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Adoption of earth science informatics standards: key factors

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Databases, spreadsheets and file-formats are developed in the course of many projects. What makes it possible for some of these to gain widescale adoption and become 'standards'? Experience from some successful initiatives shows that many factors may be involved, and that the combination of these can vary in different cases.

We base our analysis on two examples:
1. GeoSciML (IUGS, OneGeology)
2. Water Data Transfer Format (WDTF) (from the Australian WIRADA)
and also make some reflections on some comparable initiatives (INSPIRE, CUAHSI-HIS).

GeoSciML is the longest running. It has been a recognisable project since 2004, building on several predecessors, most notably the North American Data Model (USA & Canada) and XMML (Australia, Canada, UK, France). There has been no central project management or funding arrangements: rather the project has operated in a consensus process by a self-organised team of enthusiasts who have been able to convince their employers to support their involvement. Activity has been intermittent, but framed by a series of four 'testbeds' demonstrating interoperability between multiple data services and fewer clients, supported by face-to-face meetings held once or twice a year. The core team has varied from 6-20 people, with continuity provided by a few key individuals who have attended all meetings, but with new participants welcomed at all phases.

The original scope of GeoSciML was 'interpreted geology', covering the features typically found on a geological map. This provides a significant advantage in that a consensus on the scientific model and language for features on the typical map scale has been shared internationally for more than a century. The institutional arrangements in the discipline are relatively homogeneous: there is a "geological survey" in most nations (or states in federal bodies), the total number of which is interestingly large but not unmanageable. The XML technology used is extensible, and a number of more specialised applications have been developed (GWML, ERML). Furthermore, it is a given that geological features cross jurisdictional borders, and there is a strong tradition of international collaboration within the discipline. Studies in developing nations are supported by the mineral resources sector and also by the legacy of colonial arrangements. The IUGS through its Commission for Geoscience Information has given respectable institutional cover, and oneGeology (particularly through oneGeology-Europe and US-GIN) has provided an immediate framework for broader involvement beyond the core team. Software developed by several of the participants has been made freely available to other participants. Despite the fact that involvement is purely voluntary, re-usable data formatted as GeoSciML is being served by more than 20 national and sub-national agencies, with many more in the wings.

In contrast, WDTF was developed over a very short time-frame (a few months in 2008 with relatively minor enhancements subsequently). Its technical basis was the specialisation of a generic model and encoding (O&M) rather than extending a discipline-specific tradition. The project was sponsored by one agency (Australian Bureau of Meteorology) and executed by a small team in a single organisation (CSIRO). The scope of WDTF was limited (transfer of time-series from suppliers for ingestion into a data-warehouse) and the information model simple. Uptake by more than 100 data providers has been rapid, enforced by regulation. However, the users were also supported by $9m worth of technology upgrade grants, and an online validation service was provided for immediate conformance testing.

We may compare the features that allowed these projects to become successful with some of the characteristics of other comparable projects, such as INSPIRE and CUAHSI-HIS.