

Delivering Geoscience Knowledge in Federal Systems: What Can the Old and New Worlds Learn from Each Other?

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Abstract:

Across the globe, geological communities are facing the same four challenges: put simply, how do we best make data discoverable, shareable, viewable and downloadable, so that the user also has access to consistent data at a national and continental level? The principle of managing scientific data and knowledge where it is generated and is best understood is well established in the science community. The distributed nature of most data sources means the complementary delivery mechanism of web map services has become equally prevalent in the spatial data community. Together these two factors are driving a world-wide revolution in the way spatial geoscience information is being disseminated to its users. The outcome is that data are being managed and delivered from multiple component sources - a federated system - ie the individual states within a union. These systems exist in the USA, in Canada, in Australia, and progressively, also in Europe, where the European Union can be regarded as a federal analogue, and where new regulation is placing the force of law behind spatial data infrastructures. In these "systems" addressing the four challenges are however, far from simple. To address them means finding solutions to adequate but workable metadata description, data specifications which encompass the richness of the data but deliver continuity, web map interfaces which allow flexible access but are easy to use, and last but not least intellectual property rules that protect the originator but provide the data the users need. The models for collaboration emerging in each of the federated systems are moving towards consensus on a global digital integration framework in the geosciences. We draw on the rich experiences in North America and Europe, and explore the way the challenges have been articulated and addressed with a strong emphasis on gaining future benefit by sharing the lessons learned.

Generic challenges

Users want access to consistent data and knowledge, regardless of source

which can be at a discipline, organisational, state/provincial, national, or continental level

How do we make that data and knowledge consistently....

- Discoverable?
- Shareable?
- Viewable?
- Accessible - downloadable?

Specific challenges

- Metadata – can they be sufficiently descriptive to allow discovery, but practical and efficient to implement?
- Data specifications – can they be rich, but deliver continuity and consistency?
- Web map interfaces – can they be easy to use, but provide flexible access?
- Intellectual Property Rights – how to protect the originator, but minimize barriers for users

US Geoscience Information Network



Data integration across federal and 50 state geological surveys



...live

...free

...open-source

...distributed

...interoperable

...coming now to your desktop

USGIN: Purpose

Use standardized services and interchange formats to make data resources of State and Federal Geological Surveys findable and accessible online

Work with data providers to implement these services in a community of practice

Federal: USGS Community for Data Integration

USGS Community for Data Integration

CDI Working Groups

- Technical Stack Working Group
 - Sub-teams:
 - Mobile Applications Development
- Data Management Working Group
 - Sub-teams:
 - Data Policy
 - Data Best Practices

USGS

Metadata and Documentation

USGS National Geospatial Data System

CDI is a community of practice established in 2009

- Facilitate discovery of data and tools
- Improve use of scientific computing capacity
- Develop, implement scientific data products and services
- Enable data integration

CDI members

- USGS data providers/practitioners/scientists/consumers
- External partners in government, academia, industry

State: AASG State Geothermal Data

Towards a national data integration framework

USGIN: data integration framework

- Modular, Distributed, Web-based, Interoperable
- Open source or common off-the-shelf software
- Focus on adapting existing capabilities
- Implement Catalog of geothermally relevant resources
 - USGIN Metadata profile, utilize ISO standards for encoding
 - Open Geospatial Consortium (OGC) Catalog Service for the Web (CSW)

Decouple services from data

Develop and document protocols for data access

- OGC Web Map Service and Web Feature Service
- Develop simple feature templates for standard data types

Differences and Similarities - EU, Canada, USA

Canada & USA:

- “bottom up” technical development is robust and dynamic
- “top down” leadership and financial support missing
 - in Canada due to conflicts over authority and legislated jurisdiction
 - in USA due to Federal-State separation, and PI-driven research focus

European Union:

- INSPIRE offers the "top down" guidance with a policy/compliance consequence

Continental divide – or convergence?

Geologic data in Canada

•13 Federal, Provincial and Territorial Geological Surveys.

• Government geological survey activities, including data management, are coordinated by the National Geological Surveys Committee (NGSC).

• Surveys share and integrate data in a variety of partnership projects (eg the "Geoscience for Energy and Mapping" Project focussed on northern Canada)



Data Management

• Each Canadian survey manages its data digitally and provides access in digital and paper map form.

• Geological surveys collaborate on technology development (eg the Ganfeld software for data entry in the field).

• The "Geoscience for Energy and Mapping" Program is building a common multi-agency bedrock and surficial geology database for northern Canada.

Data Access and Dissemination

• Each Canadian survey provides access to its data online through a website using locally-defined standards.

• The Geological Survey of Canada and 3 provinces (Newfoundland & Labrador, Manitoba, & Ontario) serve some of their geology data to OneGeology.

• Data specialists from Canadian geological surveys met in Ottawa in Sept 2011 to discuss collaboration, data integration, and technology sharing.

• Earth Sciences Sector (GSC) data experts contribute to OneGeology and IUGS standards development.

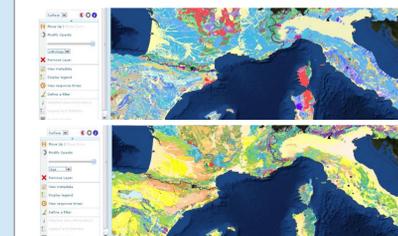


OneGeology - Europe

- A 2-year \$4.5 million European Commission funded project
- Core of 20 national geological survey partners across Europe
- Objective: make existing digital geological spatial data more easily discoverable, accessible and useable
- Help geological surveys comply with INSPIRE – the EU SDI Directive - which all EU nations are legally bound to do!

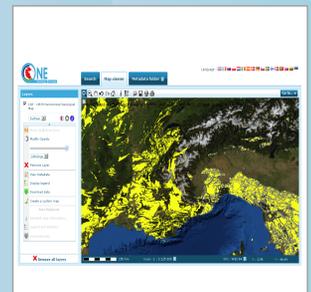


Harmonised WMS and SLD



- 20+ nations
 - different laws
 - different cultures
 - 16 languages
- 20+ organisations
 - different drivers and business models
 - diverse practices and "standards"
 - different stages of digital maturity
 - huge range of experience and capabilities
- 1000's of geoscientists

- Interoperable geology spatial dataset at 1:1 million scale available from distributed data from 26+ EU nations
- Multilingual discovery metadata profile and portal have been implemented
- State-of-the-art multilingual web map portal available
- Multinational deployment of geoscience specifications & OGC standards to view and download data
- Significant progress with the harmonisation of geoscientific language in Europe (and globally)
- Single simple harmonised data licence now used by all data providers allowing immediate free access for all users



Where we are

- Need for improved harmonized data services widely recognized in Geological Survey Organizations (GSOs)
- OneGeology provides a proven standards-based model for making geodata services discoverable and accessible
- INSPIRE, through OneGeology-Europe, has developed and demonstrated a workable approach for integrating GSO geodata service into a single harmonized EU data catalogue and associated services
- Standards and technologies are available but not broadly implemented due to cost

Gaps

- OneGeology cannot yet provide the rich varied data services GSOs believe they require
- Limited collaboration between Canadian, US and EU GSO WRT geodata service harmonization
- OneGeology-Europe work is not being exploited fully in N. America
- Considerable parallel development in geoscience knowledge management and dissemination among N. American and EU GSOs and initiatives

Opportunities

- OneGeology is incorporating to permit it to expand the scope and quality of its offerings
- Establishment of a body to facilitate collaboration and improved technology sharing between N. American and EU GSOs and initiatives
- OneGeology-Europe work could be customized for N. American application



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