Data exchanges, XML, and why the exchange problem is still unsolved

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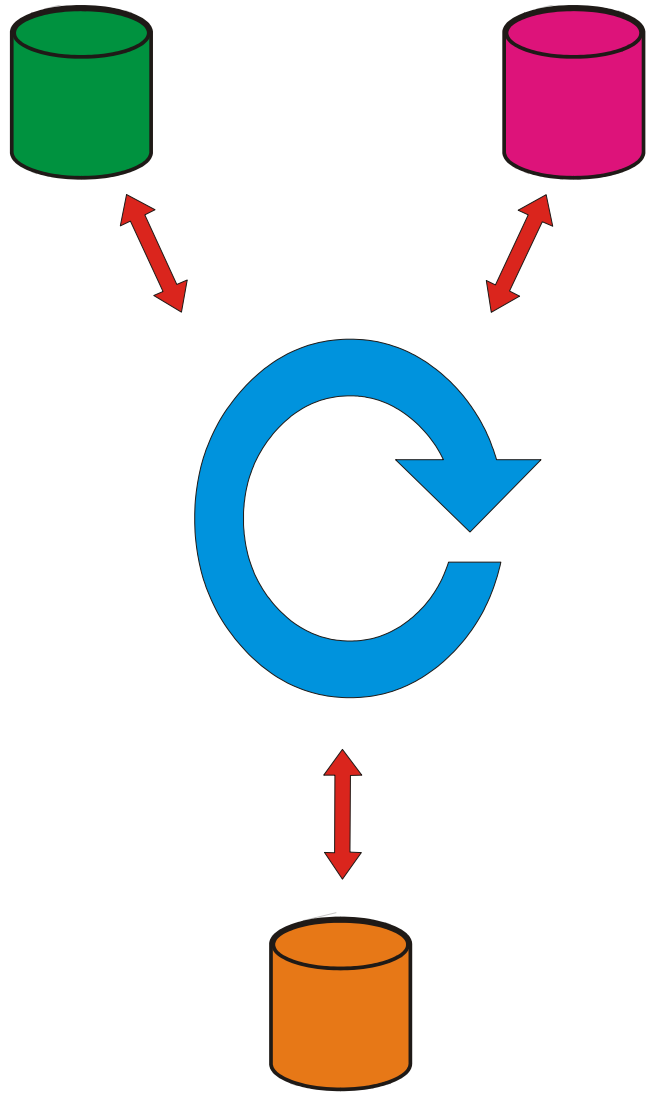
Outline

- Models of Data Exchange
- SGXML Efforts
- GML
- JCOMM ETDMP
- Marine Metadata Interoperability (MMI)
- Why it is still unsolved

