Meeting Host

Manaaki Whenua
Landcare Research

Supporting Partner

Land Information New Zealand
Toitū te whenua

Meeting Sponsors

NIWA
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Ministry for the Environment
Manatū Mō Te Taiao

koordinates

Soil Data Interoperability Experiment

105th OGC Technical Committee

Palmerston North, New Zealand

Alistair Ritchie

6 December 2017

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Making location count.

Agenda

- Background
- Design
- Demonstrations
- Observations

Interoperability Experiments

- Standardization by doing – address real problems

- '**Brief**, low-overhead, formally structured and approved initiatives led and executed by OGC members to achieve specific technical objectives'

  From: http://www.opengeospatial.org/ogc/programs/ip

- Should lead to the formation of a Standards Working Group that moves the IE results to a formal specification

Soil Data Interoperability Experiment

- OGC and the IUSS Working Group on Soil Information Standards
- OGC Initiators
  - CSIRO (AU)
  - Manaaki Whenua (NZ - Initiative Manager and Technical Lead)
  - ISRIC World Soil Information (NL)
- Active Participants
  - Federation University of Australia (AU)
  - USDA Natural Resource Conservation Service (US)
  - Agribiology and Pedology Research Centre (IT)
  - USGS (US)
  - Horizons Regional Council (NZ)
  - Tumbling Walls (US)

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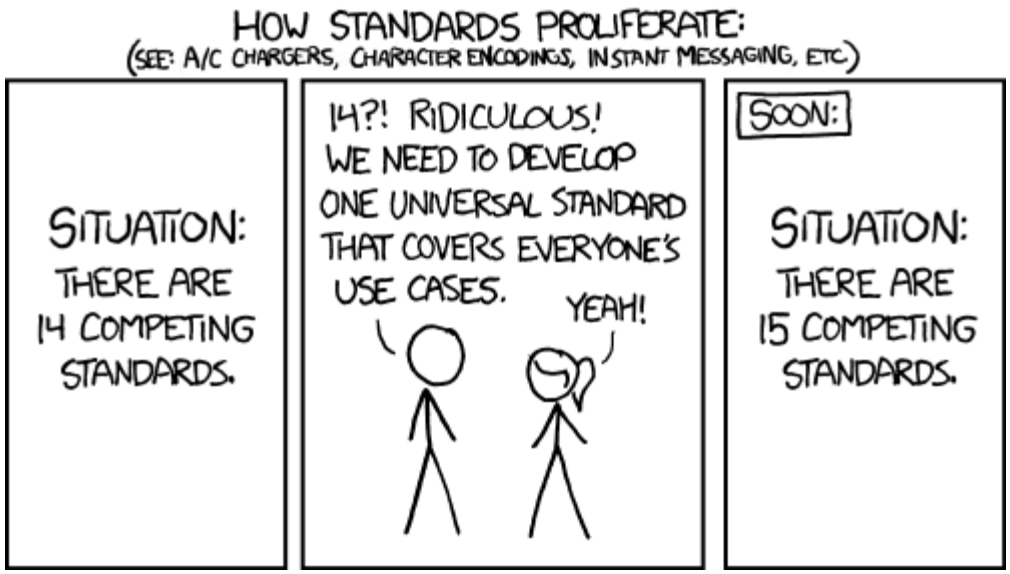
Motivation

- SOIL is essential to ALL life
- The most complex biological material on the planet
- We need to better understand and manage our global soil resources
  - Primary industry; development; food security; natural hazards
- We just don't know enough to do this well
- Urgent need to exchange data and information on our soils
- Need a structured, flexible and long lived global soil information system
- Well defined standards are essential to this system

Motivation

- Reconcile five existing standards into a single standard …



- Not quite … point to prove … can use existing standards

Use Cases

- Use Case 1: soil data integration & publication

  Publication of heterogeneous soil data from different databases at different agencies

