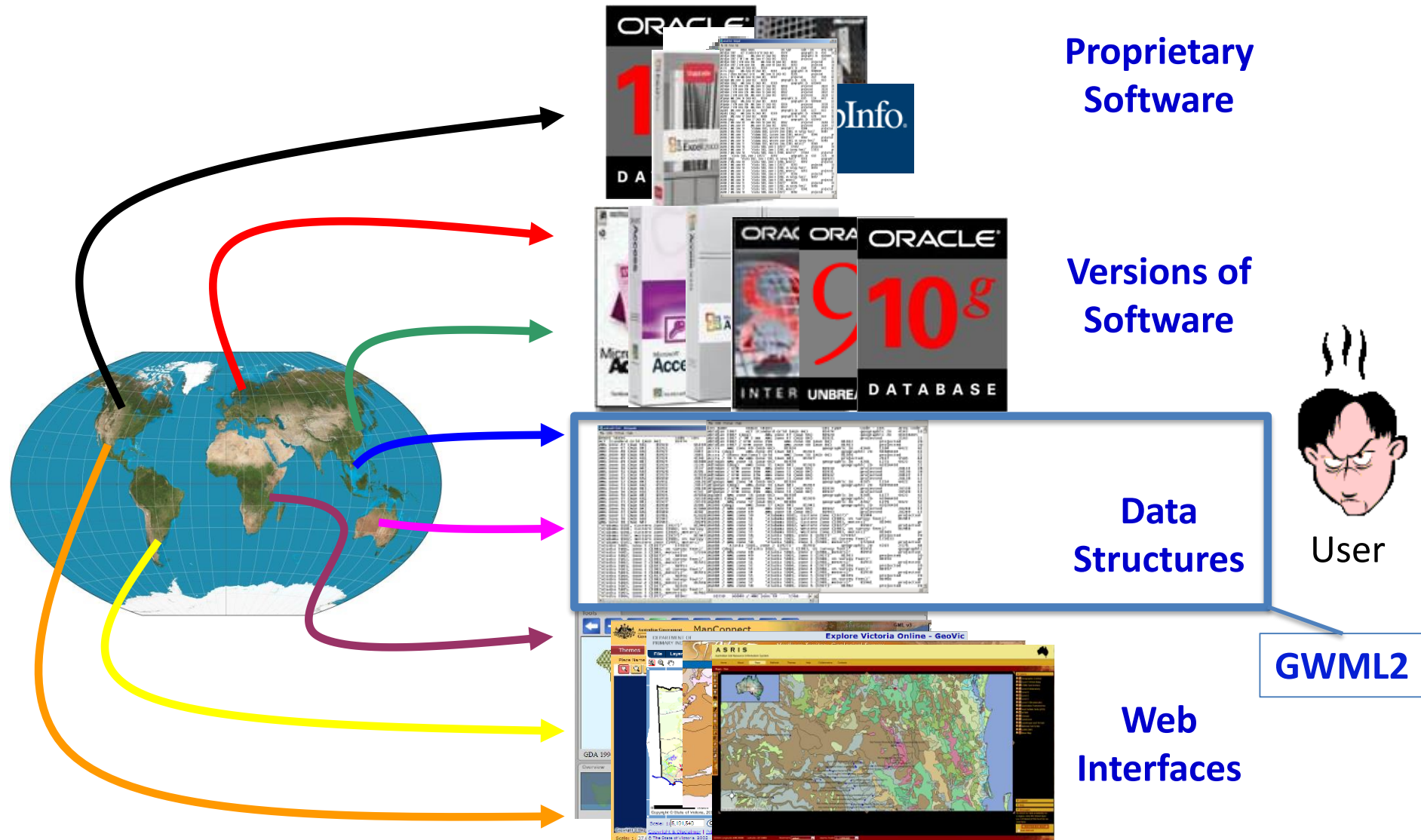


The Groundwater Interoperability Experiment 2: developing an international groundwater data exchange standard

Peter Dahlhaus¹, Sylvain Grellet², Boyan Brodaric³, Eric Boisvert³, Bruce Simons⁴, Alexander Kmoch⁵, Jessica Lucido⁶, Bernhard Wagner⁷, Laurence Chery², Francois Letourneau³, Andrew Macleod¹

