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A Walk through TRIDEC's intermediate Tsunami Early Warning System

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The management of natural crises is an important application field of the technology developed in the project Collaborative, Complex, and Critical Decision-Support in Evolving Crises (TRIDEC), co-funded by the European Commission in its Seventh Framework Programme. TRIDEC is based on the development of the German Indonesian Tsunami Early Warning System (GITEWS) and the Distant Early Warning System (DEWS) providing a service platform for both sensor integration and warning dissemination. In TRIDEC new developments in Information and Communication Technology (ICT) are used to extend the existing platform realising a component-based technology framework for building distributed tsunami warning systems for deployment, e.g. in the North-eastern Atlantic, the Mediterranean and Connected Seas (NEAM) region.

The TRIDEC system will be implemented in three phases, each with a demonstrator. Successively, the demonstrators are addressing challenges, such as the design and implementation of a robust and scalable service infrastructure supporting the integration and utilisation of existing resources with accelerated generation of large volumes of data. These include sensor systems, geo-information repositories, simulation tools and data fusion tools. In addition to conventional sensors also unconventional sensors and sensor networks play an important role in TRIDEC.

The system version presented is based on service-oriented architecture (SOA) concepts and on relevant standards of the Open Geospatial Consortium (OGC), the World Wide Web Consortium (W3C) and the Organization for the Advancement of Structured Information Standards (OASIS). In this way the system continuously gathers, processes and displays events and data coming from open sensor platforms to enable operators to quickly decide whether an early warning is necessary and to send personalized warning messages to the authorities and the population at large through a wide range of communication channels.

The system integrates OGC Sensor Web Enablement (SWE) compliant sensor systems for the rapid detection of hazardous events, like earthquakes, sea level anomalies, ocean floor occurrences, and ground displacements. Using OGC Web Map Service (WMS) and Web Feature Service (WFS) spatial data are utilized to depict the situation picture. The integration of a simulation system to identify affected areas is considered using the OGC Web Processing Service (WPS). Warning messages are compiled and transmitted in the OASIS Common Alerting Protocol (CAP) together with addressing information defined via the OASIS Emergency Data Exchange Language - Distribution Element (EDXL-DE).

The first system demonstrator has been designed and implemented to support plausible scenarios demonstrating the treatment of simulated tsunami threats with an essential subset of a National Tsunami Warning Centre (NTWC). The feasibility and the potentials of the implemented approach are demonstrated covering standard operations as well as tsunami detection and alerting functions. The demonstrator presented addresses information management and decision-support processes in a hypothetical natural crisis situation caused by a tsunami in the Eastern Mediterranean.

Developments of the system are based to the largest extent on free and open source software (FOSS) components and industry standards. Emphasis has been and will be made on leveraging open source technologies that support mature system architecture models wherever appropriate. All open source software produced is foreseen to be published on a publicly available software repository thus allowing others to reuse results achieved and enabling further development and collaboration with a wide community including scientists, developers, users and stakeholders.

This live demonstration is linked with the talk "TRIDEC Natural Crisis Management Demonstrator for Tsunamis" (EGU2012-7275) given in the session "Architecture of Future Tsunami Warning Systems" (NH5.7/ESSI1.7).