *"I cannot judge the relevance of a document as it depends on the perspective with which is regarded. Different target groups search for different documents and information. Thus, no single document is irrelevant for all target groups".*

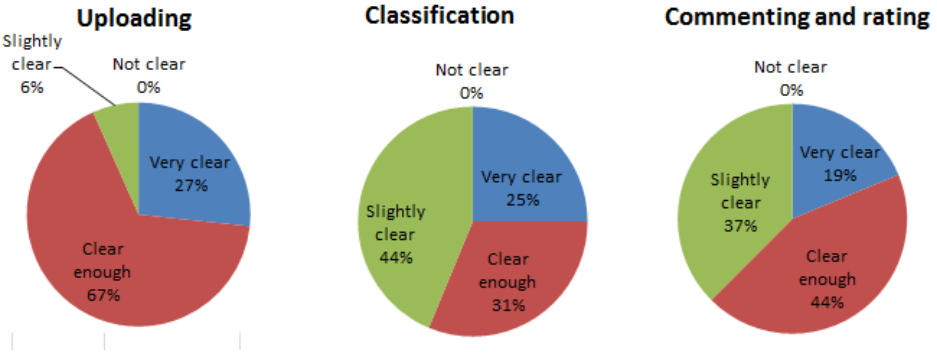

Figure 2. Percentage distribution of the answers of the survey.

As the conclusion of the validation exercise, the participants agreed that the living document is a useful tool to search for relevant documents due to the truthfulness and type of the information contained in it. Furthermore, the networking possibilities included in the living document were considered valuable to maintain personal contact with other member of the ELITE VCoP. As a participant of the exercise commented "*The platform of the Elite Wiki can become very useful and handy for the end-user. Let's compare the ELITE Wiki with a toolbox. Right now what we have everything on site and we have to fill the toolbox".*

BARRIERS TO USE THE LIVING DOCUMENT

Previous studies in the literature have analysed examples of VCoPs that have not been as successful as expected and they have identified limitations on their use (Ardichvili et al., 2003; Probst et al., 2008; Tickle et al., 2011). Nevertheless, these studies do not focus on analysing the barriers that constrain the use of VCoPs in the crisis management field. In order to identify the specific barriers that lead to avoidance of VCoPs in this field a survey was conducted with the members of the ELITE VCoP. The survey was completed 45 experts (see Table 3). Although the barriers identified in the survey are related to the use of the ELITE living document, they may also be present in other VCoPs in the field of crisis management.

Background of participants	Number of responses	Percentage of responses
First responders	5	11,1 %
Emergency planning/management	8	17,8 %
Civil protection	13	28,9 %
Academic/Researcher	16	35,6 %
Volunteer	3	6,6 %
Total	**45**	**100%**

Table 3: Respondents to the survey.

As a result of the survey, five barriers were identified: (1) lack of incentives from the organization, (2) insufficient benefits in comparison to the effort and time required, (3) confidentiality issues, (4) difficulties with technology adoption, and (5) lack of time. The main barrier for 40% of the participants is the lack of incentives for contributing to the VCoP from the organization in which they work. As a participant commented *"many organizations in the emergency response area will allow their employees to look for information but discourage them from posting anything without getting specific clearance first"*. As a solution to this barrier, participants suggested that organizations should consider that part of their employees' work is to share and collaborate with other experts. On the other hand, the majority of the participants rejected economic rewards as an appropriate measure to foster the participation in VCoPs. Another main barrier for 30% of the participants is insufficient benefits in comparison to the required effort and time. Regarding this barrier, experts commented that although they consider the living document is a useful tool to share lessons learned, the benefits are obtained in the long-term when a critical mass of information is already uploaded. In order to overcome this barrier, participants suggested that the ELITE VCoP should have a number of members responsible for updating continuously and adding new information to the VCoP. Moreover, 15% of the participants consider confidentiality issues an existing barrier in the field of crisis management. Participants recognised that they are reluctant to share lessons learned and information on past disasters publicly and that they limit to share it to already known contacts. As a possible solution to this barrier, participants suggested creating institutional norms to encourage knowledge sharing among different organizations that take part in a VCoP. Difficulties with technology adoption were found to be an existing barrier for 10% of the participants. As a participant commented "*I rely on already known*

search engines such as Google to search for information". Thus, in order to mitigate difficulties adopting a new technology, participants consider that providing support for technical issues and organizing periodic formative meetings could be helpful. Finally, lack of time to participate in VCoPs is a barrier for 5% of the participants. As a participant admitted *"it is hard to prepare information to share with international experts because frequently reports and best practices are written in different languages and the translation into English requires too much time and effort".* Regarding this barrier, participants agreed that organizations should allow their employees to spend part of their work schedule to enrich their knowledge and make contacts in VCoPs.

