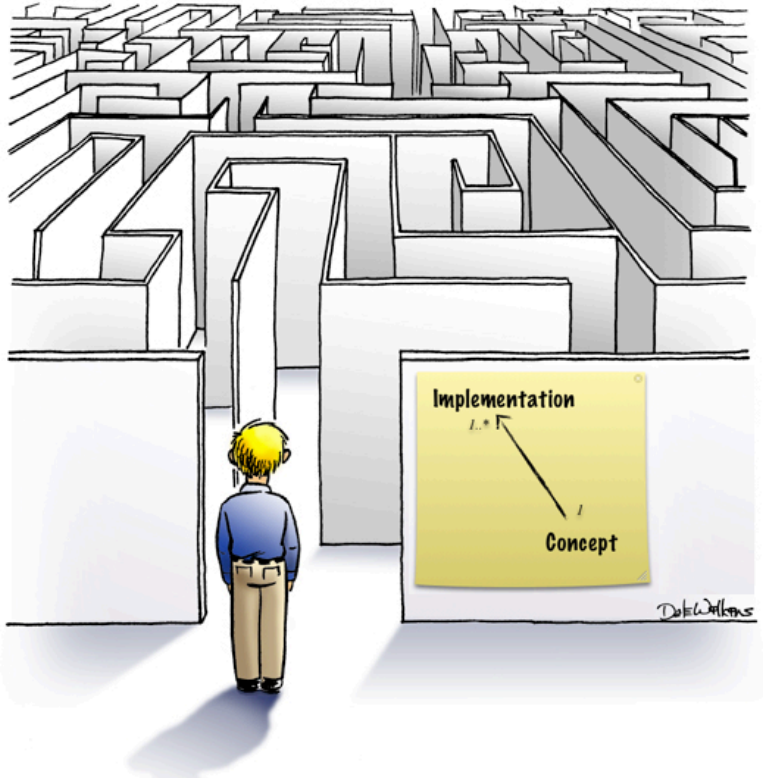

Methodology for developing well-formed Application Schemas using ISO 19109

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Sydney - December, 3rd 2010

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Outline

- Goal: Well-formed Application Schema
- Model Driven Architecture vs. diagramming
- Common Issues
  - Common patterns may be “anti-patterns”!
- Methodology overview
- Application

Sustainable Model Management Research

- Need to systematically capture information models to describe how information in a domain is defined and inter-related.
- “Sustainable Water Information Models” research project
  - Evaluate modelling formalisms
  - Consider long term evolution and maintenance of systems
  - Identify critical gaps in best practice
  - Propose and test solutions
  - Prototype tools to enable improved practices to be implemented
  - Apply best practice to Water Resources domain
    - Adopt or create information models
    - Liaise with emerging standardisation efforts

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Broader Context

- *OGC Hydrology Domain Working Group*
  - *Joint with WMO Commission for Hydrology*
  - *CSIRO leading modelling efforts:*
    - *WaterML (Observation data)*
    - *Features of interest (hydrology, surface and groundwater)*
  - *Exploring role of GRDC Metadata profile*
- *GeoSciML testbed support – implementation of domain models*
- *INSPIRE (Infrastructure for Spatial Information for Europe)*
- *ISO Harmonised Model Working Group*
- *ANZLIC Harmonised Data Model*
- *Global Soil Map project*
  - *Considering input into formalising model*

