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METEO FRANCE

Met-Ocean and Hydro DWGs … An opportunity for cross-domain collaboration?

OGC Technical Committee

Toulouse, France

Jeremy Tandy

September 2010

OGC Met-Ocean domain working group: Conceptual modelling

OGC Met-Ocean domain working group provides the forum for development of a harmonized data model for meteorology

The main stakeholders in this activity comprise:

- **WMO**
- **INSPIRE**
- **Aviation community**
- **Earth Science community**

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OGC Met-Ocean domain working group: Conceptual modelling

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INSPIRE Thematic Working Group:
Atmospheric Conditions & Meteorological Features

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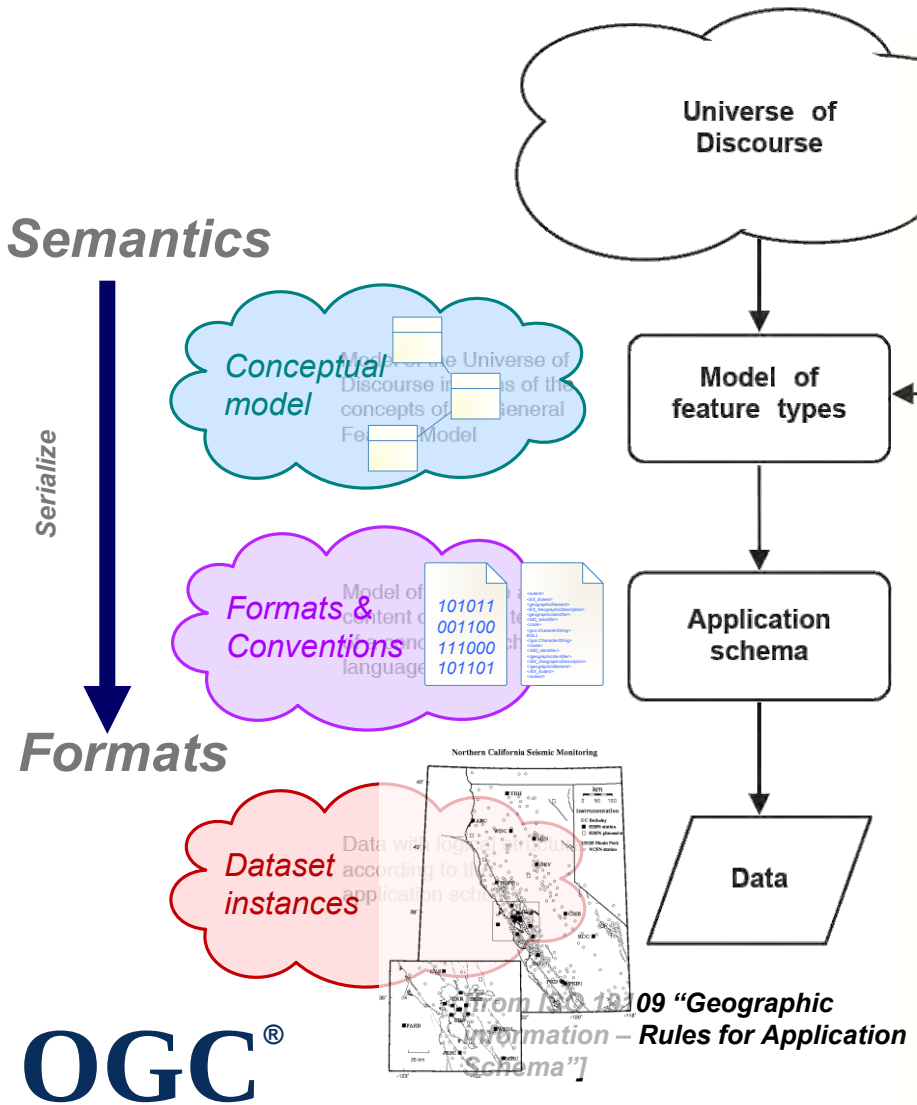
Conceptual modelling for shared understanding *(ISO 19109)*



[From ISO 19109 "Geographic information – Rules for Application Schema"]

Our goal is to establish a core conceptual model that meets the needs of our stakeholder community and maintains compatibility with existing data encodings such as GRIB, BUFR and netCDF – providing a mechanism to map content from one format to another.

