

The role of the public in the improvement of emergency plans

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Abstract. The emergency plan is a key element to consider in the emergency response because contains the response procedures to be executed and the information required to make decisions. We believe the citizens have valuable information (*tacit knowledge*) which may be analyzed and incorporated to the emergency plans to improve them and reduce the information handled during the emergencies. In this paper we propose a public participation approach for eliciting information from the citizens using collaborative tools and improve the emergency plans.

1 Motivation

Emergency response is among the most critical activities performed by humans: it involves processes where decisions affecting lives and property must be made in a short amount of time. These decisions are based on information coming from different sources, which must be accessed and combined adequately to avoid both information gaps and overload. Moreover, different decision makers may require different information elements or different views of information.

The basis of decision making and action during emergency response is the emergency response plan (or emergency plan, for short), a document that includes procedures to be executed in response to the event of an incident, plus all the

information required to make decisions (such as maps, pictures, videos, etc.). The emergency plan directs respondents towards the event location, defines the procedures in response to each possible incident, and provides the information needed to perform the response actions.

However, having an emergency plan may not be enough. As pointed out in (Palen 2007) a critical part of the response efforts lies with the individuals affected by the emergency. In most cases, the very first response actions are performed by in-place victims or passers-by. They are on location at the emergency site, and their actions may make rescue efforts easier or harder depending on what actions they take. Unfortunately, and despite best efforts by emergency management teams, citizens are usually not well acquainted with emergency plans, and do not have knowledge that may be helpful in case of crises.

While respondents get technical knowledge about the emergency site and response procedures from the emergency plan, individuals living in the area have a different type of knowledge: as they inhabit these spaces on a daily basis, they will likely develop an instinctive response to emergency situations based on their daily interactions with the environment. In other words: they have knowledge different from, and possibly more accurate than, the knowledge contained in the emergency plan. We believe this tacit knowledge is valuable for emergency response, and should therefore be gathered from them to aid in response efforts.

We have been studying ways of filling the gap between the knowledge contained in the emergency plan and the one provided by individuals. Our main goal is to investigate and devise methods to obtain information from the public during the planning process. To that end, we rely on Public Participation mechanisms. These are usually applied by the government to elicit opinions or desires of the population, using different strategies such as panels, surveys, public hearings, and others (Abelson 2001). We believe that the implementation of public consultation processes may generate information not included in the initial version of the emergency plan, which may lead to an overall improvement and a higher familiarity of individuals with it.

During emergency response, affected citizens can generate fresh information from the location of an incident. This type of contribution has been shown to play a key role in large natural disasters such as the Katrina hurricane (Palen 2007) or wildfires in the USA (Sutton 2008). On the other hand, public contribution may also be used to improve response plans and overall safety conditions: those who inhabit the space on a daily basis can provide valuable feedback about the emergency plan for that space, and its applicability. These individuals can generate important contextual information (called local knowledge in (Brabham 2009)) that may lead to improvement of the emergency plans and safer conditions long before the occurrence of actual emergencies.

To reduce information overload and simplify context management during emergency response, it is necessary to pre-select from the multiple information sources. Contextual information is not part of the abstract level emergency plan, but could be incorporated to the emergency plans before an emergency occurs. For instance, consider a street map, included in an emergency plan, with instructions for mobile rescue teams to get to a specific building. These directions may be obtained from a navigation application. However, there may be some objects on the street (e.g. large recycling bins) that may make the route unsuitable for large trucks. If this issue is not verified beforehand, it will appear as contextual information when an emergency happens, requiring on the fly decisions and associated delays. Obviously, performing exhaustive local checks is difficult and costly, but can easily be done by the people residing in the area. Unlike information generated during the response stages, this type of contextual information may be analyzed and eventually incorporated in a revised version of the emergency plan, reducing the amount of information that needs to be handled during response.

2 Public participation for emergency plan improvement

Rowe and Frewer (Rowe 2000) point out that citizens' views of risks often are different than that of risk management experts, and consider this alternative viewpoint valuable in several stages of the risk management process. We believe this also holds for the emergency management field. Thus, we want to take advantage of citizens' contribution at different stages of the emergency management lifecycle. So far, most attempts to use knowledge generated by the public have focused on the response phase, with numerous studies about the use of social networks as the main communication channel (a selection can be found at the *idisaster 2.0* blog, <http://idisaster.wordpress.com/bibliography/>). Public participation in other stages of the lifecycle, especially planning, has not been extensively explored.

Our approach is summarized in the concept map of Figure 1, which extends the taxonomy described in (Diniz 2008). Black nodes and edges represent the different types of knowledge handled during emergency responses. Formal knowledge is explicit in different forms, particularly the emergency plan. Contextual knowledge is gathered during the response from the emergency scenario (e.g. number of people affected, status of a bridge, and the like). Emergency planners design and implement emergency plans as the aggregation of formal and contextual knowledge elements (Canós 2010). Individual experience and know how is called previous personal knowledge, and is tacit in nature. We have divided it in two types, namely expert and naïve knowledge: the former is

the one of respondents, and the latter that of the citizens that inhabit in the emergency plan's area of influence. These are the main actors of the public participation processes. Citizens have personal knowledge that they use in the public participation activities, but this knowledge is of a different nature than that of respondents: it relates to "local" aspects of specific area the citizens live in. Of course, both knowledge sets may overlap in some cases.