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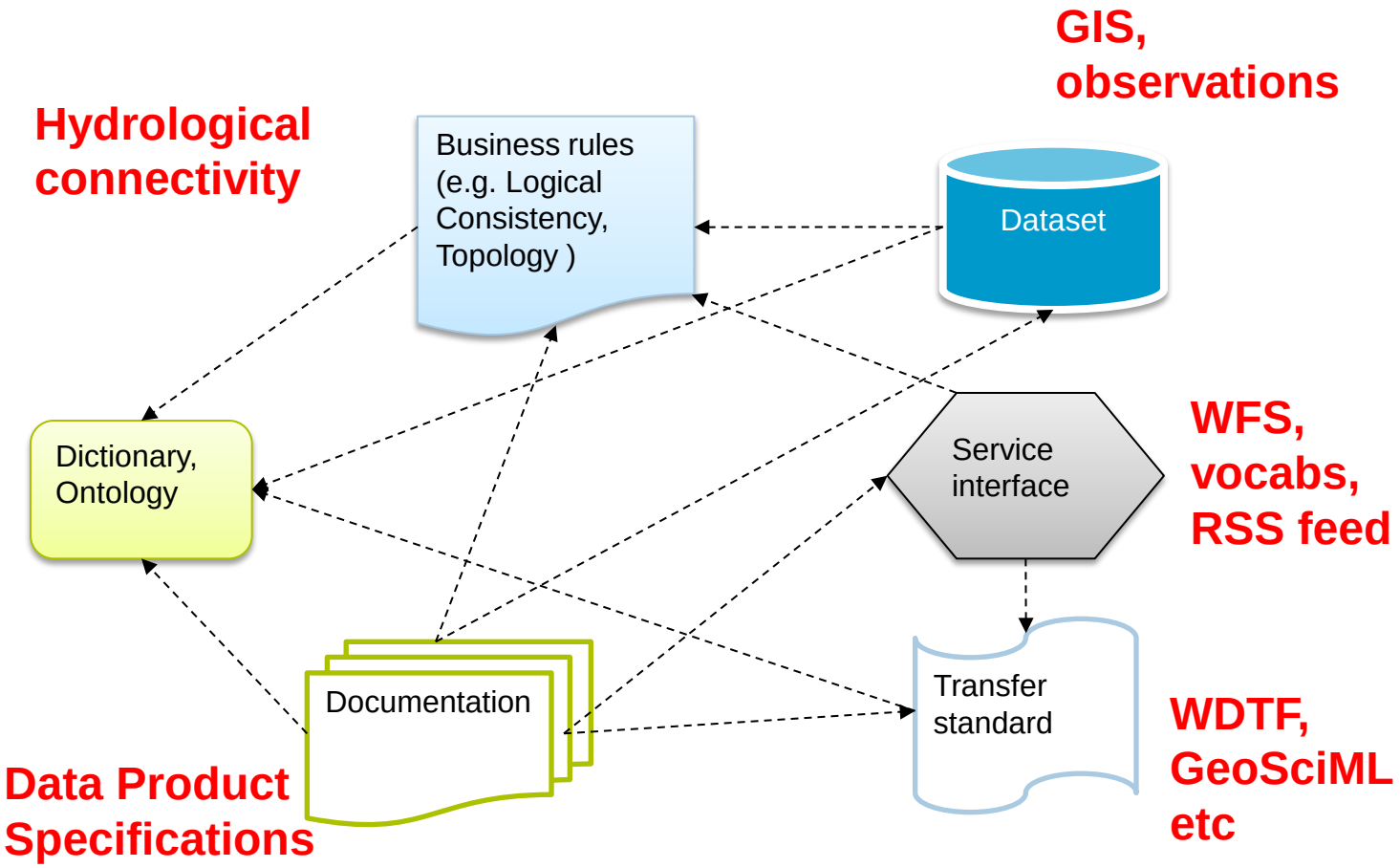