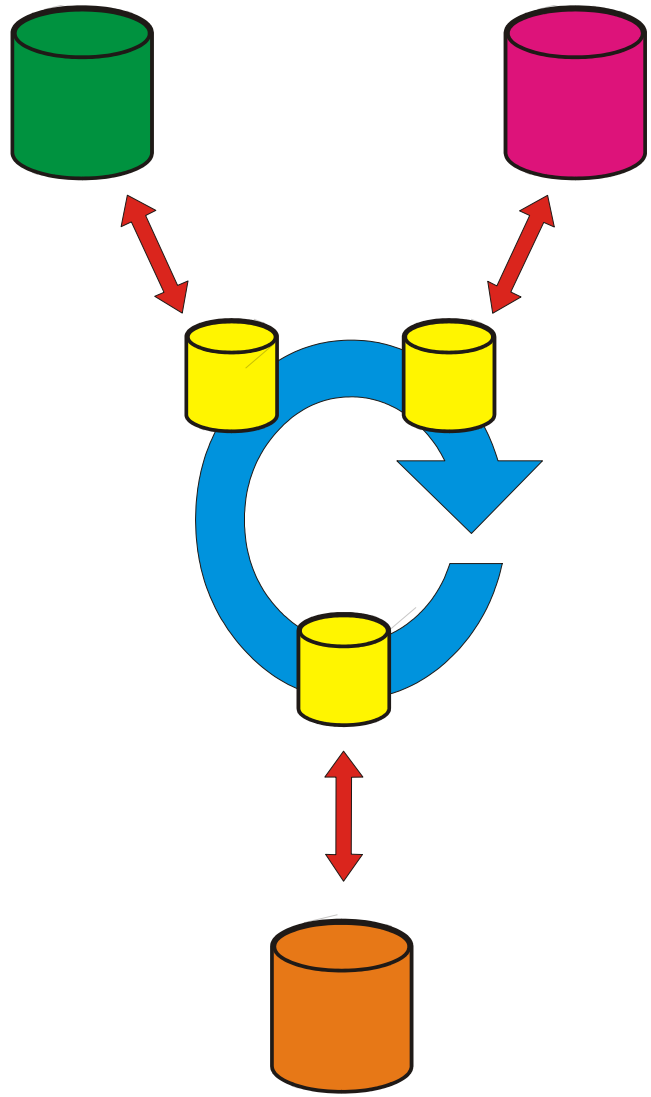
Informal Model

- Oceanographic Community
  - IOC, ICES, JCOMM
  - GOOS, US IOOS
- For?
  - environmental data