- Use Case 2: soil sensor data

  Publication of data from sensors monitoring dynamic soil properties

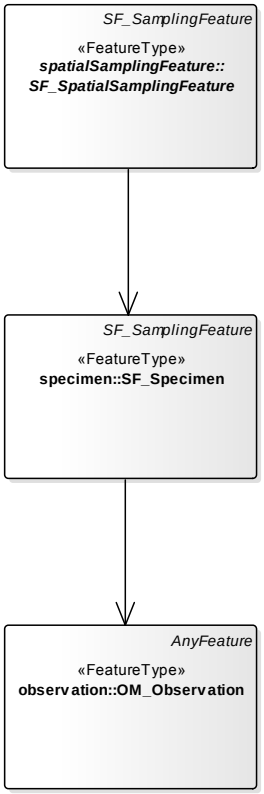
- Use Case 3: soil property modelling and predictions

  Provision of high resolution estimates of functional soil properties generated using digital soil mapping techniques – e.g. GlobalSoilMap project soil property predictions

- Use Case 4: pedo-transfer functions

  Process observed and interpreted soil properties using of pedo-transfer functions - algorithms that calculate additional interpreted soil properties

Soil Observations



ISO19156/OGC10-004r3 - Observations and Measurements

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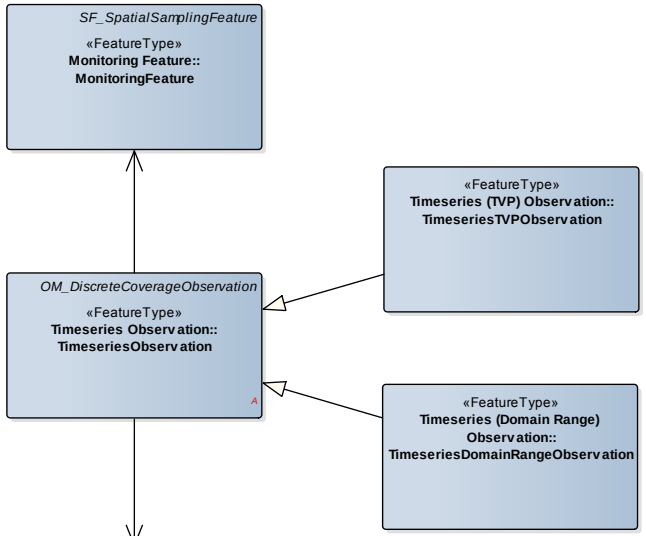
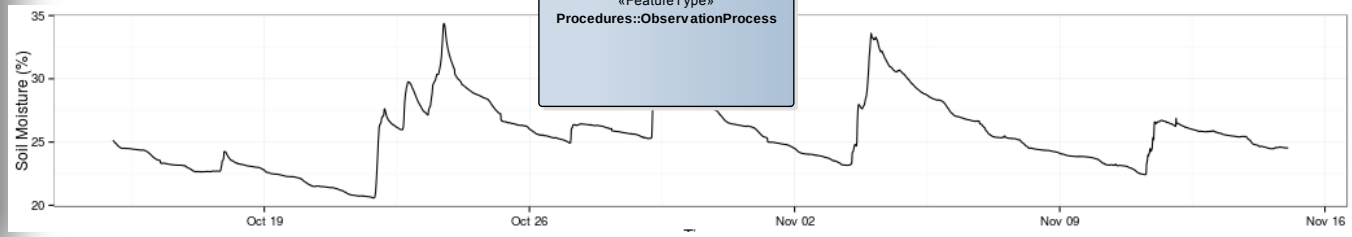
Soil Sensors



