

A Framework for Building Open and Sustainable Disaster Management Information System

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Abstract

Ideally, a disaster management information system should be open and sustainable: It is open in the sense that it supports the discovery, access and use of data and information from independent sources by independently developed applications and services and can readily accommodate new information sources and applications as needed in response to unforeseen crisis situations. It is sustainable in the sense that it can adapt with needs, improve through use and grow in capabilities with scientific and technological advances.

Despite tremendous advances in interoperability standards and tools, linked data and related technologies, most disaster management information systems (DMIS) in use today fall short of this ideal. State-of-the-art DMIS typically rely almost solely on official information sources built and maintained by government agencies and authorities responsible for disaster management. The information sources, together with modern fusion and visualization tools, work sufficiently well for predictable emergencies, especially when all the data and information that may be needed to deal with the imminent emergency can be identified based on prior knowledge and past experiences with similar emergencies and hence can be retrieved from the sources a priori and made available and usable during the emergency.

A typical state-of-the-art DMIS offers little or no help in discovery and use of existing data and information that are critically needed to deal with unforeseen calamitous situations but reside in external sources. Moreover, it cannot make effective use of contents generated by people via social networking services. This talk will first present motivating scenarios to illustrate how this limitation can prevent emergency responses from being responsive and effective during unforeseen major disasters. It will then present an architectural framework for open and sustainable disaster management information systems without this limitation.

The virtualization layer in a system built on the framework supports common and standard schema, models, views and formats of multi-domain, diverse data from diverse information sources. It aims to offer each application served by the information system its own virtual (information) repository and the option of relying on the system not only for data and information, but also for computation and communication. Indeed, some applications and services may use it as a data cloud, letting their own virtual repositories access, process, filter, and fuse data and information on their behalf. The novel active storage system service

(ASSS) enables applications to tag data and information of importance to them, define events and phenomena that will trigger push operations in terms of values of tagged information and specify the data sets and recipients of each push operation. Thus configured, the information system works like an active storage: It responds to specified external events by automatically pushing specified data and information to specified applications and/or end users.

Keywords : Disaster Management Information System, Virtual Repository, Linked Open Data