Mobile Emergency Management Services Targeting Large Public Events

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ABSTRACT

In recent years, natural disasters and terrorist attacks have been quite numerous, and broadly reported in the media. The tourism industry has been especially impacted by these emergencies. In order to mitigate the effects of such events, guaranteeing an adequate level of preparedness is essential. However, despite the extreme disrupting events that large-scale disasters such as tsunamis have had on tourism in specific areas, few tourism organizations have properly developed emergency strategies as an integral part of their business plans. Several national and supra-national initiatives are currently working on possibilities to employ mobile communication networks for emergency management systems. The success of such systems depends on users being familiar with the service though, which is difficult to achieve if the system is solely used for emergency management. Therefore, the authors propose a reference architecture that allows the integration of mobile value-adding services, allowing for broad usage outside of emergency cases and thus an increased familiarity. The authors also present a specific system design focusing on the case of large public events as an instantiation of the reference architecture, describe the implementation in some detail, and present the evaluation of the prototype implementation in a simulation study at a large public event.

Keywords: Design Science, Emergency Management, Mobile Communications, Tourism

INTRODUCTION

Disasters can have negative and lasting effects on the tourism industry (Faulkner, 2001). For example the recent earthquake, tsunami and nuclear disaster in Japan have also negatively affected the tourism industry of this region. In a recent survey of tourism managers in Germany (Travel Industry Club & Trendscope, 2011), the country with the highest spending on international tourism (World Tourism Organization, 2009), 93% stated that tourists will avoid Japan as a destination for a long time range and 62% expect that this will lead to a reduced number of tourist arrivals for other Asian countries as
well. Several crises and disasters have affected the global tourism industry in recent years (Ritchie, 2004). Examples comprise terrorist attacks (Paraskevas & Arendell, 2007), political instability (Kreimer et al., 2003), bio-security threats and natural disasters (Hystad & Keller, 2007). Since tourism is also an important economic factor for many countries and many destinations depend on tourism to prosper in the market, there is an increasing pressure on managers and policy makers concerned with tourism to consider the impact of crises and disasters on the industry and to develop strategies to deal with their impacts (Ritchie, 2004). In order to mitigate disaster effects, it is essential to undertake steps to increase the level of disaster preparedness, including infrastructure investments for warning systems and training activities (Johnston et al., 2007). However, despite the devastating effect disasters can have on tourism, few tourism organizations have properly developed disaster strategies as an integral part of their business plans (Faulkner, 2001). This negligence is especially surprising as tourists protect themselves by avoiding travelling to unsafe areas (Elvia Reiseversicherung & Leuphana Universität Lüneburg, 2008) and safety represents an important factor (only topped by cost/benefit-ratio) for German tourists when deciding on their tourist destination (European Commission, 2009).

Emergency management systems (EMS) provide the capability to address this dilemma and to enable emergency forces to manage crises, including detection and analysis of incidents (Carver & Turoff, 2007). Persons in charge can be supported to prepare evacuations, control and support disaster forces and to locate victims (Carver & Turoff, 2007). Since mobile communication infrastructures offer standardized wireless communication services in almost all countries and allow a fast diffusion of information, they represent an existing IT infrastructure asset for saving human lives in emergencies (Leidner et al., 2009). They can allow emergency managers to distribute warnings to affected areas by cell broadcast to warn potential victims (Fritsch & Scherner, 2005). Facilitating social media as communication channel for crisis management and response appears promising, too. For instance, several authors have advocated the use social media for disaster relief (Kapucu, 2008; Liu et al., 2008; Sutton et al., 2008) and emergency management systems based on mobile communication infrastructures (Yuan & Detlor, 2005; Valtonen et al., 2004; Underwood, 2010).

Technically, many services used for emergency management systems do not differ from services used on other occasions. For example, the upload of a picture could be used to inform emergency managers but also for sharing holiday pictures on a social media platform. If both functionalities can be integrated into a common design, it would enable users to become familiar with the emergency functionalities without any additional training. Therefore, we argue that offering mobile value-adding and emergency management services via the same infrastructure could create new business opportunities for the tourism industry. Services can be used to improve the holiday and leisure time experience for tourists and to help tourist guides to host their customers. For example, Zipf and Malaka (2001) argue that location-based services in tourism settings can provide the basis for novel tourism-related applications and open up new business opportunities. Integrating value adding mobile services into an emergency management system thus improves users’ familiarity with the system while, at the same time, offering additional value perceived by customers. Furthermore, revenue created by value-adding services could provide the necessary funds to finance the mobile emergency management system. Besides sharing the costs for operating the infrastructure, the idea of providing both commercial and disaster warning services based on a technically integrated platform positively affects users’ experience due to a common client base.

This paper is structured as follows. We first present the methodological approach of our work in Section 2. In Section 3, we derive requirements for emergency management sys-
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