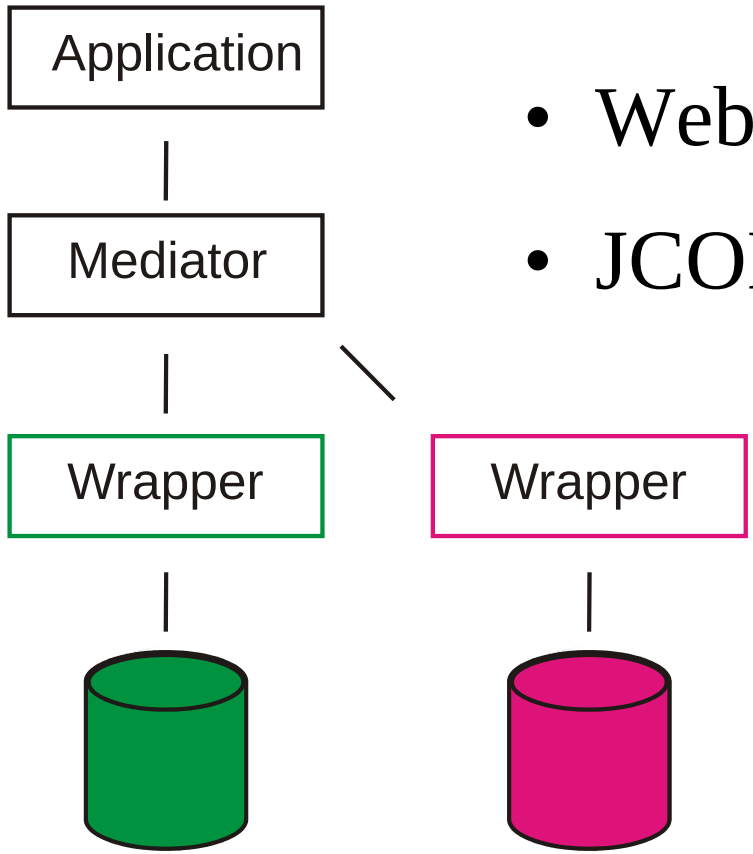
Formal Model

- Military Community
- For?
  - planning, execution, reporting and monitoring



Wrapper Model

- Wrappers, Mediators, Integrators, Navigators



- Web Services
- JCOMM ETDMP

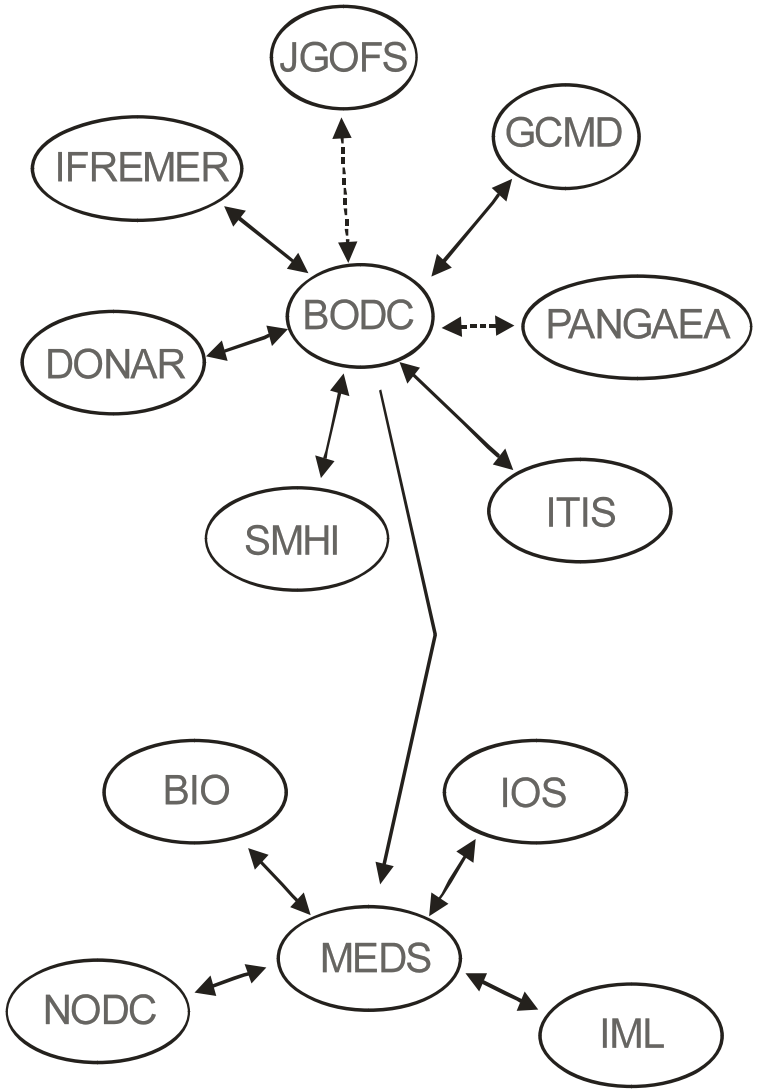
SGXML Efforts

- Metadata
- Parameter Dictionaries
- Data in XML

SGXML - Metadata

- Review and mapping
  - ISO 19115, FGDC, EDMED, DIF, MARC 21 and Dublin Core
  - Mapping contribution
    - MEDI to ISO; EDMED to ISO
- Identified levels of metadata
  - unification, service, thematic, associated (ETDMP)
  - archival, browse, summary, discovery... (NDG)

SGXML - Parameter Dictionaries



SGXML - Data - Keeley Bricks

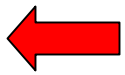
- Two principles
  - Exploit the natural hierarchy found in ocean data types
  - Construct different structures from these data objects
- Profile Data Study
  - 20 bricks

SGXML - 20 Keeley Bricks

- analysis_method
- availability
- calibration
- comment
- data_dictionary
- data_point
- data_set_id
- depth_pressure
- history
- instrument
- latitude
- ldate
- longitude
- provenance
- quality
- quality_testing
- sampling
- sensor
- units
- variable

Keeley Bricks

- data_set
  - availability
  - comment
  - data_point
  - data_set_id
  - provenance
  - quality
  - quality_testing



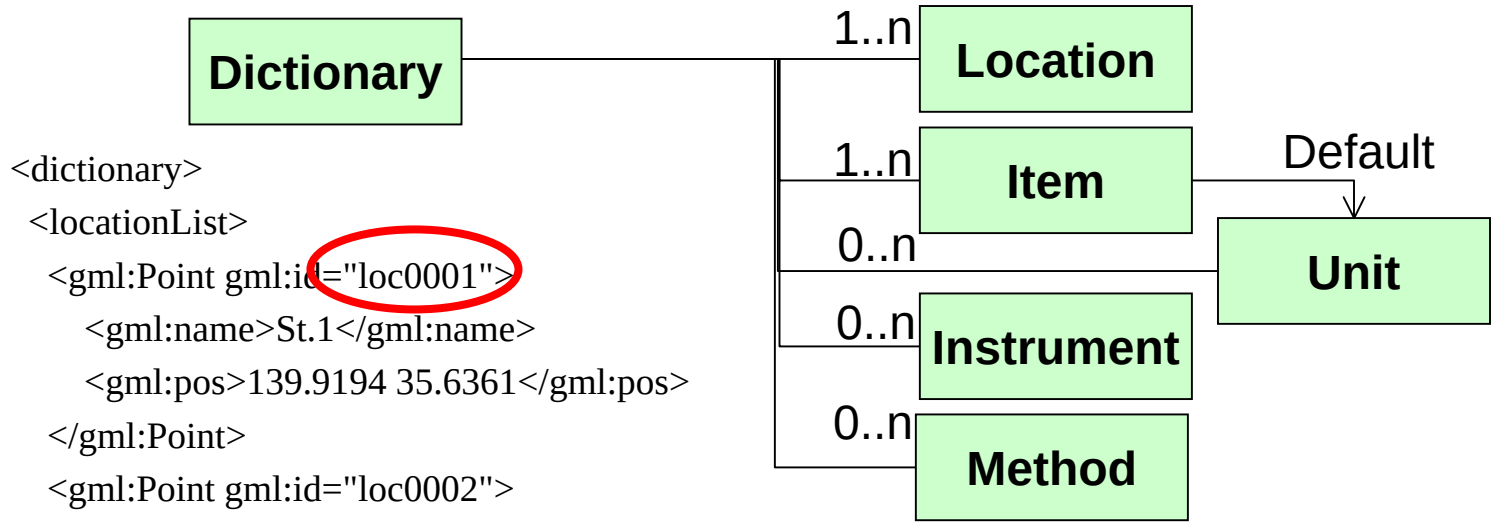
  - variable_set
  - location_set
  - history_set
  - data_set