A common conceptual model will enable tooling and software to sourced / provisioned from the breadth of the community that subscribes to the core conceptual model

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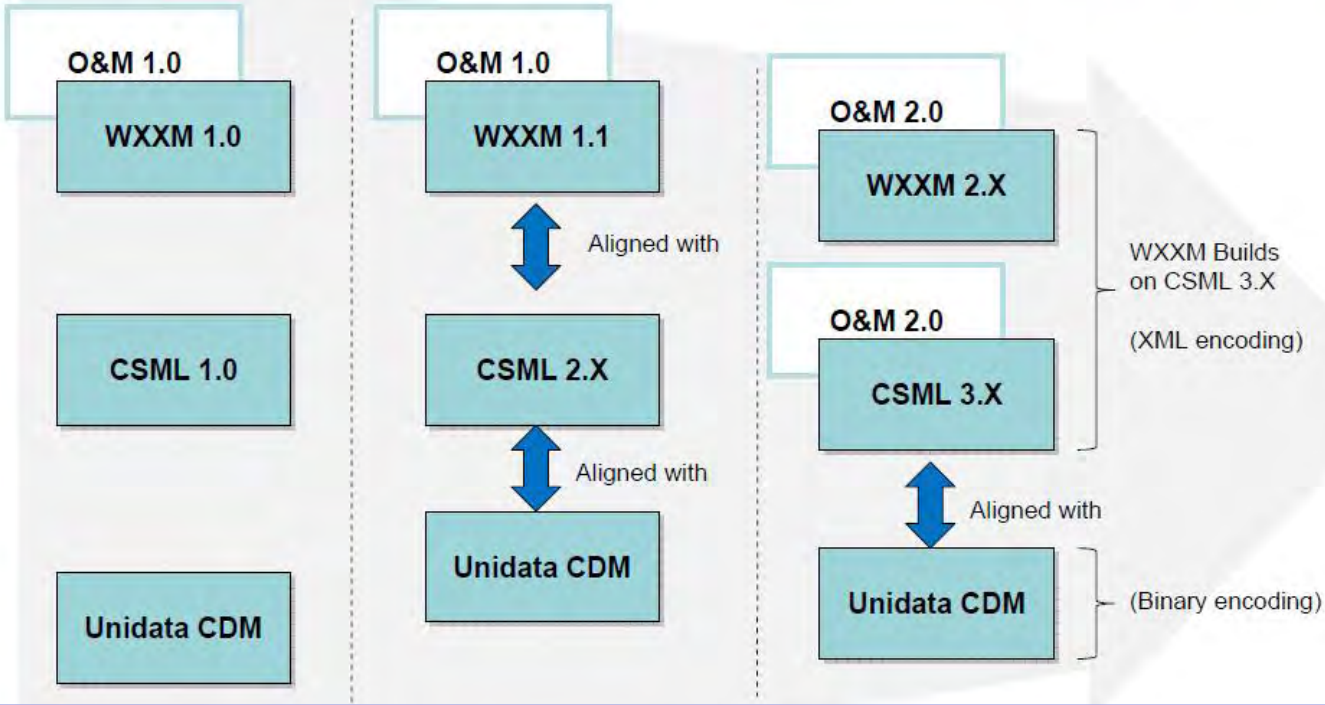
Candidates for convergence?

WXXM 2.0

Aaron Braeckel

WXXM 2.0

Weather Model Convergence?



Briefing to W
04 May 201
National Cen
Boulder, CO

OGC Observations and Measurements (O&M)