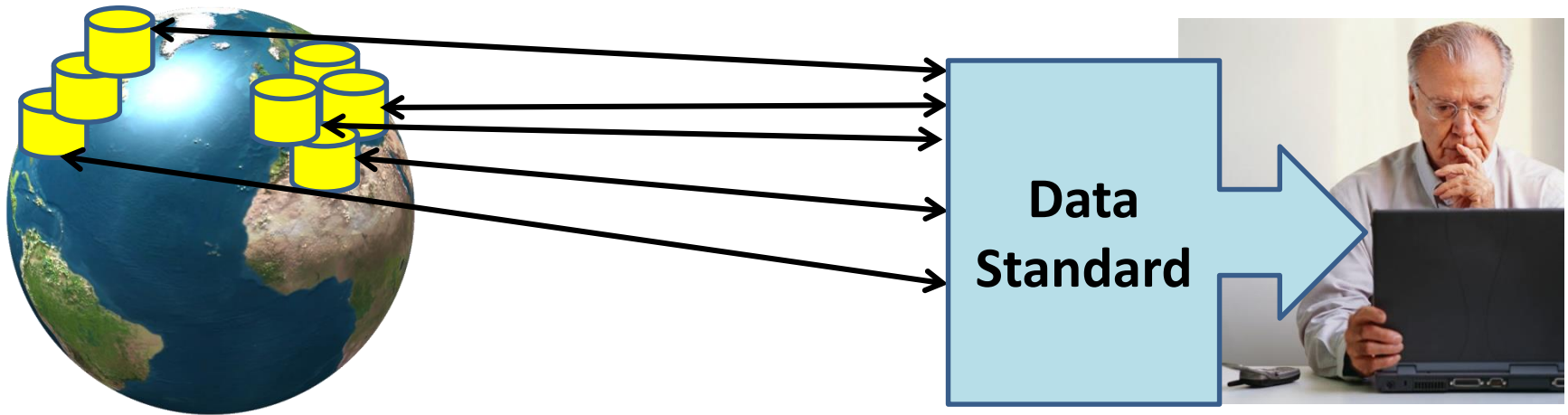
1. Federation University Australia, Ballarat, Australia p.dahlhaus@federation.edu.au
2. Bureau de Recherche Géologiques et Minières (BRGM), France
3. Geological Survey of Canada (GSC), Canada
4. CSIRO Land and Water, Australia
5. Salzburg University (U Salzburg), Austria
6. U.S. Geological Survey (USGS), USA
7. Geological Surveys of Germany (GSG), Germany

The problem: disparate data & databases



The solution: interoperability

Making disparate data usable in a seamless manner
regardless of its original collective heterogeneity...
the data remains with the custodian...
but can be available to the public in the same portal



Requires a **data standard** developed and maintained
by key stakeholders

Open Geospatial Consortium: an international consortium of companies, government agencies and universities that develops publically available international spatial data standards for data interoperability.

OGC^(R) standards are technical documents that detail interfaces or encodings used by software developers.



Groundwater Interoperability Experiment 2 (GW2IE)

http://external.opengis.org/twiki_public/HydrologyDWG/GroundwaterInteroperabilityExperiment2

Interoperability? How?

Full interoperability requires adopting common:

- systems** - communication protocols (e.g. for web services);
- syntax** - representation language (e.g. Extensible Markup Language (XML), JavaScript Object Notation (JSON) or others);
- structure** - data schema (e.g. GWML1);
- semantics** - content vocabulary (e.g. for water quality parameters); and
- pragmatics** - best practices in the collection and use of the data

GWML2 interoperability experiment

Aims:

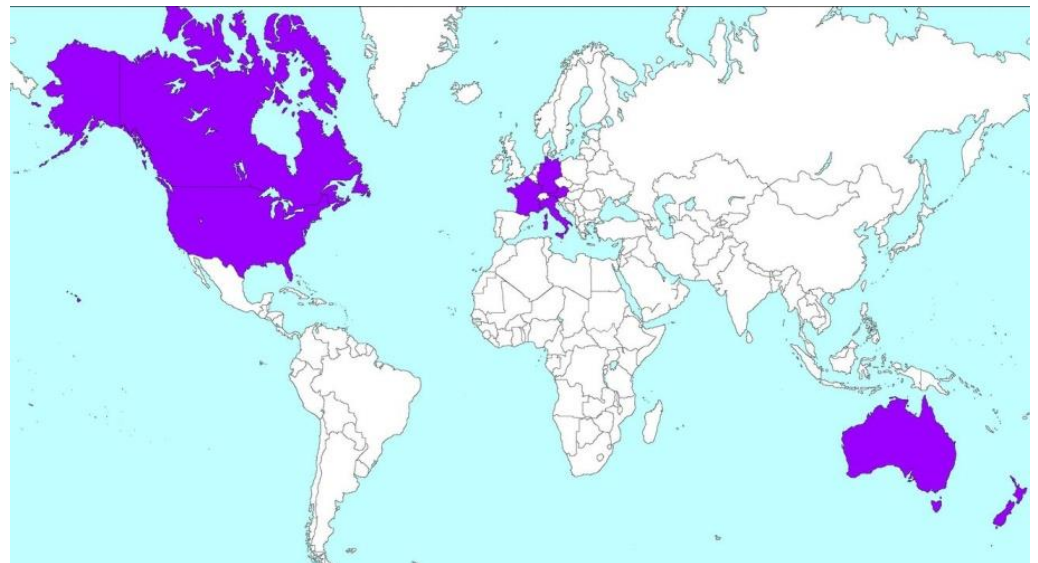
- Develop an international groundwater information model
- Develop a GML application schema, for groundwater data
- Harmonize existing models (GWML, INSPIRE)

Regions:

North America

Europe

Australasia



Participants:

Europe:

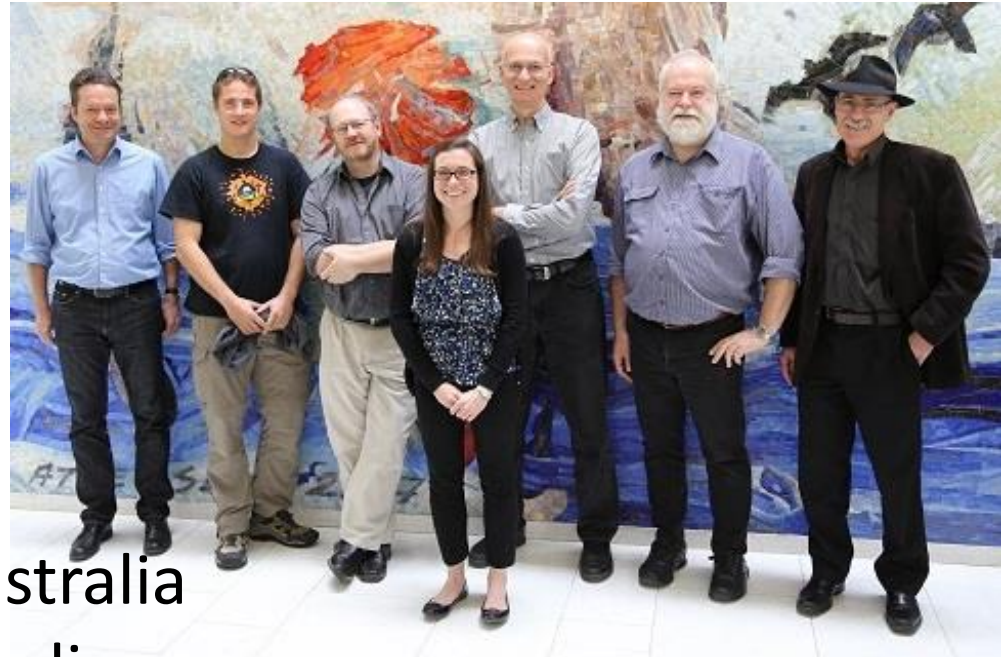
- Bureau de Recherches Géologiques et Minières
- Joint Research Centre, European Commission
- Geological Surveys of Germany
- Salzburg University

North America:

- Geological Survey Canada
- U.S. Geological Survey

Australasia:

- CSIRO
- Bureau of Meteorology, Australia
- Federation University Australia
- New Zealand Geological Survey (GNS)



GWML2 interoperability experiment



Use Cases



Agreed entities



Conceptual Schema



Logical Schema



Physical Schema

Five use cases tested

- **Commercial** – find water wells, estimate cost of water supply well
- **Policy** – meet EU Water Framework Directive requirements
- **Environmental** – assess risks to groundwater dependent ecosystems
- **Scientific** – determine flow of groundwater via modelling software
- **Technologic** – map GWML2 to existing models