CONCLUSIONS, DISCUSSION AND LIMITATIONS

Crises experiences provide organizations and experts an exceptional opportunity to learn. By drawing from lessons learned from experiences in past disasters, organizations both aim at avoiding duplicating mistakes and repeating successes. Nevertheless, organizations are used to develop their own lessons learned reports which include both successes and failures, independently without sharing them with other organizations. Successful VCoPs can support their member's participation, collaboration and knowledge sharing without the need for being in the same place. ELITE project goes a step further towards building a VCoP and a living document developed by the end-users, for the end-users, through the end-users. The ELITE VCoP aims at enhancing the collaboration and exchange of knowledge on natural disasters among a multidisciplinary group of experts who come from different organizations and countries of Europe. Regarding the living document developed for the ELITE VCoP, a validation exercise was carried out with the members of the ELITE VCoP to test it and receive their feedback. As a result of the validation exercise, the living document was considered as an easy to use and useful tool to search for relevant documents due to the truthfulness and the type of the information contained in it. Nevertheless, it is important to highlight the existing limitations of this study. After the project ended, some of the participants who were initially committed to contributing and using the living document were reluctant to share documents and use it. As a result of a survey that was conducted with the members of the ELITE VCoP to identify the barriers of the living document, lack of incentives, insufficient benefits in comparison to the effort and time required, confidentiality issues, difficulties with technology adoption, and lack of time were the main barriers identified. In order to overcome these barriers, this study proposes a series of solutions that could be used to foster the participation in VCoPs. Nevertheless, further study is required to identify additional measures and how to accomplish them in practice.

ACKNOWLEDGMENTS

This research project has been supported by the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 312497.

REFERENCES

1. Ardichvili, A., Page, V. and Wentling, T. (2003) Motivation and barriers to participation in virtual knowledge-sharing communities of practice, *Journal of Knowledge Management*, 7, 1, 64-77.
2. Brown, J. S. and Duguid, P. (1991) Organizational learning and communities-of-practice: Toward a unified view of working, learning, and innovation, *Organization Science*, 2, 1, 40-57.
3. Cox, A. (2005) What are communities of practice? A comparative review of four seminal works, *Journal of Information Science*, 31, 6, 527-540.
4. Crichton, M.T., Ramsay, C. G. and Kelly, T. (2009) Enhancing organizational resilience through emergency planning: Learnings from Cross-Sectoral lessons, *Journal of Contingencies and Crisis Management*, 17, 24-37.
5. Donahue, A. K. and Tuohy, R. V. (2006) Lessons We Don't Learn A Study of the Lessons of Disasters, Why We Repeat Them, and How We Can Learn Them, Naval Postgraduate School, Center for Homeland Defense and Security, Monterey, California.
6. Elliott, D. (2009) The failure of organizational learning from crisis–a matter of life and death?, *Journal of Contingencies and Crisis Management*, 17, 3, 157-168.
7. Granot, H. (1999). Emergency inter-organizational relationships. *Disaster Prevention and Management*, 8, 1, 21-26.
8. Herranz, S., Díez, D., Díaz, P. and Hiltz, S. R. (2012) Exploring the Design of Technological Platforms for

Virtual Communities of Practice. *Proceedings of the 9th International Conference on Information Systems for Crisis Response and Management (ISCRAM).* Vancouver, Canada.

9. Hildreth, P., Wright, P. and Kimble, C. (1999) Knowledge management: Are we missing something?, *Proceedings of the 4th UKAIS Conference*, York, UK, 347-356.
10. Jaeger, P. T., Shneiderman, B., Fleischmann, K. R, Preece, J., Qu, Y., and Fei Wu, P. (2007) Community response grids: E-government, social networks, and effective emergency management, *Telecommunications Policy*, 31, 10, 592-604.
11. Kimble, C. and Hildreth, P. (2005) Dualities, distributed communities of practice and knowledge management, *Journal of Knowledge Management*, 9, 4, 102-113.
12. Lesser, E. and Everest, K. (2001) Using Communities of Practice to Manage Intellectual Capital-Improving an organization's use of knowledge assets, *Ivey Business Journal*, *65*, 4, 37-47.
13. McDermott, R. (1999). Nurturing three-dimensional communities of practice, *Knowledge Management Review*, 26-29.
14. McDermott, R. (2000) Knowing in community, *IHRIM Journal*, 1-12
15. Probst, G. and Borzillo, S. (2008) Why communities of practice succeed and why they fail, *European Management Journal*, 26, 5, 335-347.
16. Snyder, W.M. and de Souza Briggs, X. (2004*)* Communities of practice: A new tool for government managers. Collaboration: Using networks and partnerships, IBM Center for the Business of Government, 171-272.
17. Tickle, M., Adebanjo, D. and Michaelides, Z. (2011) Developmental approaches to B2B virtual communities, *Technovation*, 31, 7, 296-308.
18. Turoff, M. and Hiltz, S.R. (2009) The future of professional communities of practice, *Designing E-business systems. markets, services, and networks*, 144-158.
19. Van de Walle, B., Turoff, M., and Hiltz, S. R. (2009) Information systems for emergency management, Advances in Management Information Systems, ME Sharpe.
20. Wang, J. (2008) Developing organizational learning capacity in crisis management, *Advances in developing human resources*, 10, 3, 425-445.
21. Wenger, E., and Snyder, W. M. (2000) Communities of practice: The organizational frontier, Harvard business review, 78, 1, 139-146.
22. Wenger E. (1998) Communities of practice: Learning, meaning, and identity, Cambridge university press.
23. Wenger, E., McDermott, R. and Snyder, W. M. (2002) Seven principles for cultivating communities of practice. Cultivating Communities of Practice: A Guide to Managing Knowledge, Harvard Business Press.