now ISO/DIS 19156 Geographic Information – Observations and measurements

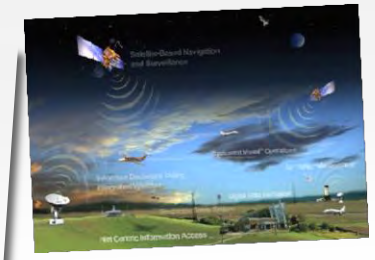
Profiling O&M for meteorology

Adopted variant of INSPIRE methodology for developing conceptual models

Develop narrative based on realistic & focused user scenarios

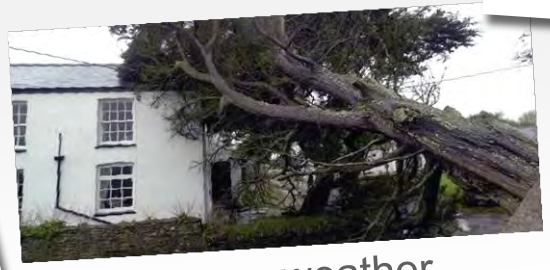
Use cases

current aviation



future aviation

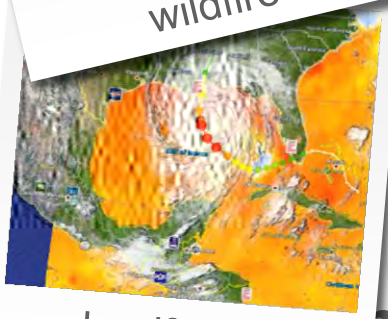
wildfire



severe weather warning service

sustained polar science campaign

climate assessment



landfalling hurricane

plume forecasting for emergency response

winter highways maintenance

riverine flood forecasting

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Cross-domain use case

- UC11: **Riverine Flood Forecasting using Meteorological Ensemble Forecasts**
- Few people are interested in weather itself, it's the **impacts** of weather that are the concern
- **How do we integrate weather & climate information into the hydrology domain?**
- Potential for cross-domain engagement with **Hydrology DWG …**

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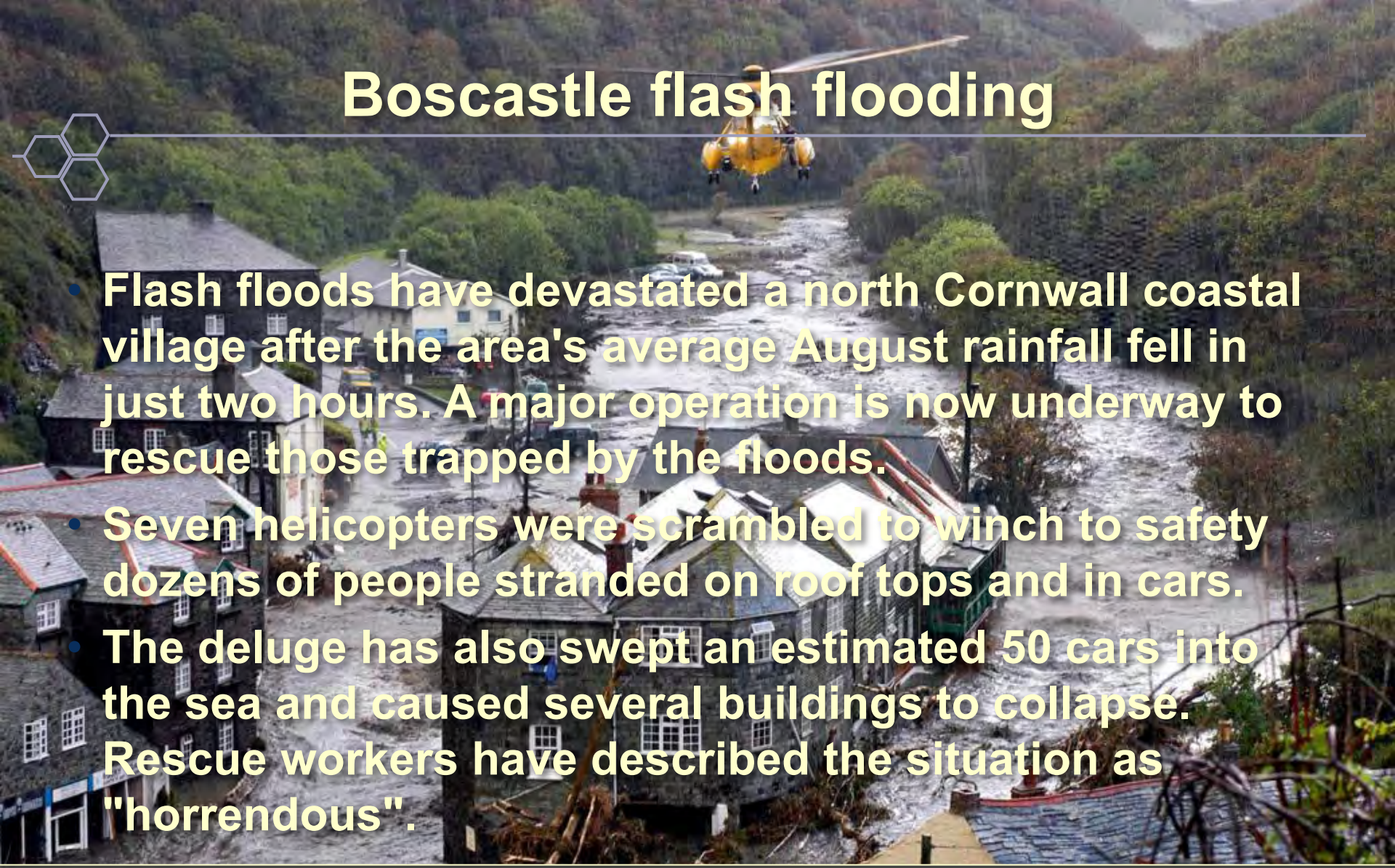
Boscastle flash flooding



- Flash floods have devastated a north Cornwall coastal village after the area's average August rainfall fell in just two hours. A major operation is now underway to rescue those trapped by the floods.
- Seven helicopters were scrambled to winch to safety dozens of people stranded on roof tops and in cars.
- The deluge has also swept an estimated 50 cars into the sea and caused several buildings to collapse. Rescue workers have described the situation as "horrendous".