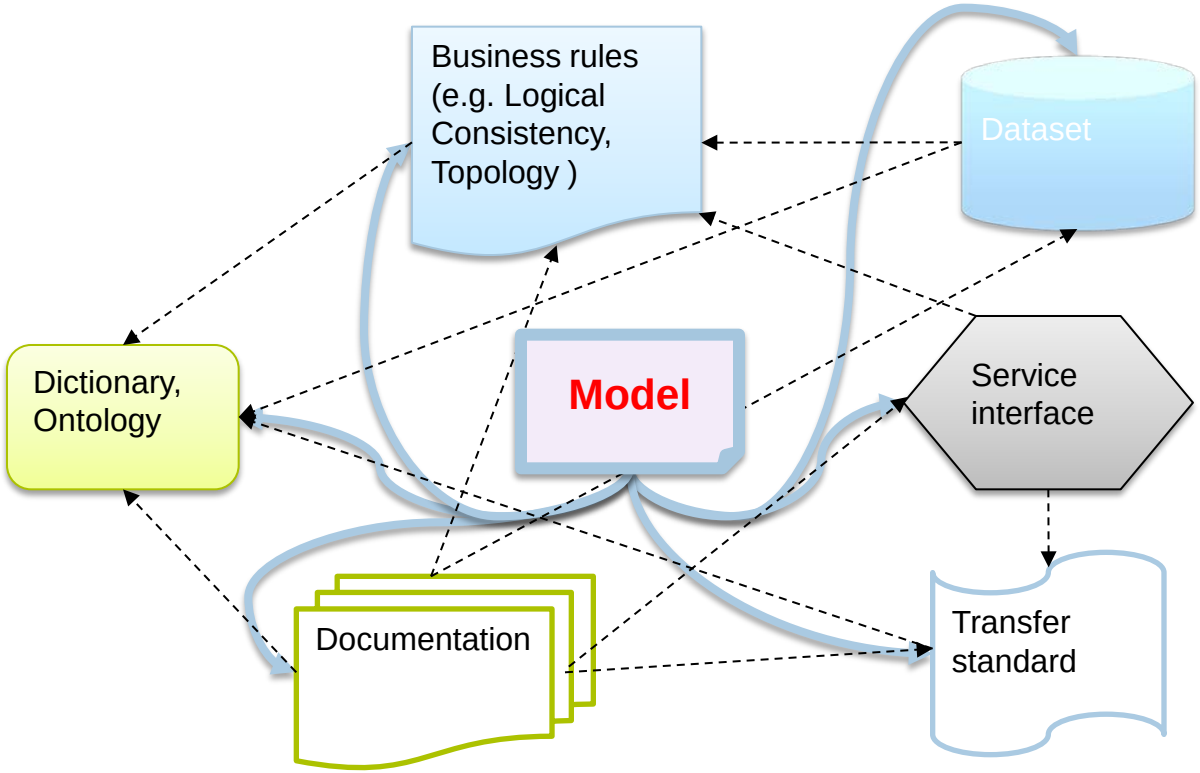
Scope of domain models?