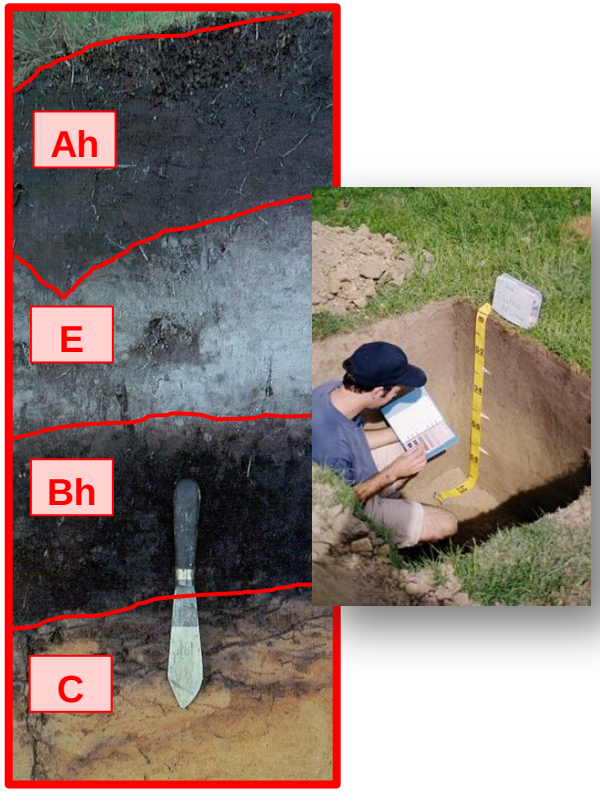


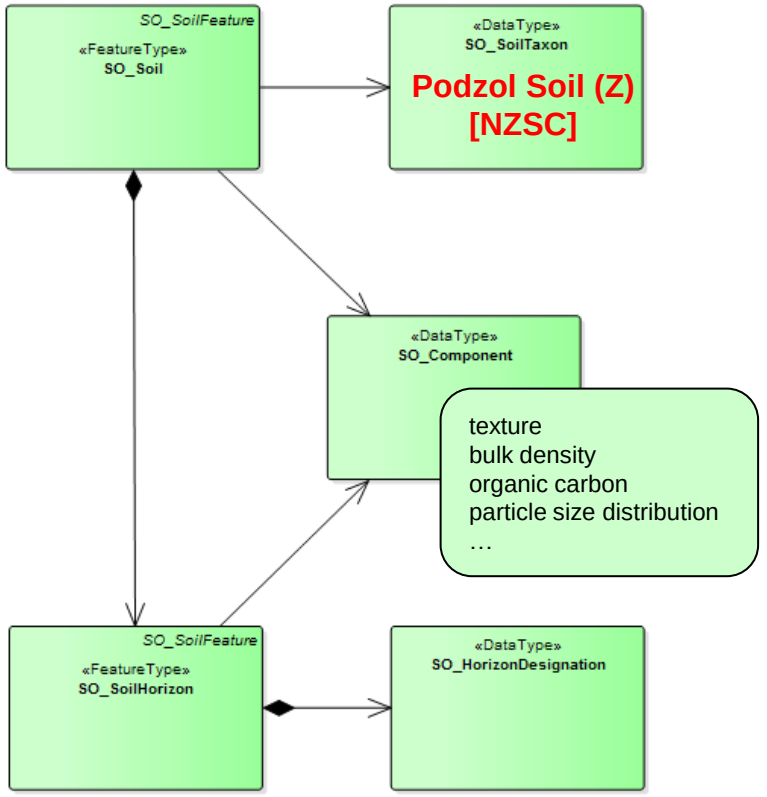
OGC15-043r3 – Timeseries Profile of Observations and Measurements

Soil Descriptions

- Reviewed five existing standards – no ‘winner’

  ANZSoilML; e-SOTER SoTerML; INSPIRE Soil; ISO SoilML; IUSS/ISO ‘Wageningen Proposal’ (effort to reconcile ANZ and ISO)