BBC

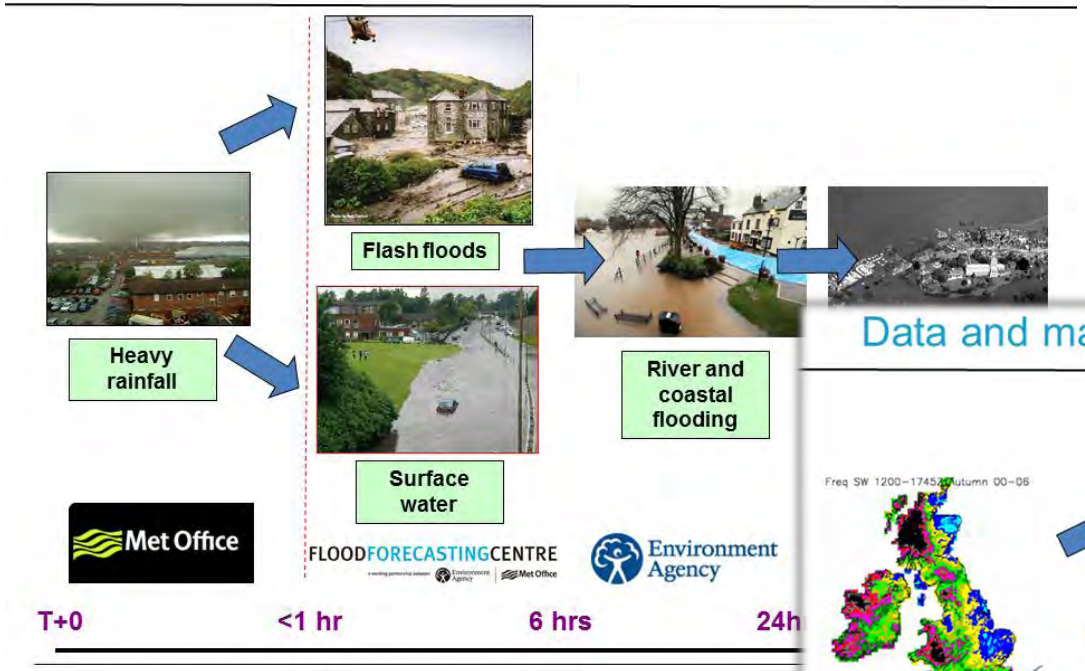
16th August 2004

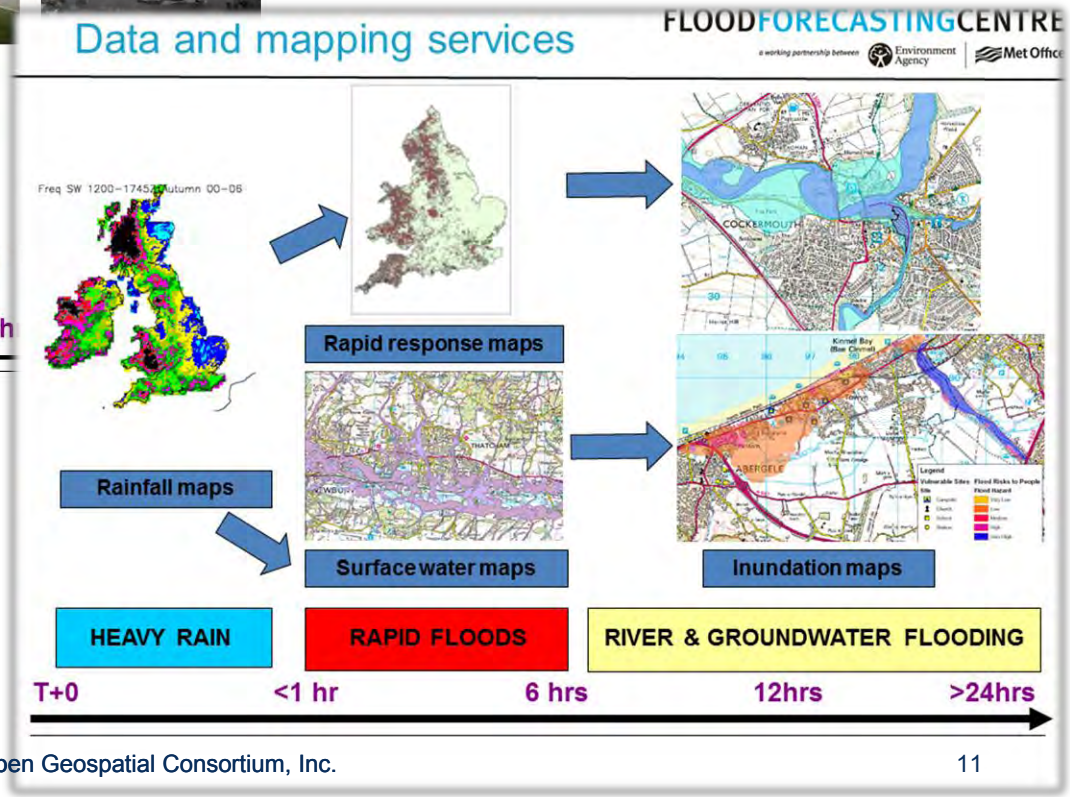
NEWS

Flash flooding – my *local* experience

- Between 1200 and 1700 UTC on 16th August 2004 a huge amount of rain fell into the catchment of the Valency river which runs through Boscastle.
- Rain gauge and weather radar data show that the rainfall was extremely localised, with only 5 2x2 km radar pixels showing a total more than 100 mm, and two rain gauges showing 184.9 and 200.4 mm respectively.

Weather & hydrology – *coupled domains*





Co-exist, *yes* – but tightly or loosely coupled?
Shared *abstract* concepts – TimeSeries

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Creating models to be shared …

- A **domain model** does not exist in isolation …
  - A model will **import** common packages from ISO191xx – only manage what is unique to your domain!
  - Users need **controlled vocabularies** / reference information and rules (i.e. a **profile**) that **binds** them to the **model** so they can create **data instances** that are consistent
- Experience from domain modelling so far:
  - Each model will require 20 – 30 registered vocabularies; but only about 6 seem domain specific. The others are generically applicable across multiple domains, e.g. *units of measure*
- As we build models that are organised into packages for re-use, we find that one community's common core is unlikely to match or integrate with that of another community – **today's thematic modules are not re-usable across domains**
