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From planning to resilience: The role (and value) of the emergency plan

M. Carmen Penadés *, Ana G. Núñez, José H. Canós

ISSI-DSIC, Universitat Politècnica de València, Spain

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ABSTRACT

The study of resilience in the emergency management field is nowadays in effervescence. Traditionally, the robustness of organizations against disasters is based on several pillars: equipment, staff training, organization and, especially, planning. All of these dimensions are aimed at increasing the preparedness and recovery of organizations against disasters. While the approaches to resilience in emergency management focus on the processes that implement these dimensions, we approach resilience-building processes from a different perspective: instead of focusing on planning-related activities, we pay attention to the principal outcome of such activities, namely emergency plan.

We show how the management of the emergency plan can contribute to reinforcing an organization's resilience. First, we identify the major resilience-related emergency plan components and suggest improved emergency plans that consider the characteristics that contribute to resilience. Secondly, we show how to reinforce the resilience of the organizations that have emergency plans. Our study is based on QuEP, a quality-based framework for the assessment and improvement of emergency plan management within organizations. We have extended and integrated the resilience characteristics as practices of the QuEP's maturity level hierarchy to make up QuEP + R. We describe its resilience model and give details of a supporting tool, currently under development.

1. Introduction and motivation

The growing frequency of natural and manmade disasters has raised the concern of communities about their capacity for response. As a consequence, these communities and their governments have turned their attention to the methods, techniques and tools for increasing their preparedness against all types of adverse events. The importance of the problem on a global level has triggered the development of a number of studies aimed at increasing communities' resilience, like The Hyogo Framework for Action 2005–2015 (UNISDR, 2005), created by the United Nations Organization. Most of these studies focus on disaster management and how organizations improve their responses to hazards. In (Manyena, 2006; Bhamra et al., 2011; Alexander, 2013) some resilience definitions are summarized and discussed in relation to disaster management.

Improving emergency preparedness has also been a long term goal of the Emergency Management community. In fact, it is generally agreed that preparedness is one of the main stages of the emergency management lifecycle (Blanchard, 2008; Lindsay, 2012). Although preparedness has planning as its main activity, it also includes resource management, potential threats identification and training, among others. The main outcome of the preparedness stage is the emergency plan, which is considered the central element of the entire emergency management lifecycle and the source of the formal knowledge managed during responses (Diniz et al., 2008).

Although McEntire et al. acknowledge the importance of emergency preparedness activities in this resilience building process (McEntire et al., 2002), the relationship between emergency preparedness and resilience building has not been made explicit in the literature. For instance, search in the ISCRAM Digital Library,[1] including the keyword "resilience" returned 40 papers out of 1261.[2] On the other hand, while 81 papers have "planning" as (part of) a keyword, only 3 papers also include "resilience".

Putting planning and resilience together yields a new perspective on the resilience building processes. We argue that there is a strong relationship between emergency preparedness and resilience building. To explore this relationship, we focus on the emergency plan and study its effects on resilience. Assuming that for an organization having an emergency plan does not necessarily mean it is being resilient, we determine to what extent the components and characteristics of the

* Corresponding author.
E-mail addresses: mpenades@dsic.upv.es (M.C. Penadés), anunez@dsic.upv.es (A.G. Núñez), jhcanos@dsic.upv.es (J.H. Canós).

[1] The ISCRAM Digital Library is owned by the International Association of Information Systems for Crisis Response and Management, and holds the proceedings of the International Conference on Information Systems for Crisis Response and Management since its first edition. It can be accessed at http://idl.iscram.org.

[2] As of September 19, 2016.

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emergency plan can be a good indicator of the *theoretical* resilience of organizations. We call it *theoretical*, since emergency plans are just plans. How effective they are will depend mostly on how the organization uses the knowledge included in the emergency plans to actually become more resilient. In other words: the *theoretical* resilience must be transformed by organizations into *actual* resilience; people can (or should) acquire an adaptive behaviour against disasters by applying the policies described in the emergency plans. For different reasons, it is quite unusual for all the policies in an emergency plan to be properly executed (Kean et al., 2004). As a consequence, good levels of *theoretical* resilience do not necessarily mean good levels of *actual* resilience. From this perspective, a one-to-one ratio between *theoretical* and *actual* resilience is a goal rather than a fact. The present study is therefore not restricted to the emergency plan only, but also includes its management.

We analyze the relationship between the emergency plan and both the *theoretical* and *actual* types of resilience from a conceptual point of view. We want to explore how concepts from the resilience field relate with those of emergency planning, and provide a model to evaluate the *theoretical*/*actual* resilience of an organization from the analysis of the management of its emergency plan. As the first step, we study how much *theoretical* resilience current emergency plans contain. This is the key to assessing how much the content and structure of emergency plans contribute to increasing an organization's resilience. To address this issue, we start from the definition of resilience given by Fiksel (Fiksel, 2003), who pointed out the existence of several dimensions (or *characteristics*) that contribute to resilience, which may be interpreted in a wide context (product, enterprise or nested systems). These characteristics are:

"(…)

- *diversity: the existence of multiple forms and behaviors*
- *efficiency – performance with modest resource consumption*
- *adaptability – flexibility to change in response to new pressures*
- *cohesion – existence of unifying relationships and linkages between system variables and elements*" (quoted from (Fiksel, 2003), page 5333).