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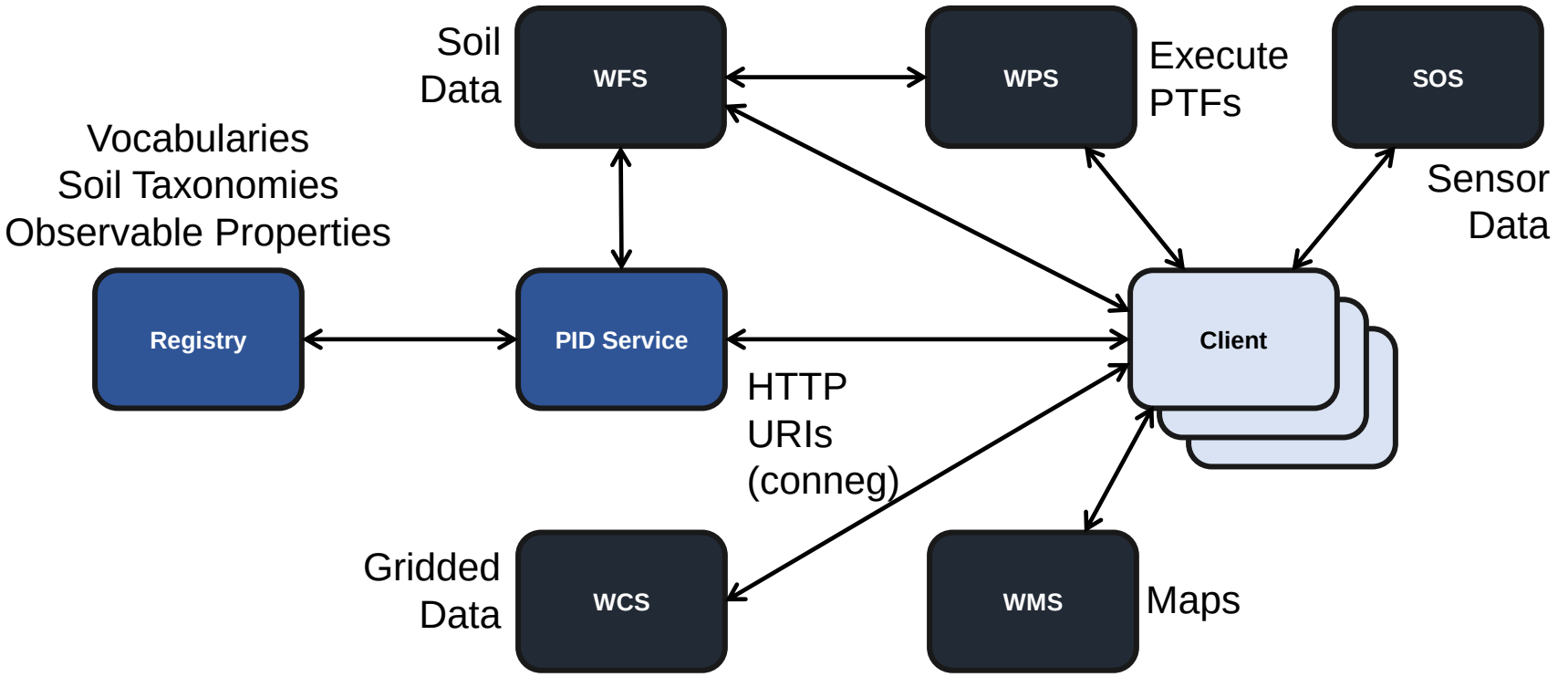
