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SECTOR: Secure Common Information Space for the Interoperability of First Responders

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Abstract

The ever-growing human, economic and environmental losses due to natural and/or man-made disasters demand a systematic, holistic, inter-governmental and multi-disciplinary approach to the management of large-scale crisis. However, crisis management is usually coordinated by local authorities, supported by a variety of different national and international crisis management organizations, all acting relatively autonomously. Coordination actions usually adopt non-interoperable information management tools, due to the heterogeneity of the involved organizations, limiting or even hindering the coordination efforts. This paper introduces the efforts conducted in the context of the EU-funded project called SECTOR, which aims at establishing the foundations of future Collaborative Crisis Management (CCM) Information Spaces by expanding the European scientific knowledge base on (cross-border) multi-agency processes and their complications when setting-up and designing the enabling information systems.

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1. Introduction

The accelerating rates at which disasters have unfolded in recent years, and the unprecedented levels of economic losses associated with them indicate we have entered a new era of catastrophes (NatCatSERVICE, 2012). In fact, we have witnessed a series of large-scale disasters, such as the Chernobyl nuclear accident, the Kobe and Marmara earthquakes, the March 11 earthquake and tsunami in Japan, including the nuclear crisis due to the Fukushima nuclear plant damages, and the September 11 terrorist attacks in New York and Washington, which have in common massive effects on large concentrations of people, activities and wealth. As a concrete example, in October 2014, the head of the Scottish Government Critical Infrastructure Protection Unit (CIRU) was awoken in the night to discover that a ship carrying nuclear material was adrift without engine power in the North Sea, and was close to active Oil Rigs containing crews pumping oil. In a brief time, air crews (planes and helicopters) were scrambled in Scotland and Norway and high speed protection vessels were also dispatched. The exchange of information relied on the good working relationship between Norway and Scotland around North Sea Oil. Disaster was averted. Many disasters are not averted (e.g. UK Kings Cross Station Disaster) (Desmond, 1998), and all of them have proved limitations of governments to properly react and recover from them and of containing their devastating effects, which may lead to other consequent disasters. In fact, it is shown that the failure to ensure “common information” sharing is a cause of failure in the response phase (Desmond, 1998). This kind of events has negative consequences for the involved populations, but also a short-term destabilizing effect on the economy (OECD, 2004).

The traditional approach of a single organization involved in the crisis management and recover is not feasible in the case of large-scale disasters, due to their scale, impact and severity. Therefore, several different first responder organizations at national and international level act together, and are coordinated by a given organization such as OCHA (Office for the Coordination of Humanitarian Affairs), paving the way for a Collaborative Crisis Management (CCM). Since decision-making must be flexible and responsive (OECD, 2004), there is a great demand for CCM intensive information sharing among the organizations involved in the crisis management. However, this is hindered by the high level of heterogeneity of the involved organizations, which can be classified as (i) technological heterogeneity (i.e., organizations use different computer-based tools), (ii) data heterogeneity (i.e., each organization may assume a given information model), (iii) informatisation heterogeneity (i.e., some organization may adopt GIS (Cai, 2005) or Collaborative Tools (Erl, 2005), while others only deals with paper-based documents or rather simple computer-based tools). Such heterogeneity is a great obstacle to information sharing in a timely and efficient manner, making impossible to exchange data with other organizations or to comprehend data from others. There are a few initiatives currently in place to improve interoperability among crisis management stakeholders (e.g., MIC, GDACS V-OSOCC, PDNA, etc.), but no common approach, technique or tool is available to support the whole crisis management cycle (from prevention to recovery) across agencies and across borders. Flexible concepts and tools are lacking, that enable cross-border networks of crisis management organizations to set-up flexible support systems for a joint operation in which information is continuously updated and shared between organizations, leveraging on existing Information Systems from the involved organizations, and in which progress is monitored and resource sharing facilitated.

SECTOR is an EU-funded project that aims at providing an answer to the increasing demand for data sharing and interoperability in large-scale disaster management by offering a systematic, holistic, inter-governmental and multi-disciplinary approach to the collaboration of heterogeneous first responder organizations when managing large-scale disasters. We intend to show how a Common Information System (CIS) can help avert disasters, and this, driven by guidance from leading experts in interviews and on-going direction via our expert group, provides a unique approach and contribution to solve the “non-collaboration” problem by enabling interoperability through multi-agency cooperation and collaboration (House et al., 2014). Starting from the analysis of past events and the state of the art on information sharing platforms and procedures, in Section 2 we define the main requirements that future CCMs shall fulfil. In Section 3 we propose the SECTOR solution to address the identified needs, whereas in Section 4 we describe the typical large-scale disaster scenario for which the SECTOR solution is needed to coordinate a wide range of heterogeneous first responder organizations. We conclude the paper with the current state of the project and future work.

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