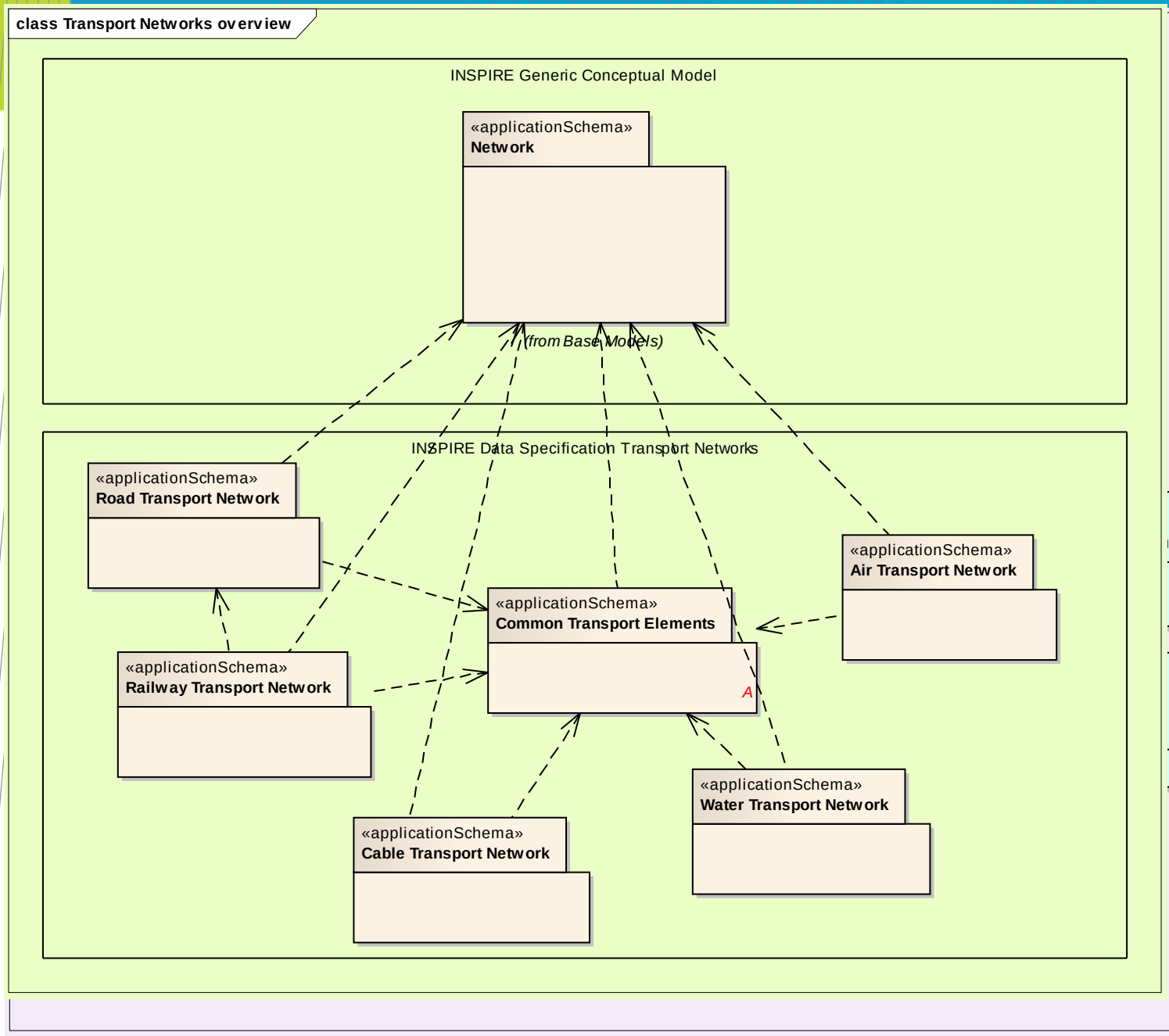


How do we ensure consistency?



Well Formed UML

- UML is like XML, or code...
  - Anybody can produce something
  - Differences in style, readability, usability and manageability
- Goal(s) of a formal information model (Application Schema)
  - Meet usage requirements
  - Be readable
    - Unambiguous language (e.g. ISO 19103)
    - Avoid detailed redefinitions of common concepts (not part of your domain!)
  - Be stable
  - Be extensible
    - Because generally you cant model all your domain at once
  - Support re-use of information


class Transport Networks overview
INSPIRE Generic Conceptual Model
«applicationSchema»
Network
(from Base Models)
INSPIRE Data Specification Transport Networks
«applicationSchema»
Road Transport Network
«applicationSchema»
Air Transport Network
«applicationSchema»
Common Transport Elements
A
«applicationSchema»
Railway Transport Network
«applicationSchema»
Water Transport Network
«applicationSchema»
Cable Transport Network