Quick

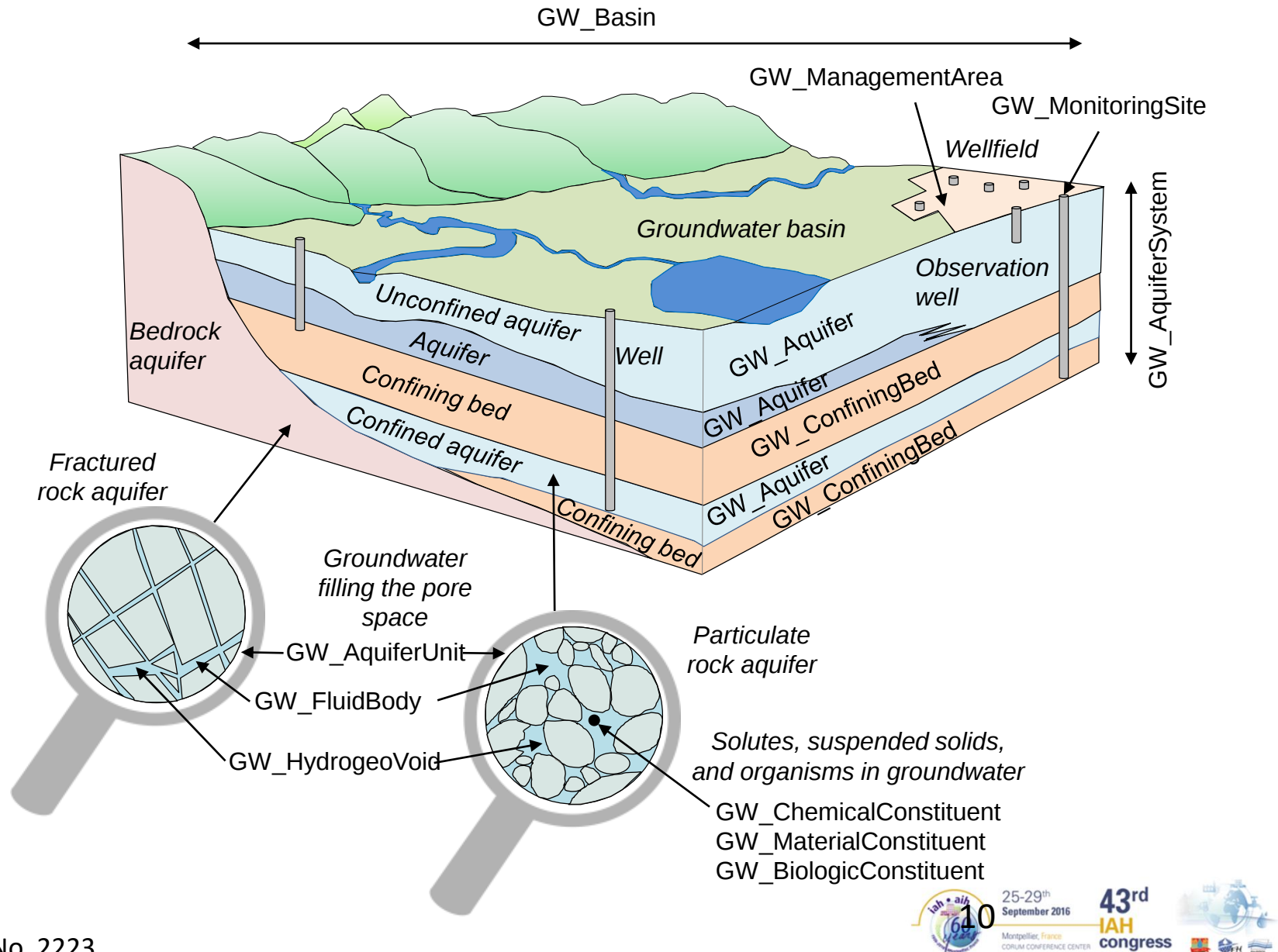
ROTATI
ZOOM:

