

Chapter 44

Communication between Power Blackout and Mobile Network Overload

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ABSTRACT

In cases of power outages the communication of organizations responsible for recovery work (emergency services, public administration, energy network operators) to the public poses several challenges, primarily the breakdowns of many communication infrastructures and therefore the limitations of the use of classical communication media. This paper surveys technical concepts to support crisis communication during blackouts. Therefore it first investigates the perception and information demands of citizens and communication infrastructures in different scenarios. Furthermore, it analyzes communication infrastructures and their availability in different scenarios. Finally it proposes 'BlaCom', an ICT-based concept for blackout communication, which addresses the time span between the occurrence of the energy blackout and the possible overload of the mobile phone network. It combines general information with location-specific and setting-specific information, was implemented as a prototype smartphone application and evaluated with 12 potential end users.

1. INTRODUCTION

The 2012 blackout in India (670 million affected), the 2009 blackout in Brazil and Paraguay (87 million), the 2006 European blackout (10 million) and the 2003 Northeast blackout in the United States and Canada (55 million) show that big power outages still occur all over the world. The constant electricity supply became increasingly important over the recent decades because large

parts of our infrastructure only function with electricity. Therefore the occurrence of power outages is a growing problem (Birkmann et al., 2010). This does not only concern the economy or private households, but all basic (critical) infrastructures like water and food or information and communication technology in general (Lorenz, 2010). The dependency on a functioning electricity supply is very high, so that a long outage is highly problematic (Deutscher Bundestag, 2011;

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Holenstein & Küng, 2008). Even though the probability for power outages is relatively low and the average duration of such blackouts e.g. in Western Europe only amounts to few minutes, the general preparation for potential crisis situations is rather poor (Birkmann et al., 2010). If a power outage takes place, communication tools, and almost all further infrastructures, will fail after a certain time, which can entail serious consequences especially in the case of long outages (Deutscher Bundestag, 2011; Hiete et al., 2010). Such long blackouts do not only mean a physical, but also a psychological burden for the affected people (Volgger et al., 2006). Uncertainty and feelings of anxiety, as well as the need for information emerge.

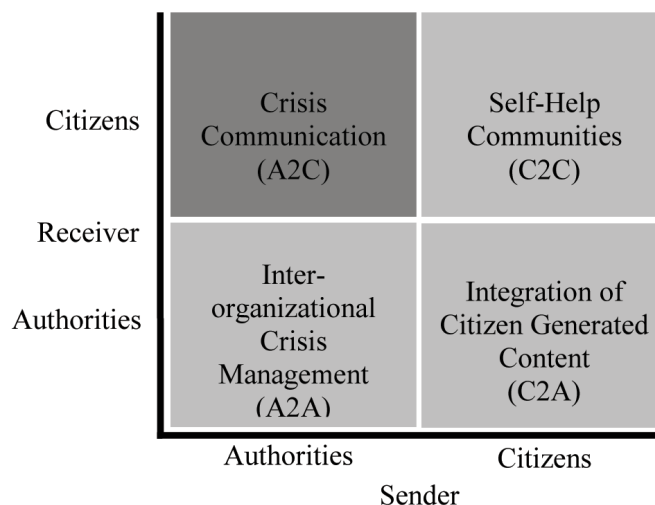
In terms of the communication matrix for social software in crisis management (Reuter et al., 2012), four different cases for information and communication in such a situation can be distinguished (Figure 1) depending on a distinction of (a) organizations and the (b) public as the (i) sender and the (ii) receiver of information. On the inter-organizational level organizations of crisis response communicate with each other often using radio communication, which is less affected by working electricity due to emergency power units (bottom left). On the public level,

citizens and volunteers communicate with each other in the real or via social media such as Twitter or Facebook (top right). This citizen-generated content is also being analyzed by crisis response organizations (bottom left). Besides the communication among the citizen, it is also very important that organizations responsible for recovery work inform the public (top left)

This work focuses on crisis communication between authorities/organizations and the people affected by a power outage (citizens), as marked in Figure 1. It focuses on which and how crisis-related information should be provided to the public.

Based on a previous short paper (Reuter, 2013) this paper outlines the perception of the population, their demands for information as well as relevant communication media and their availability during power outages. Furthermore it presents an ICT-based prototypically implemented concept for crisis communication and the results of its evaluation. This paper reports from a project focusing on coping and recovery work during big to medium power outages (Wiedenhoefer et al., 2011). Therefore organizations responsible for recovery work and crisis communication, such as emergency services like the police and fire department and infrastructure suppliers, such as

Figure 1. Focus of the study using the “crisis communication matrix” (Modified) (Reuter et al., 2012)



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