XML Document – data_set

```
<data_set>
    <data_point pt_code="Species" pt_link="1">Crangon</...>
    <data_point pt_code="Stage">Postlarva</data_point>
    <data_point pt_code="number">15</data_point>
    <data_point pt_code="biomass">13</data_point>
    <data_set_id level="record"/>
    <location_set>
        <depth_pressure pt_code="DEPT">14.141</depth_p...>
    </location_set>

</data_set>
```

SGXML - Data - Japanese Efforts



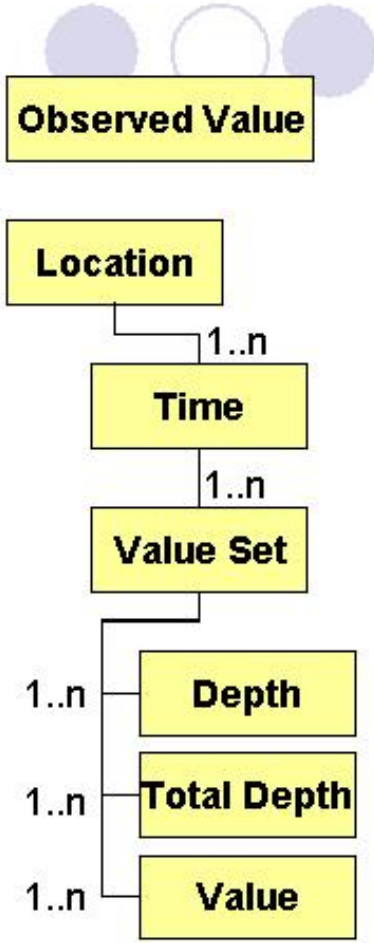
Item (ID) Definition Location (ID) Definition

```
<dictionary>
 <locationList>
  <gml:Point gml:id="loc0001">
    <gml:name>St.1</gml:name>
    <gml:pos>139.9194 35.6361</gml:pos>
  </gml:Point>
  <gml:Point gml:id="loc0002">
    <gml:name>St.2</gml:name>
    <gml:pos>139.9364 35.5864</gml:pos>
  </gml:Point>
 </locationList>
 <itemList>
   <item itemId="item001" unitId="degC" instrumentId="ins0001" methodId="met0001">
     <name>water temperature</name>
   </item>
```

