A hazard-independent approach for the standardised multi-channel dissemination of warning messages

M. A. Esbri Palomares (1), M. Hammitzsch (2), and M. Lendholt (2)

(1) Atos Research & Innovation, Madrid, Spain, (2) GFZ German Research Centre for Geosciences, Potsdam, Germany

The tsunami disaster affecting the Indian Ocean region on Christmas 2004 demonstrated very clearly the short-comings in tsunami detection, public warning processes as well as intergovernmental warning message exchange in the Indian Ocean region.

In that regard, early warning systems require that the dissemination of early warning messages has to be executed in way that ensures that the message delivery is timely; the message content is understandable, usable and accurate. To that end, diverse and multiple dissemination channels must be used to increase the chance of the messages reaching all affected persons in a hazard scenario.

In addition to this, usage of internationally accepted standards for the warning dissemination such as the Common Alerting Protocol (CAP) and Emergency Data Exchange Language (EDXL) Distribution Element specified by the Organization for the Advancement of Structured Information Standards (OASIS) increase the interoperability among different warning systems enabling thus the concept of system-of-systems proposed by GEOSS.

The project Distant Early Warning System (DEWS), co-funded by the European Commission under the 6th Framework Programme, aims at strengthening the early warning capacities by building an innovative generation of interoperable tsunami early warning systems based on the above mentioned concepts following a Service-oriented Architecture (SOA) approach. The project focuses on the downstream part of the hazard information processing where customized, user-tailored warning messages and alerts flow from the warning centre to the responsible authorities and/or the public with their different needs and responsibilities.

The information logistics services within DEWS generate tailored EDXL-DE/CAP warning messages for each user that must receive the message according to their preferences, e.g., settings for language, interested areas, dissemination channels, etc.. However, the significant difference in the implementation and capabilities of different dissemination channels such as SMS, email and television, have bearing on the information processing required for delivery and consumption of a DEWS EDXL-DE/CAP message over each dissemination channel. These messages may include additional information in the form of maps, graphs, documents, sensor observations, etc. Therefore, the generated messages are pre-processed by channel adaptors in the information dissemination services converting it into a format that is suitable for end-to-end delivery over the dissemination channels without any semantic distortion.

The approach followed by DEWS for disseminating warnings not only relies on traditional communication ways used by the already established early warnings such as the delivery of faxes and phone calls but takes into consideration the use of other broadly used communication channels such as SMS, email, narrowcast and broadcast television, instant messaging, Voice over IP, and radio. It also takes advantage of social media channels like RSS feeds, Facebook, Twitter, etc., enabling a multiplier effect, like in the case of radio and television, and thus allowing to create mash-ups by aggregating other sources of information to the original message.

Finally, status information is also important in order to assess and understand whether the process of disseminating the warning to the message consumers has been successfully completed or the process failed at some point of the dissemination chain. To that end, CAP-based messages generated within the information dissemination services provide the semantics for those fields that are of interest within the context of reporting the warning dissemination status in DEWS.