GWML2 implementation (Australia)

Andrew MacLeod, Bruce Simons & Peter Dahlhaus
An interoperative spatial information portal that federates groundwater data from disparate sources. >400k bores, >3M monitoring records, >450k chemistry records, etc.

Primarily for research and investigation.

Non-government portal (unique?).

Dahlhaus et al. 2016
https://doi.org/10.2166/hydro.2015.169
The VVG portal is used daily by a wide cross-section of society

Use by sector:
- Commercial: 120 (43%)
- Government: 56 (20%)
- Community: 30 (11%)
- Water authority: 30 (11%)
- Research: 28 (10%)
- Other (unspecific): 8 (3%)
- Education: 6 (2%)
VVG used in OGC interoperability experiments

Groundwater Interoperability Experiment 2 (GW2IE) 2012 - 2016
OGC WaterML2: Part 4 – GroundWaterML2 (GWML2) 2016 -

Second Environmental Linked Features Interoperability Experiment (SELFIE) 2018 - 20

Mostly collaborations of participants from organisations in European Union, North America & Oceania
GWML2 Interoperability Experiment

• Tested the GWML2 model by implementing services
  • Based on Victorian State Government and FedUni research bore data

• Physical model xml-implementation

• WaterWell
  • Borehole construction
    • Headworks
    • Casing
    • Screening
    • Filtration
  • Lithological logs
  • Stratigraphic logs
GWML2 Interoperability Experiment

- Victorian Aquifer Framework
  - Modelled Raster surfaces represented as GWML2 features
  - Aquifer, FluidBody

- Victorian Mineral Springs Database + GDE’s
  - GW_Spring
  - Groundwater flows, interactions
    - Discharge / Recharge
GWML2 Interoperability Experiment

• Hydrochemistry
  • O&M service delivering chemistry observations
  • Controlled vocabulary for Observed Properties (skos)
  • Linked to GWML2 features (tested querying + filtering)
    • Feature of Interest (bore/well) - proximal
    • Parameter (hack) to real world (aquifer/fluid body) – ultimate FOI
Technical Architecture

MySQL and PostgreSQL Databases

Geoserver + Application Schema module

Custom PID and Routing manager

Complex Database views to reorganise and map data

Manual XML-based mapping configuration
SELFIE Updates and Lessons

• Improved Persistent Identification (PID) and URI Management

• Content Negotiation (Conneg) by encoding type
  • Implemented new representations in HTML and (experimental) JSON-LD

• Our Use Case
  • Federating / harmonising information about the same bore/well from different data providers, data sources and schema’s/API’s

• Lessons
Lessons, Challenges, Future Work

• Ease of implementation is vital
• The combination of domain/informatics/technical expertise helps a lot
• Many solutions exist now that weren’t available at the time of GWML2IE
  • Geoserver features-templating Extension
  • Content Negotiation by Profile
• Extracting meaning with use of Semantic tech and Ontological knowledge
• High volume time-series and sensor data
Thank you!