- And if they were, we have no **stable infrastructure to support sharing** … *dependency management, version control …*

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The challenge:

- **How do we design at the correct level of abstraction and modularity to support re-use across multiple domains?**
- **How do we govern and deliver a model so it can be used within or referenced from other domains?**

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- **Water Act (Australia) tasks the Bureau of Meteorology with responsibility for collating, archiving and delivering water information**
- **Collaborating with CSIRO, their *Sustainable Water Information Models* project uses a *model driven approach* for managing water information**
- **To support this CSIRO are developing tools for managing modular models**

Mechanisms for integration of information models across related domains

Rob Atkinson
CSIRO Land and Water
EGU Congress, Vienna, May 2010

www.csiro.au

CSIRO

Theory vs. practice

Semantic overlap...

Soils

Geology

LandUse

Groundwater

disparate

- systems
- modelling efforts
- Governance
- data silos

Same object – multiple representations

Id	code	area	pop
23	SUD	1203.3	23.3

Id	abbrev	area
SD	SUD	1211

Id	label
1123	Sudan

country	GDP
1123	SUD

"SUD"

GIS File

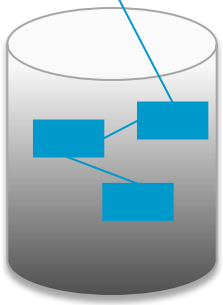
"Sudan"

Report

Id=SD

GIS

"1123,Sudan"



Common model

Id	code	name	auth	type
SD	SD	Sudan	ref	country

Cross-references

Subscriptions

"Republic of Sudan"

"Sudan"

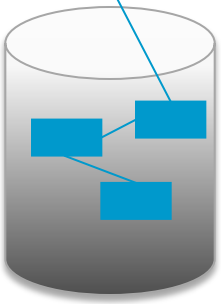
Id=SD

"1123,Sudan"