Implications

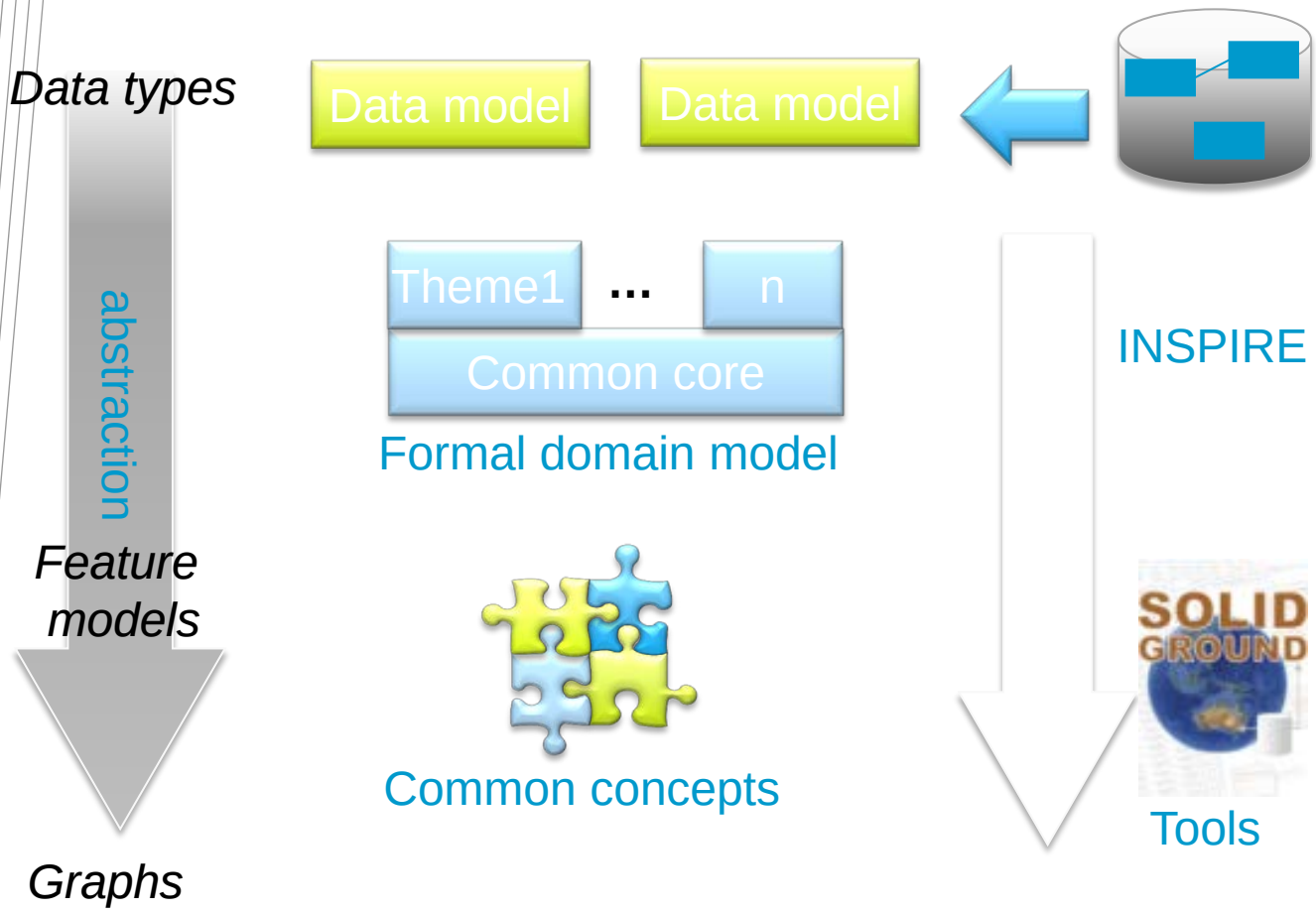
- "Encapsulation"
  - Isolate model from change elsewhere in the model
  - "Modularity"
    - Principles
  - Stability + flexibility
  - Flexibility = incremental change, where and when needed
- Backwards compatibility
  - Models must match real world data exchanges
  - Existing systems will not change
  - Model must be faithful to constraints
- Pragmatism
  - But can be better!
  - Encapsulation allows part of model to be validated first
  - Modules can be glued back together any time (mechanics)

Anti-patterns

- My scope is all there will ever be....
  - I'll just have to redefine everything I need
- The "model" is a diagram
  - Seems to make useful diagrams
  - But isn't useful as a model
- This technology defines the base class
  - Common metadata for all features
  - Therefore they all derive from a single base class.
- My implementation describes the concept...
  - And i'll never change it or the technology I use
  - Modelling in GIS or XML systems

