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The Australian Landslide Database

Single point of access to landslide information

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Geoscience Australia recently tested an information management technique to allow its landslide data to be presented simultaneously with landslide information available from several other agencies in Australia. The result is the Australian Landslide Database (ALD), a 'virtual' database which brings information across databases together and gives users the latest landslide data. The database is a spatial index of the available information about landslide events in Australia and provides a range of information related to an event, including its causes and consequences.

A comprehensive approach

The project stemmed from a recommendation made by the Council of Australian Governments to establish a nationally consistent system of data collection as part of a more comprehensive approach to natural disaster management in Australia (COAG 2004). Such a reform in data collection requires new, innovative approaches in both the governance and the science of natural disaster management. The evolution of the ALD demonstrated an option for the future management of natural hazard datasets. The vision for a new national landslide database was based on the concept of collecting data once, maintaining it at the most effective level, and sharing this information across all levels and between different users and applications. This approach assumes that responsibility for collecting information does not fall to a single organisation, but is a shared responsibility, and these joint efforts are combined to produce comprehensive data.

Data sharing

The new database overcame several obstacles which have previously hampered efforts to facilitate the exchange of data, such as variations in data format and levels of detail, as well as the collection and classification of a large volume of information from different sources. In overcoming these obstacles, the database designers demonstrated how information management techniques could be applied to facilitate the sharing of data. The methodology adopted, known as 'networked service-oriented interoperability', required the completion of four distinct components: a landslide application schema, a landslide domain model, web service implementations and a user interface. These components are not described here, but are outlined in Osuchowski & Atkinson (2008).

The methodology was successfully implemented by connecting three physically separate and unique landslide

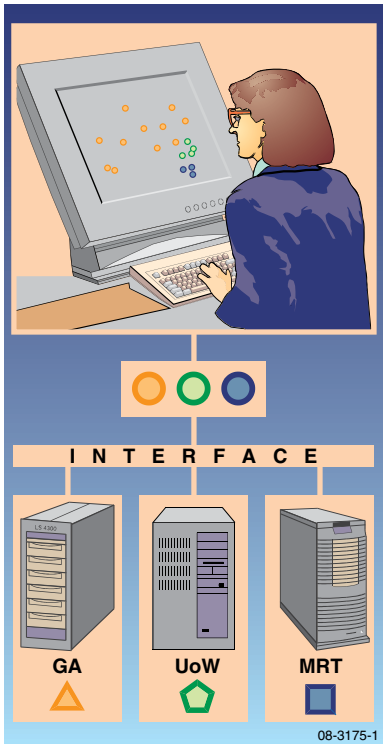

Figure 1. Concept underlying the common interface into one 'virtual' database.

event databases via the web. These databases included a national database managed by Geoscience Australia, a regional (state-wide) database managed by Mineral Resources Tasmania and a local database managed by the University of Wollongong. The new database provided a resource which synthesised the capabilities of each of the single-purpose inventories and allowed landslide data which had been described uniquely in the different host databases to be translated into a consistent format. This process allows the user to view and query information from different databases at the same time, while the original data remains unaltered (figure 1).

"The system collates and characterises a large volume of information from different sources in real time."

Such an approach, in combination with a willingness to share data, provides a powerful and extensible coordinated landslide resource for Australia, as well as an appropriate foundation for further investment in data collection and analysis.

New database tools and functionality

Users of the database can select the number of databases to be included in their landslide query and have the option of executing a basic or advanced level search. The user can define the spatial extent of their search in several ways by: searching the map extent, drawing a boundary box or selecting a defined region (figure 2).

Queries also can be filtered to refine the coverage of landslides. In addition to landslide identification and the date of the landslide, filters currently include information related to landslide type (movement type and material class), cause (both human and natural contributing factors as well as trigger factors) and damage (such as number of buildings damaged or destroyed, fatalities, injuries, and type of damage). This means a search could be refined to locate all debris slides or flows which had wave erosion as a contributing factor within a certain timeframe.

The reporting functionality includes tabular and cross-tabular reports which can be downloaded in a range of data formats. For numerical fields, a count is also displayed.

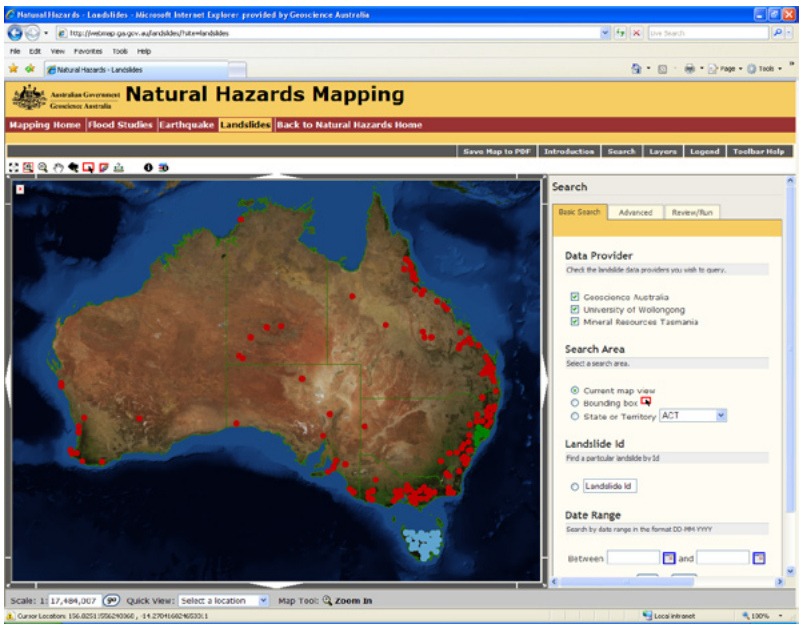

Figure 2. User interface for the virtual Australian Landslides Database displaying a spatial index of data accessed from host databases.

Major benefits

The main advantage of the interoperable approach is the increased volume of information it enables. A range of additional benefits (described in Osuchowski & Atkinson 2008) include the following:

- The system collates and characterises a large volume of information from different sources in real time. This provides an automatically updated single point of access to landslide information with new information available online immediately.

- Users are able to simultaneously search and query remote landslide inventories regardless of where they are hosted or differences in format.
- Data is presented consistently to enable the comparison of data across databases, landslide characteristics or locations. This allows data to be compared and contrasted within a landslide domain.
- Detailed information can be accessed for either detailed analysis (such as a single landslide event) or generic information can be accessed and aggregated for strategic purposes (such as aggregating details for a number of landslide events). Data is provided at basic, intermediate and sophisticated levels from an information-rich foundation source.
- Drill-down functionality means that different users can access the level of information they require from the same source data. This removes the need to locate, access and interrogate isolated landslide databases or to separately identify and contact a number of individuals.
- Results can be displayed as reports, tables, maps and potentially as graphs and tables of statistics. Users can also access multi-media such as photographs, videos, published papers, landslide risk management reports, studies etc.
- There is no limit to the number of landslide databases that can be linked into the virtual database since the interface neither stores nor records data.

The new database increases the availability, accessibility and discoverability of data and is now a joint initiative across local, state and national levels of government with all levels contributing to a national system. Since implementation, this approach has resulted in an immediate 70 per cent increase in the total number of landslide events reported nationally. The database now has more than 3000 entries detailing landslides and sets of landslides since 1842 throughout Australia, Lord Howe Island, Norfolk Island and Macquarie Island.

Acknowledgments

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www.ga.gov.au/ausgeonews/ausgeonews200612/inbrief.jsp#inbrief2

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