

Interoperability in Disaster Management

However, recent disasters have also shown shortcomings in existing technologies and policies. Pertinent among these are the many barriers that exist in making available and providing the most appropriate (geo-)information and making systems co-operate. Up until now data has been searched by human beings. Automation is provided, but within a specific domain and carrying out dedicated tasks, and thus incapable of delivering intelligence to heterogeneous multi-user groups. The challenges in sharing and analysing geo-information are crucial. Most current geo-data is designed, stored and managed by organisations each under normal conditions having its own mandate and operating largely independently of one another. Because such data is not designed to work in a multidisciplinary environment its interoperability is limited.

Systems for disaster management are moving up national, and even supranational government political agendas, including that of the European Union (EU) and the United Nations Platform for Space-based Information for Disaster Management and Emergency (UN-SPIDER). Research has been initiated in the effort to find service-oriented knowledge-based utilities to support interoperability of geo-information in crisis response. One EU initiative is INSPIRE (Infrastructure for Spatial Information in Europe) for harmonisation of geo-information and GMES (Global Monitoring for Environment and Security). The EU has also funded many large projects, including defining services (ORCHESTRA), developing data models (WIN), monitoring and data-processing of in-situ sensor networks (OSIRIS), co-operation between different systems (OASIS), and developing integrated alert systems (CHORIST).

Gi4DM

In response to the need for more and better knowledge, methods and collaboration a new research community has been established in recent years which attempts to solve urgent problems and develop strategies for the longer term. This has established forums for the communication of research results and lessons learnt. One such is Gi4DM (Geo-information for Disaster Management), a multidisciplinary symposium initiated by the Joint Board of Geospatial Information Societies (JB GIS) including ICA, FIG, and ISPRS. The first Gi4DM was held in 2005, and has since become an annual event. After Gi4DM 2006 in Goa, India, the third conference was held in Toronto Ontario, Canada from 23rd to 25th May 2007. Organised by the Canadian Institute of Geomatics (CIG) and ISPRS WG IV/8, the symposium attracted nearly 250 participants from 33 countries and featured more than a hundred oral and poster presentations.

One important issue discussed was the exchange of information and services among the many agencies. The sharing of services is called operability and can be subdivided into three types:

- system interoperability deals with making hardware, operating systems and communications heterogeneity such as instruction sets, protocols and file systems communicate with each other
- syntax and structure interoperability concerns communication at the level of data representation, formatting, data models and Data Base Management Systems (DBMS)
- semantic interoperability refers to the meaning of data; for instance, the understood significance of the term "building".

Although all three types are associated with specific problems needing resolution, the hardest concerns semantics, the meaning of terms. There does not exist a universal geo-information terminology; one used by all agencies across all government levels and all nations. As a result, the meaning of terms and attributes attached to geographical entities depends on the context of use and users: a potential cause of confusion, or even "Babel syndrome". It is one of the salient reasons behind the shortcomings shown in the management of disasters. In an attempt to solve semantic interoperability issues researchers are intensively studying ontology. For example, Delft University of Technology has begun PhD research on ontology architecture for disaster management. Ontology defines the basic terms and relations comprising the vocabulary of a topic area, and the rules for combining terms and relations to define extensions in vocabulary. One paper presented at Gi4DM bearing "ontology" in its title stressed how the dynamic nature of disaster management complicated further semantic interoperability. Semantic interoperability will remain an important research item.

The special session on "Future Dialogues" provided an opportunity to develop scenarios for disaster management and to discuss implications of converging technologies (bio, nano and geo-info) and adaptive management systems. The fourth Gi4DM will be held in Beijing from 30th June to 2nd July 2008 in the run-up to the XXIst ISPRS Congress, also to be held in Beijing from 3rd to 11th July, and is to be organised by Beijing University of Civil Engineering and Architecture. The theme will be 3D Geo-info and Urban Disaster Management.