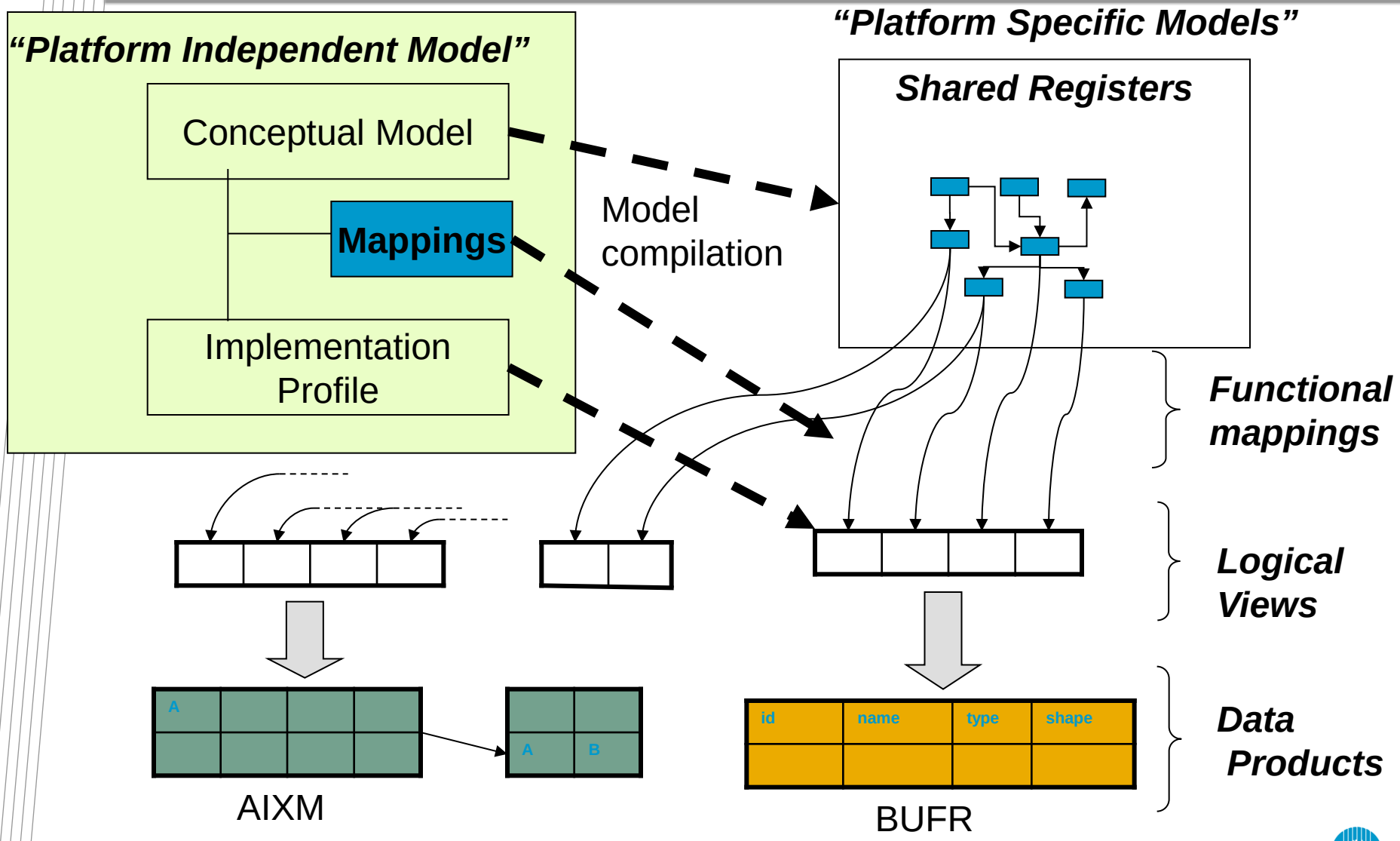
Data Vs Information modelling

- Syntax – e.g. Relational data structures, XML schema
- Semantics – controlled vocabularies and references