GIS File

Report

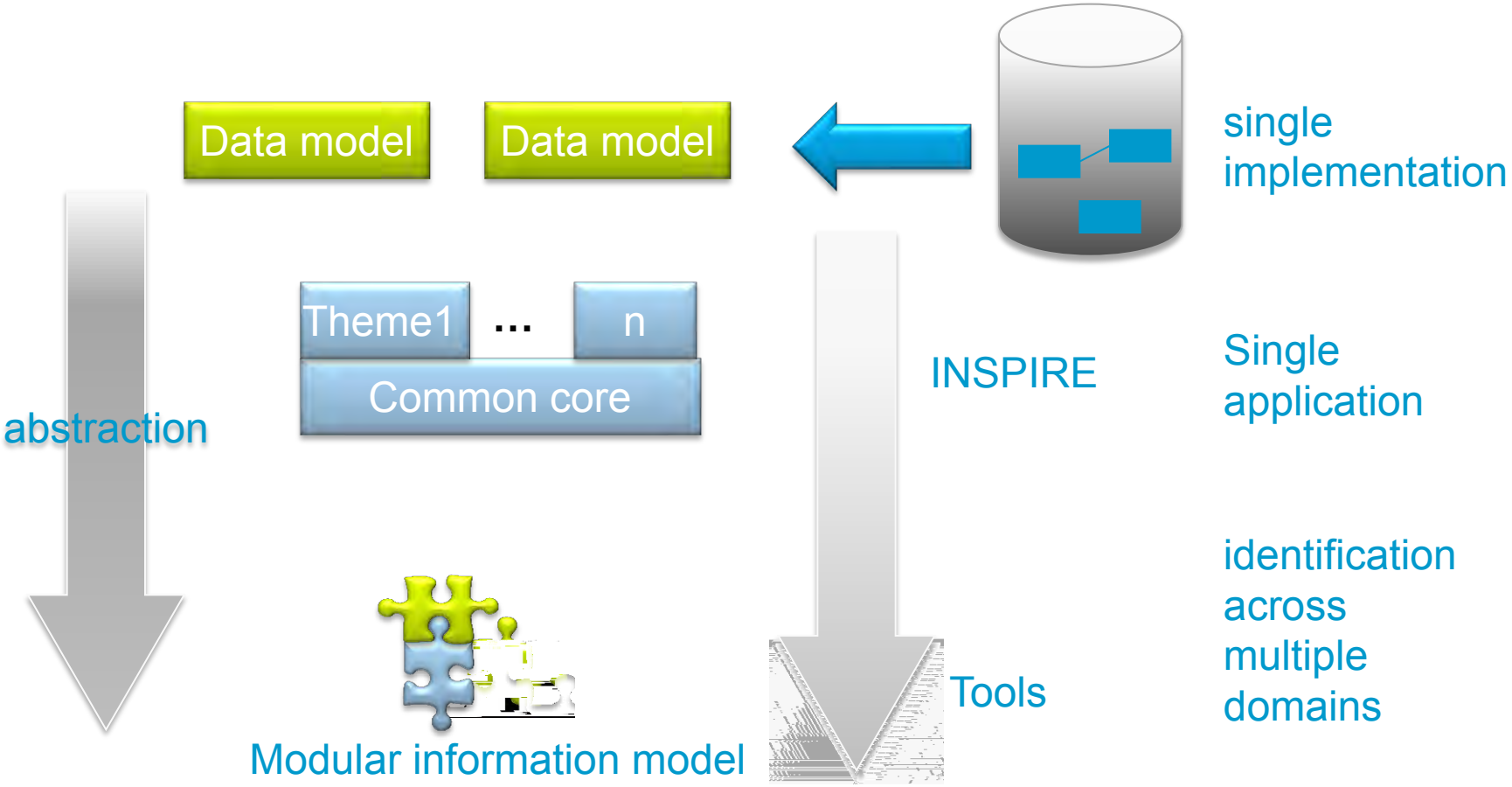
GIS



CSIRO

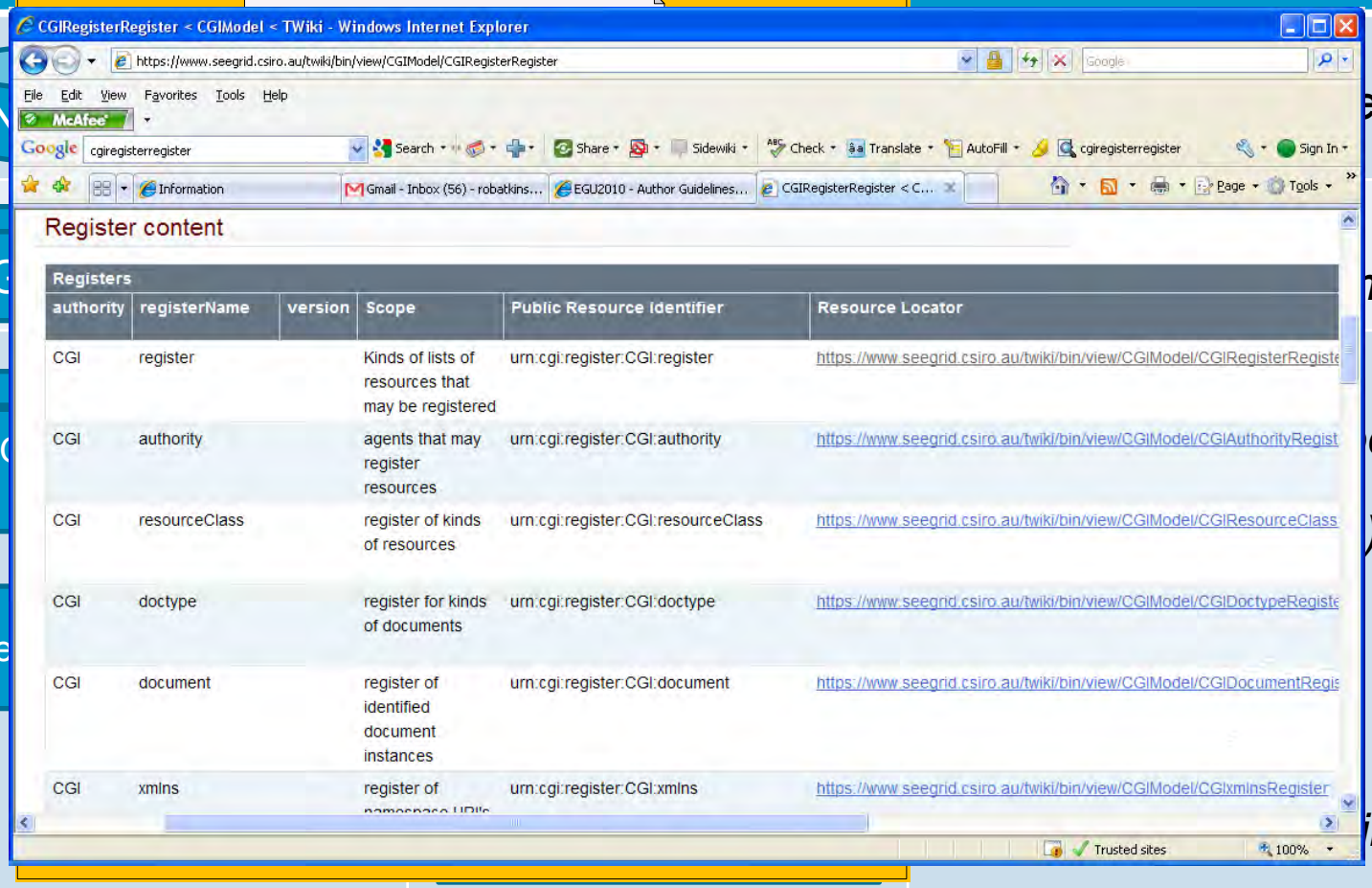
Data Vs Information modelling

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

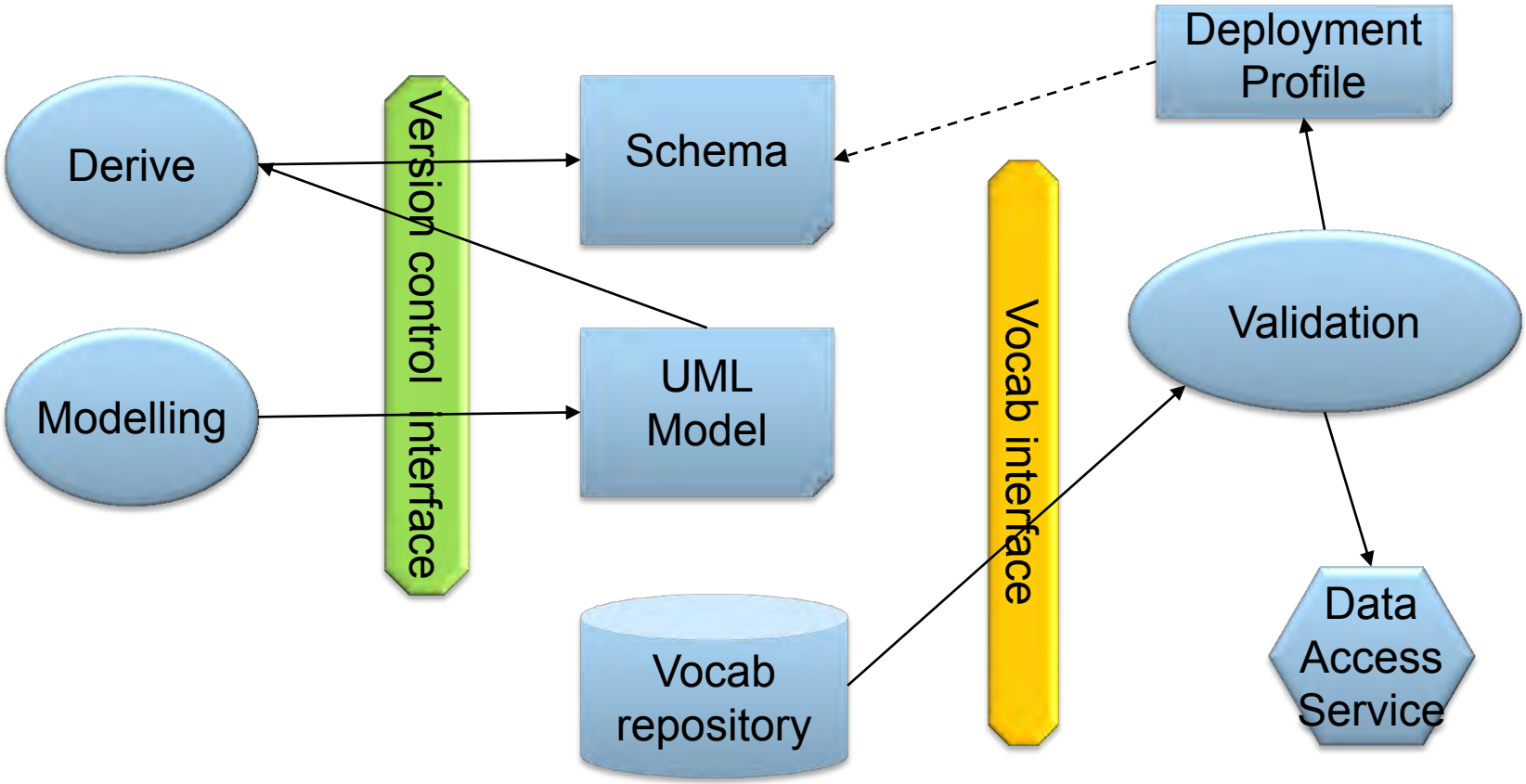


CGI Information Model and GeoSciML

Model	Realisation	Nature



Current Best Practice



The complexity dilemma

- We need modular models (and ontologies, controlled vocabularies)
  - simpler to reuse a component model
  - don't have to assimilate entire related domain to reference something
- But this introduces complexities
  - model package dependencies
  - versioning
  - linkage between models and vocabularies
  - relationships between concepts (ontologies)

- Response:
  - have our cake and eat it too...
  - let the tools to the hard work

Prototype tooling: *Solid Ground*

- **Done**