PAN: Left Mouse + Right Mouse + Drag

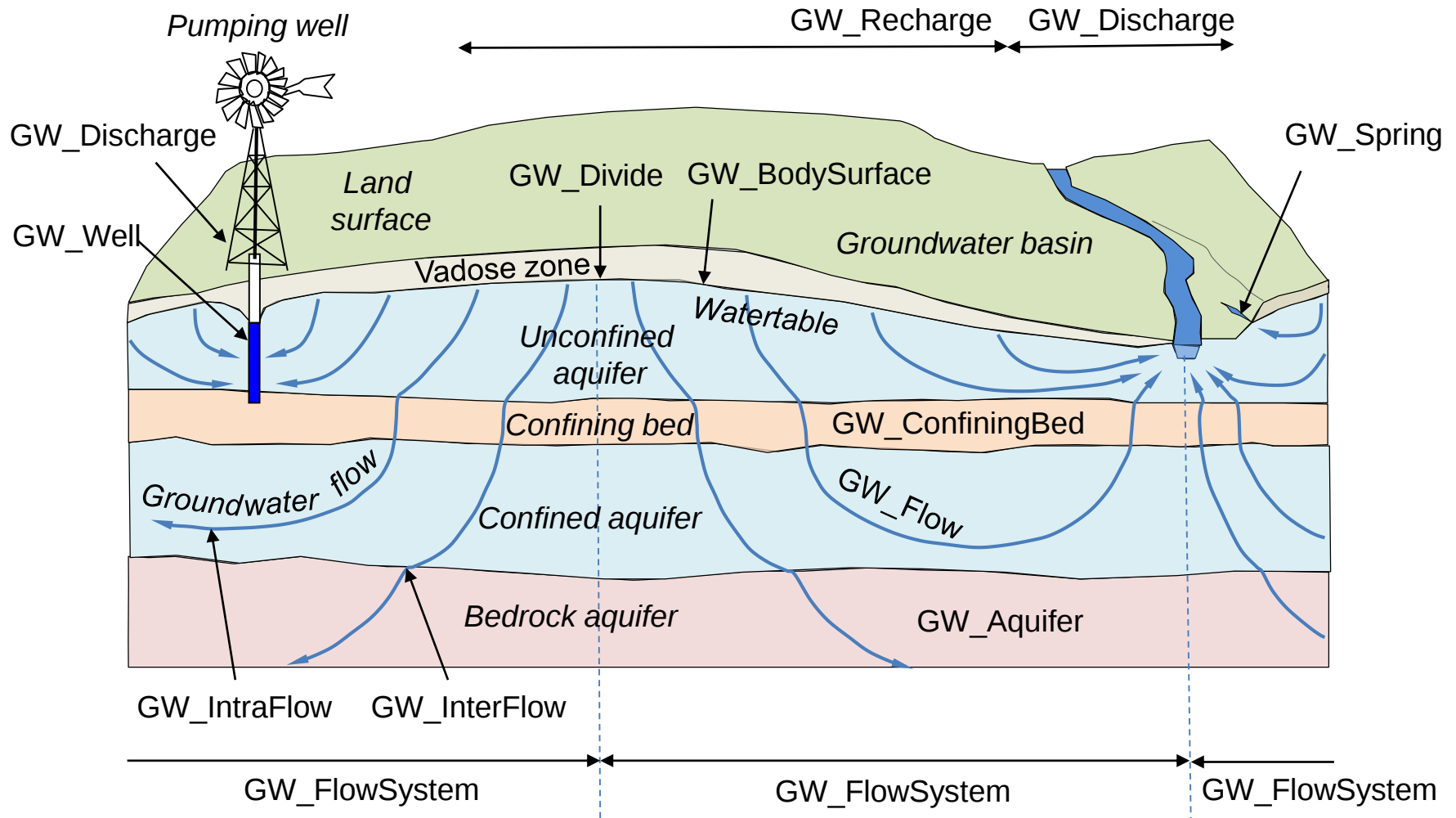
SELECT Bore: Left Mouse + Double Click

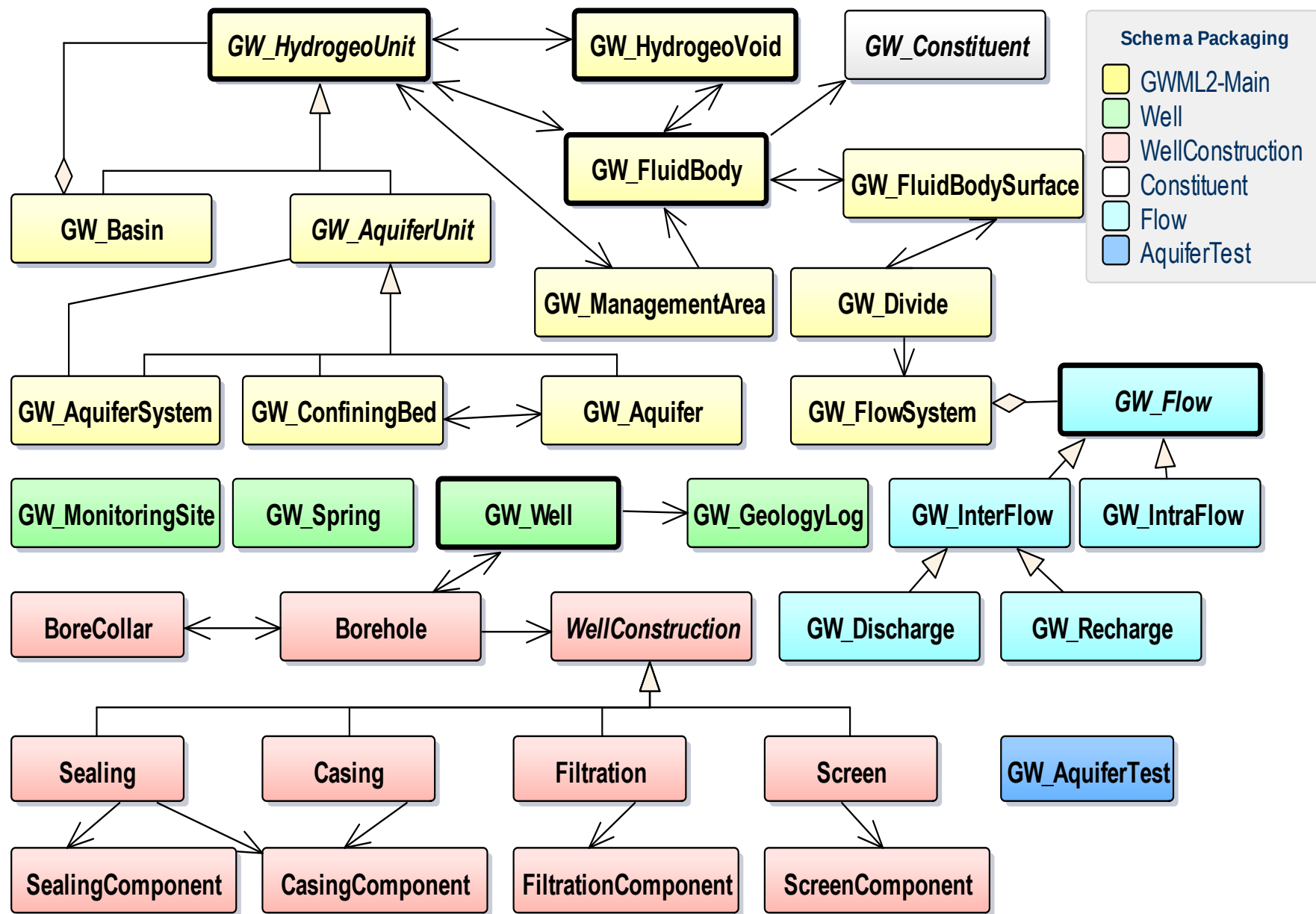
Abstract No. 2223

Entities: HydrogeoUnits, Voids, Fluid Bodies



Entities: Flow, Well





simplified UML representation of the GWML2 conceptual schema. Colours denote distinct packages within the logical schema

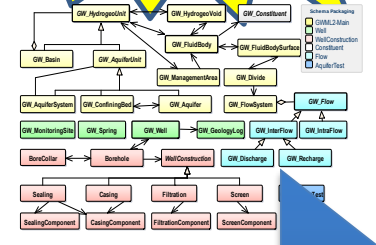
Conceptualised April 2011
Commenced October 2012

57 meetings

Demonstration
services



Establish
SWG



June 2015

September 2015

December 2015

March 2016

September 2016



Engineering
Report



Draft GWML2
standard

The Groundwater Markup Language standard

OGC WaterML 2: Part 4 – GroundWaterML 2 (GWML2)

- Is now part of international standards for exchange of water data
- Borrows from other standards (e.g. Geological data, Water data, Observations & Measurements, etc.)
- Is maintained by a Standards Working Group



HydrologyDWG

Log In or Register

You are here: OGC Public Wiki > HydrologyDWG Web > GroundWaterSWG (27 May 2016, BoyanBrodaric)

GROUNDWATER Standards Working Group (GW SWG)

Google **OGC GW SWG** to find it!