If we look at current emergency plans, we see they are far from showing most of the above characteristics. In general, they are text-based, monolithic documents that give little evidence of either diversity or efficiency. In many cases, their structures and basic contents are based on law, which is not flexible enough to cope with unexpected changes, making adaptability difficult. However, the concept of an emergency plan has high potential, if properly developed, to contribute significantly to increasing an organization's resilience (Penadés et al., 2011; Canós et al., 2013; Turoff et al., 2013).

Consequently, our first goal is *to find ways to make emergency plans more resilient* in the sense of Fiksel's model. We define a framework based on the dimensions of emergency response defined in (Canós et al., 2004). For each dimension, we identify a number of features and identify the ones that contribute to Fiksel's characteristics and possible ways of improving the level of achievement of the characteristics within each feature.

Having resilient emergency plans is not by itself enough to improve the resilience of an organization: in order to be useful, emergency plans must be well managed. Our second goal is thus *to find the aspects of emergency plan management that are related to resilience*. To achieve this goal, we rely on QuEP (Núñez et al., 2015; Núñez et al., 2016a), a framework inspired by the Total Quality Management strategy (Charantimath, 2011; Oakland, 2014), which assesses the emergency plan management capabilities of organizations according to a hierarchy of maturity levels. We explore the relationship between the QuEP principles and practices with Fiksel's resilience characteristics and analyze the factors that contribute to resilience.

The remainder of this paper is organized as follows. Section 2 provides a view of the background to resilience in different domains and how it is measured by characteristics-based quantification. Section 3 analyzes the emergency plan management domain to identify the actions that increase and reduce resilience. In Section 4 we describe the features that emergency plans should include to enforce resilience, and in Section 5 we introduce the QuEP framework and how to integrate resilience as a new dimension to be measured in the assessment and improvement of emergency plan management, supported by an IT-based tool. Section 6 gives our conclusions and outlines further work.

2. Background

The capability and ability of an element to adapt and return to a stable state after a disruption are closely related to the concept of resilience. Originally developed as an ecological concept (Holling, 1973), resilience was applied to other contexts and domains, enriched with a social (Adger, 1997) or organizational dimension (Timmerman, 1981). Nowadays, resilience is related to both the individual and organizational responses to disturbances and the term is used in different contexts and domains. In (Manyena, 2006; Bhamra et al., 2011; Alexander, 2013), the authors summarize the most widely recognized definitions of resilience and their contextualization in each domain. These definitions often include a number of properties that characterize resilience. For instance, if we review the term "resilience" in the earliest works in the ecology and society domains, the study is focused on aspects of socio-ecological systems, such as persistence, adaptability and transformability to adapt to continuous change and earth threats. The properties identified to characterize resilience include latitude, resistance, precariousness and cross-scale relations, among others (Folke et al., 2004) or, in terms of absorption of disturbances, self-organization, and learning and adaptation (Walker et al., 2002). Another pioneering field in resilience was the psychology domain (Werner, 1995); in this case, the studies focused on how resilience affects individuals in adversity and their positive adaptation from everyday situations to major life events through psychological characteristics in stress process contexts. Fletcher and Sarkar identified certain resilience factors, such as positive personality, motivation, confidence, focus and perceived social support (Fletcher and Sarkar, 2013).

The properties identified to characterize resilience provide a good approach to measuring resilience. Brown identifies five such approaches: quantification based on functionality is applied to computer systems or infrastructures and engineering (Brown, 2013). Quantification based on food access is applied to the household economy domain. Activity-based measurement is focused on people's resilience according to different investments and has very limited applications. The quantification derived from *theoretical* resilience is based on *theoretical* frameworks. Finally, the measurement based on characteristics consists of deriving indicators from the characteristics of resilience and assuming that if they are improved, resilience itself is also improved. In fact, the first resilience system was defined as the *measure of a system's persistence and ability to absorb disturbances* (Holling, 1973). Klein also emphasizes the importance of measuring and improving resilience through clear and good indicators (Klein et al., 2003).

2.1. Resilience in emergency management

The concept of resilience is new to the emergency management arena after decades of growth in different domains. Crichton et al. point out the relevance of the lessons learned in the development of organizational resilience and recommend adopting a cross-domain strategy, since experiences in other domains can be exported to a new one (Crichton et al., 2009). Here we review some studies in the organizational domain and the strategic management domain according to Crichton's criteria, because we consider them to have an influence on emergency management resilience.