The bottom part of Figure 1 (in green) summarizes the outcome of public participation in emergency plan improvement. The emergency plan is initially built by experts, who integrate the formal and composite knowledge elements of the emergency plan. The emergency plan is then exposed to citizens who can, in turn, produce feedback that may eventually be used by planners to improve the emergency plan. From a different perspective, a public participation process transforms citizens' knowledge into formal and/or composite knowledge, as the thick dotted red line in Figure 1 illustrates.

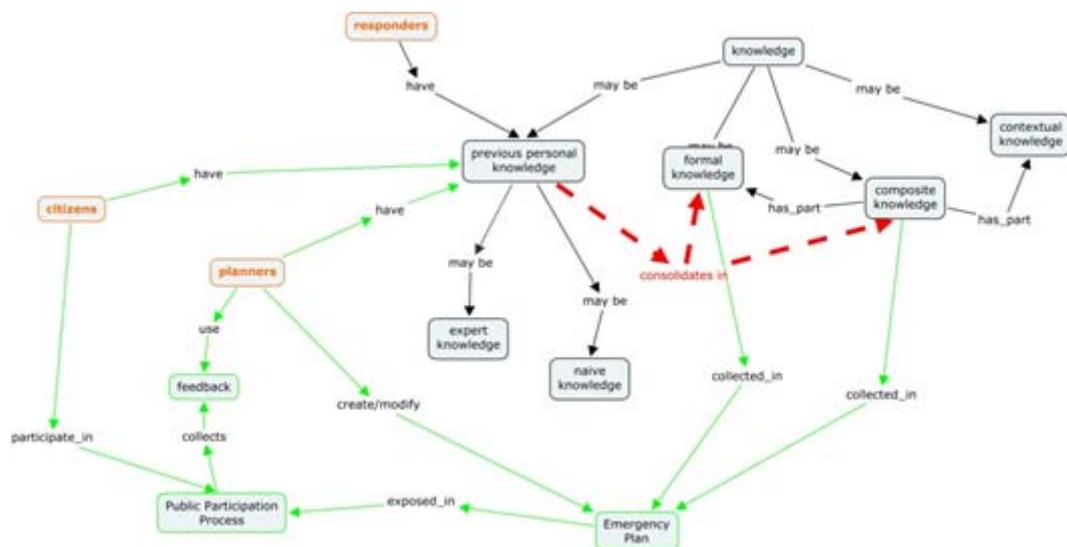


Figure 1. Public participation processes in the improvement of emergency plans

3 A process for eliciting information from the public

Public participation involves citizens in a process to elicit feedback from them, which can then be used by emergency planners. Citizens, however, may have little or no knowledge of the emergency domain. Thus, it is desirable to have them familiarize themselves with disaster situations, reflect on emergencies, in order to be better prepared to criticize and provide feedback to the planners. Additionally, given the potentially large number of people involved, this process should be supported by appropriate tools. Collaborative tools that allow interaction between participants are better, as they enable participants to discuss and reflect about each

other's suggestions. Therefore, we designed a four-step process to elicit information from naïve respondents, shown in Figure 2.

Our first concern was that naïve respondents would be unaware of the processes and potential emergency situations they may be faced with. A frequent issue with emergency response is that no one really worries about an emergency until it actually happens. This makes it harder for people to respond when it does happen.

Thus, our process starts with a familiarization stage, in which participants are led to think about emergencies and how they would act in certain situations. A reflection stage follows, where participants reflect about their chosen actions; think about alternatives and whether they should have done something different.

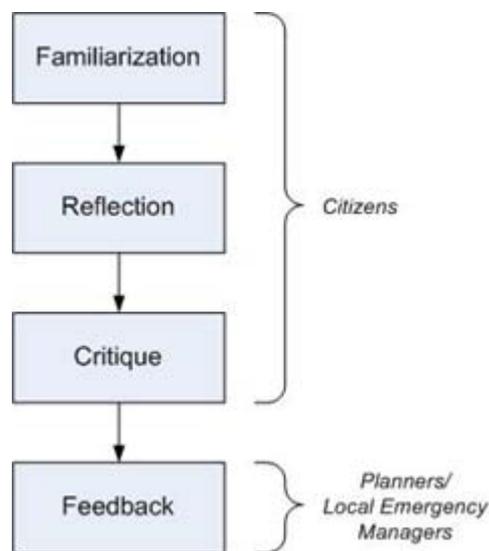


Figure 2 *Knowledge Elicitation Process*

Hopefully, these two initial stages should provide them with enough material to exercise criticism in the following stage: critique. Critique is the stage where participants actually provide feedback on the emergency plans. They use what they have learned and reflected about, and their newly acquired awareness of these situations, to provide critical comments on the emergency plan itself. These comments are then organized and given to experts to improve the emergency plans.

Given the amount of information that may be generated, this process should be supported by group interaction systems. There are different ways of gathering information from large groups of people, such as statistical, markets, deliberation and volunteerism (Sunstein 2006). Deliberation seems to be appropriate in this case, as it enables interaction between participants, including debate, improving reflection and collaboration.

4 Conclusion

We believe that non-expert knowledge can bring new insight to emergency planning processes. As a consequence, we are studying how citizens can cooperate to improve emergency plans by providing feedback. By doing so, we hope that significant pieces of previous personal knowledge become consolidated formal knowledge, reducing the amount of context to be handled during emergencies.

We devised a knowledge elicitation process to help participants reflect of the problem and learn something of the domain. We ran a preliminary case study using three different tools to gather public feedback on emergency plans. Results show that regular individuals have relevant information pertaining to emergency plan improvement. Not only are they capable of providing useful information, but also, through interaction and reflection, they became aware of what they did not know, and suggested improvements for emergency plan dissemination and security design, improving preparedness overall.

5 References

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