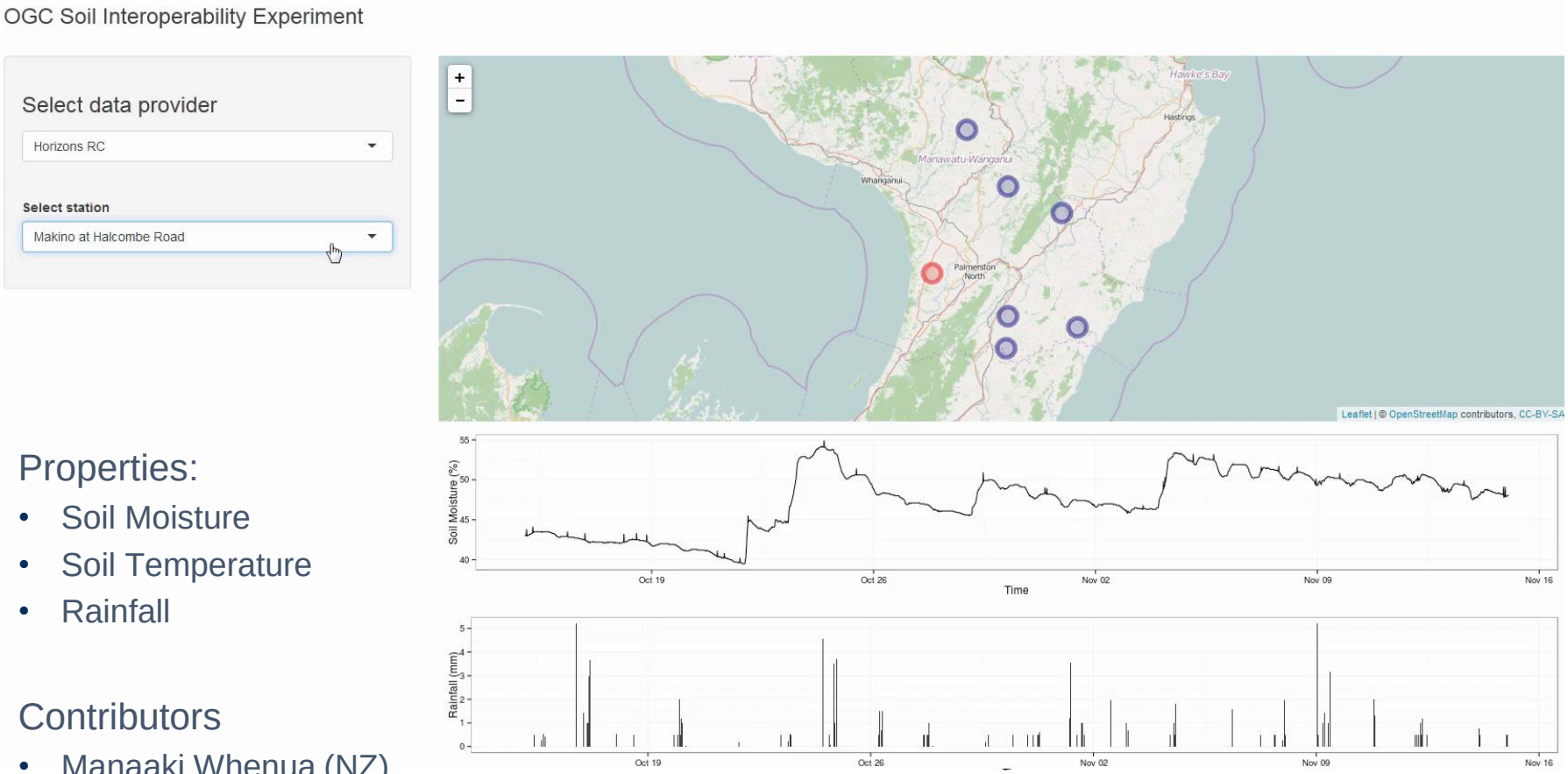
Implementation