  - Model “hygiene” tools (Hollow World Helper)
  - Pre-load ISO conceptual models and dependencies
  - Register model and dependencies
  - Register Feature Types/Code Lists and propagate vocabulary service configuration
  - Support updating model references to updated packages
  - Automate download/update of all model dependencies
  - UML -> Excel definitions -> UML
- **In progress**
  - Implement subscription/forward-caching policies for importing semantic resources
  - Improved multi-user governance
  - EA “MDG technology’ bundle with improved UI integration
- **To do**
  - Bundle registry implementation for remote deployment
  - Standardised interfaces for browsing relationships and provenance metadata in Vocabulary services
  - Define policies for sub-register management
  - Automated synchronisation in a federated environment

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Why am I here?

World Meteorological Organization

Specialized agency of UN (1951)

"UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources"

- As chair of WMO's Inter-Programme Expert Team on Metadata and Data Interoperability (IPET-MDI), I have a responsibility to ALL WMO's Technical Commission – including **Hydrology**
- WMO has a strong interest in enhancing interoperability across these domains
- The OGC Met-Ocean and Hydro DWGs provide an opportunity to bring together experts to develop shared understanding of model design issues and governance patterns for the benefit of our community … **but we need to combine our efforts to be successful!**

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Can we formalize joint working arrangements or specify an IE around this opportunity?

Thank you