

# Chapter 1

## Toward the Improvement of Emergency Response Utilizing a Multi-Tiered Systems Integration Approach: A Research Framework

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### **ABSTRACT**

*This chapter presents an extension of the Emergency Description Information Technology (EDIT) project to facilitate the effective collection and communication of information during an emergency. New academic findings and industry technologies inform a modified research framework. The research framework contains four primary research areas that are described in detail. Extending the design-science approach used for the EDIT project could improve emergency communications during large-scale international gatherings, as well as for community emergency response.*

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## **INTRODUCTION**

According to the National Emergency Number Association (NENA), there are over 6,000 public-safety answering points (PSAPs) in the United States alone (NENA, 2014). Yet, public safety representatives suggest that a large number of emergency calls cannot be completed, as the current generation of wireless communication technology cannot adequately determine the position of a caller (Fung, 2014a). Additionally, of one thousand PSAPs, only 187 report a ‘great deal’ of confidence when receiving data from wireless carriers (Fung 2014a). Furthermore, it has been stated that only a fraction of all PSAPs can receive and interpret short messaging service (SMS) data. Yet, over 70 percent of the 400 thousand individuals in the United States that call PSAPs each day connect via mobile devices. Most of these mobile devices likely had the capability to transmit SMS data. While the United States Federal Communications Commission (FCC) recently voted to mandate that all cellular service providers must support the capability of mobile devices to connect to PSAPs using SMS, it is still unclear how incident location information will be provided to dispatchers (Fung 2014b).

While there are initiatives to support the transmission of emergency information using short message service (SMS) communications, organizations such as the FCC, CTIA and NENA continue to emphasize the importance of voice communication in emergencies unless there are significant reasons that prohibit someone from doing so (CTIA, 2014; FCC, 2014; NENA, 2014). Thus, it will be essential for such a system to demonstrate viability and positive improvements before gaining acceptance and endorsements from organizations that represent emergency response services. While there have been advances in the development of improved PSAP technology, it has been slow to be implemented. For example, many PSAPs do not yet have the capability to respond to SMS, a technology that has existed for over 25 years and is already experiencing declines as it is replaced with instant messaging services. For instance, recent data suggests that 22% of U.S. adults use the WhatsApp messenger service (Pew, 2018).

While PSAPs are challenged by technical constraints, they must also deal with human communication barriers, including excess background noise, language barriers, caller hysteria, or the inability to precisely describe the incident location. As these challenges exist during normal PSAP operation (Osher, 2013), large-scale public events further highlight the need for an improved process and technology. For instance, public events, such as the Olympics, the Munich Oktoberfest and the Vienna Donauinselfest attract 680 thousand international visitors, 6.4 million total visitors and over 1 million international visits, respectively (Office for National Statistics, 2012; Oktoberfest, 2013; Die Presse, 2014). Perhaps, of a greater concern are the large pilgrimages, such as those including the 120 million pilgrims

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