Demonstration – Soil time series data



Properties:

- Soil Moisture
- Soil Temperature
- Rainfall

Contributors

- Manaaki Whenua (NZ)
- Horizons Regional Council (NZ)
- USGS (US)

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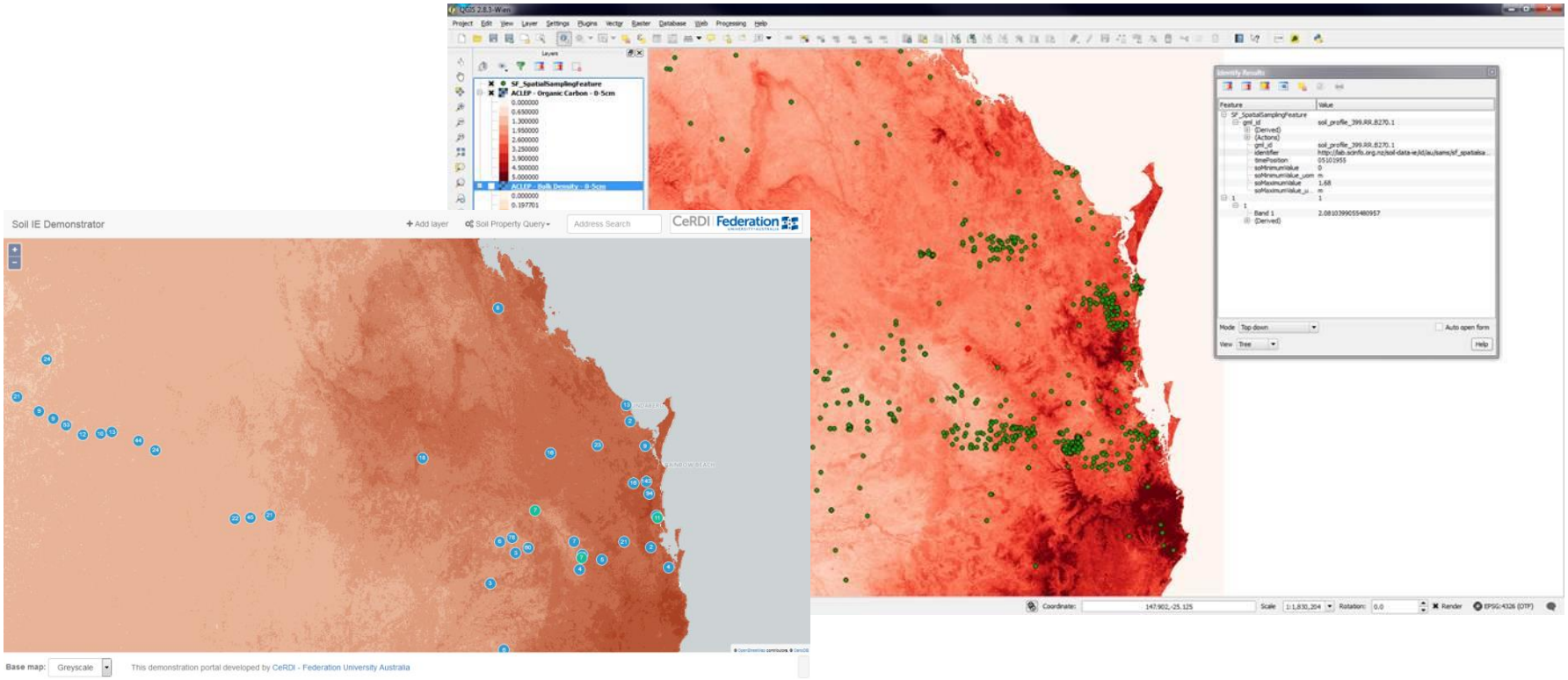
Demonstration – Soil property surfaces



Contributors

- CSIRO Land and Water (AU)
- Federation University of Australia (AU)

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Demonstration - Soil descriptions