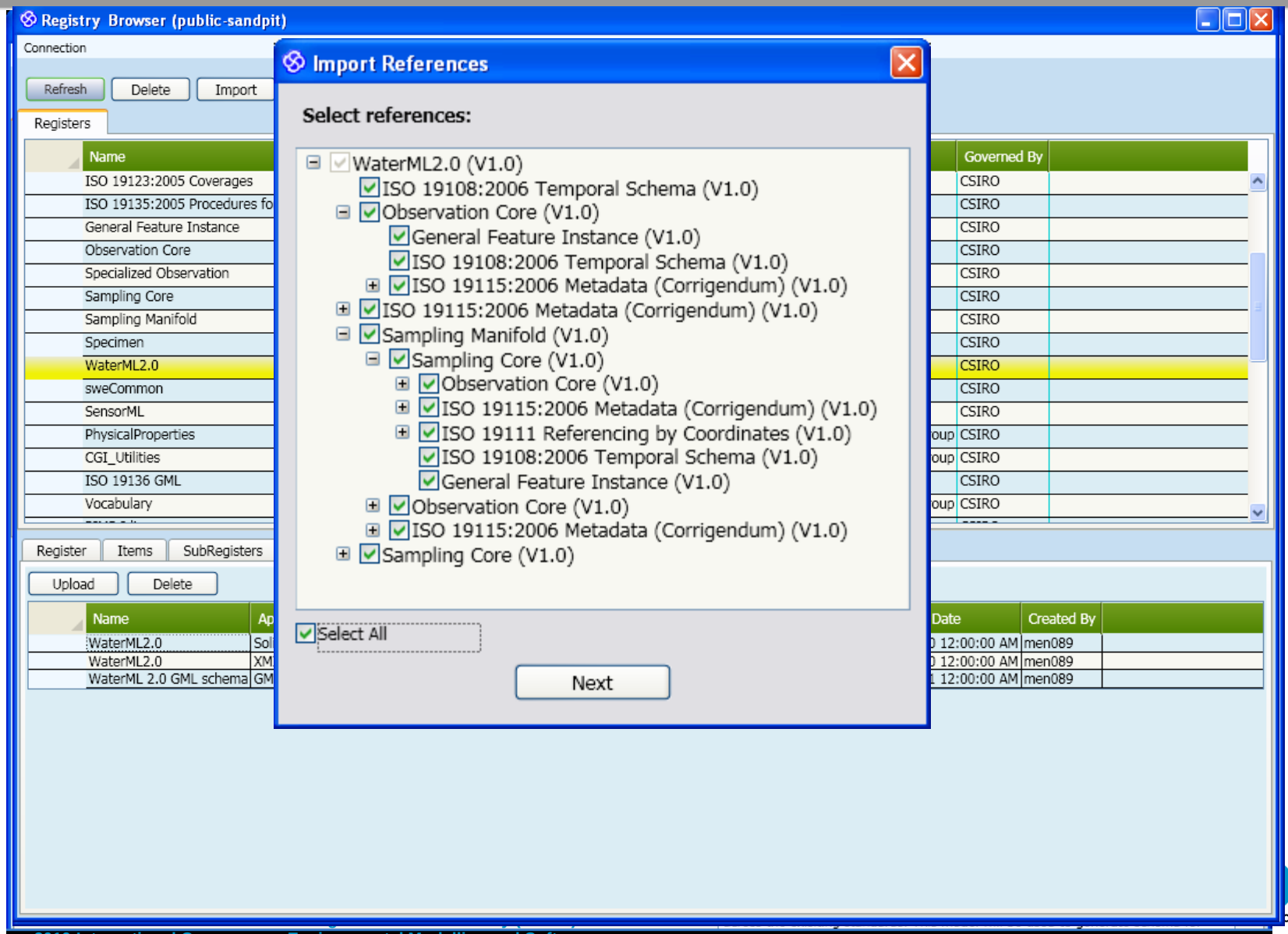


Scope
Single implementation
Single application
Identification of objects across multiple domains

Backwards compatibility with existing products



Managing all the pieces



Tools

- HollowWorld
  - ISO baseline
  - Subversion (SVN)
- SolidGround “HollowWorld Helper” suite
  - Conformance checking
  - Consistent models – diagram generators
  - Tagged value automation
- SolidGround model management
  - MDA round tripping to ISO idiom
  - Model registry
  - *Coming: FullMoon integrated with registry*
  - Version management
  - Model reference management
  - Concept/Implementation mapping

Feature Type Catalogues

- “certainty in interpretation arises from clear definitions of the information components. In reality semantically interoperable data can be exchanged amongst heterogeneous information systems as long as the exchanged information is based on harmonized information models.”

  Implementation Guide to the DGIWG Feature Data Dictionary
- Feature Data Dictionary – concepts (Features, Attributes, Domain, Range)
- Feature Type Catalogue – what features are used in an application (data product?)

- Proposed approach consistent with defining reusable features..
- Then bundling into existing AIXM schema
- Allowing a more modular and extensible future version

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