Use Cases One and Four

- Field observations
- Sampling
- Laboratory analyses
- Pedo-transfer functions

Contributors

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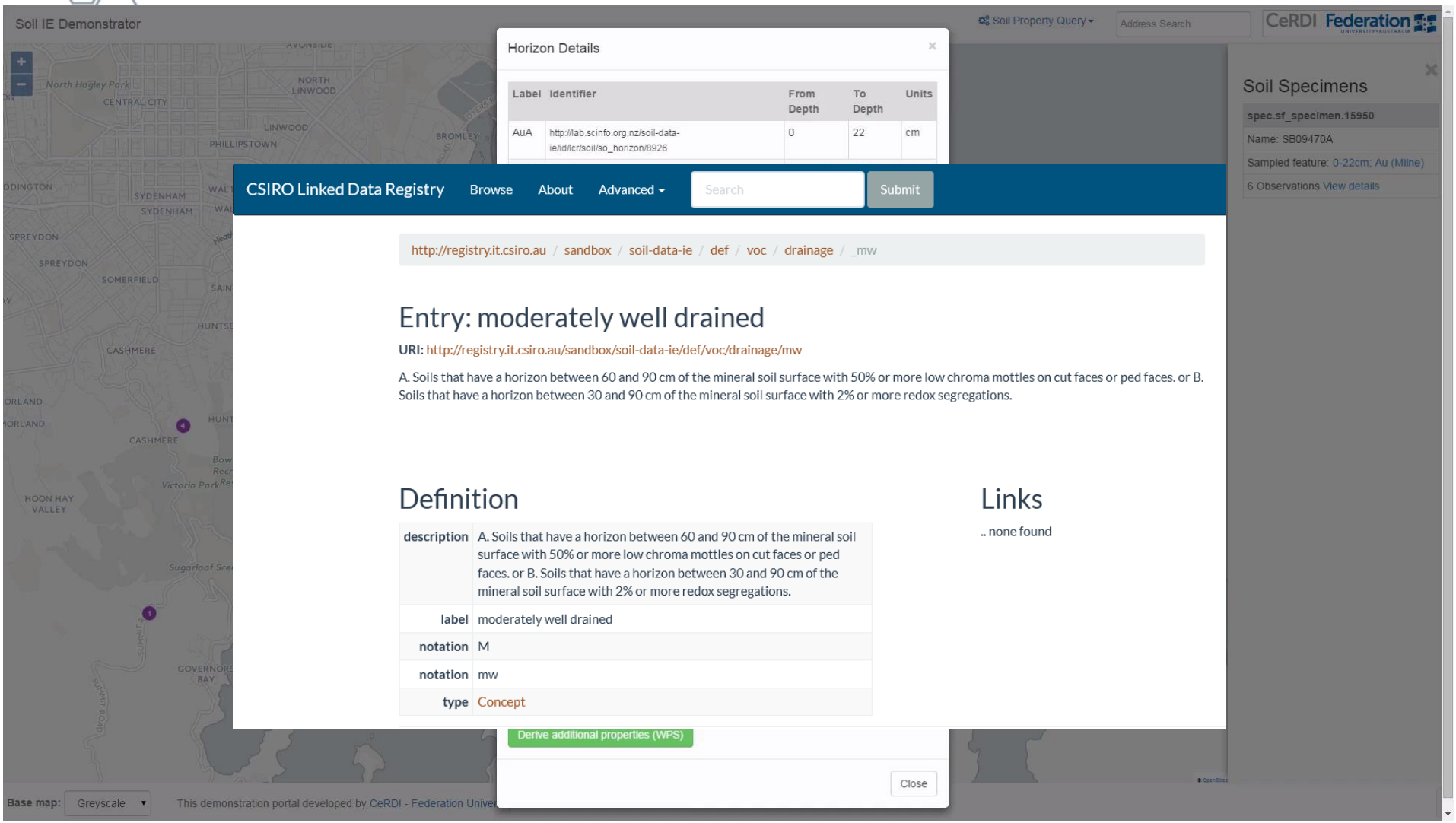
Demonstration - Soil descriptions



Observations

- Model not advanced as hoped
  - Accomplished a lot with O&M + derivatives
  - Soil IE Data model flawed and rudimentary
- Needed to use an unhappy mix of protocols and encodings
  - WxS + GML (+ GeoJSON)
  - Linked Data API + RDF
- Archaic web services and encodings
  - XML not desirable/fashionable
  - Unusual protocols for web developers to work with
  - Need to support modern web practices

Observations

- Removed the tight conceptual/implementation binding
  - Information Models/Ontologies hugely valuable
  - Tight binding can hinder adoption/compromise
  - Model can stay stable (and should)
  - Tech can evolve at its own place
  - If a standard dies because technology changes we've failed

- Domain parochialism/focus
  - There's a lot of common ground between domains
  - Solutions developed in specific contexts
  - Potential for a core environmental data ontology
  - Example: WaterML 2.0 Pt 1 –> TimeseriesML 1.0

Observations

- Is that light the end of the tunnel?
- Alternatives to XML being formalized
  - JSON in test beds and interoperability experiments (ELFIE)
  - Introduction of OWL/RDF
- Promising developments in web service standards baseline
  - WFS 3.0 (OpenAPI, XML, JSON, GeoJSON support)
  - Development focus on basic requirements (rapid) then edge cases (developed over time)
- Developing a set of tools – consortium must embrace them