Compliments: Keita FURUKAWA and Tsuneki SAKAIBARA

SGXML - Data - Japanese Efforts

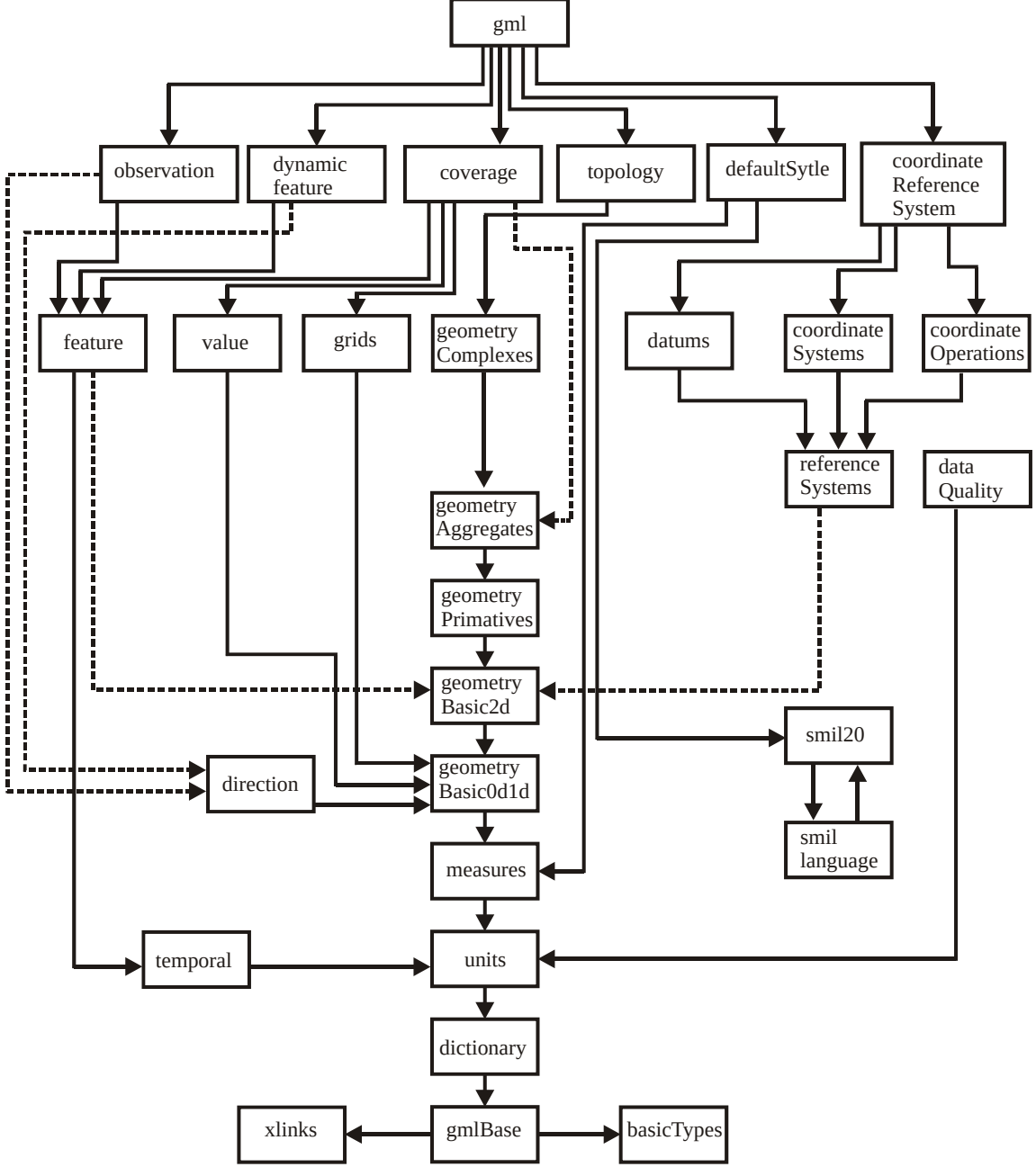
```
<observationLocation locationId="loc0001">
 <time>
  <gml:TimePeriod>
   <gml:begin>
    <gml:TimeInstant>
     <gml:timePosition>2002-07-25T10:03</gml:timePosition>
    </gml:TimeInstant>
   </gml:begin>
   <gml:end>
    <gml:TimeInstant>
     <gml:timePosition>2002-07-25T10:09</gml:timePosition>
    </gml:TimeInstant>
   </gml:end>
   <gml:duration>P0DT0H0M6S</gml:duration>
  </gml:TimePeriod>
  <valueSet observationId="waterQuality">
   <depthInstant>
    <depthPosition>0.5</depthPosition>
   </depthInstant>
   <totalDepth>
    <depthPosition>6.5</depthPosition>
    <basis>water surface</basis>
   </totalDepth>
   <value itemId="item001">25.3</value>
   <value itemId="item004">27.4</value>
   <value itemId="item005">41.9</value>
   <value itemId="item006">4</value>
```



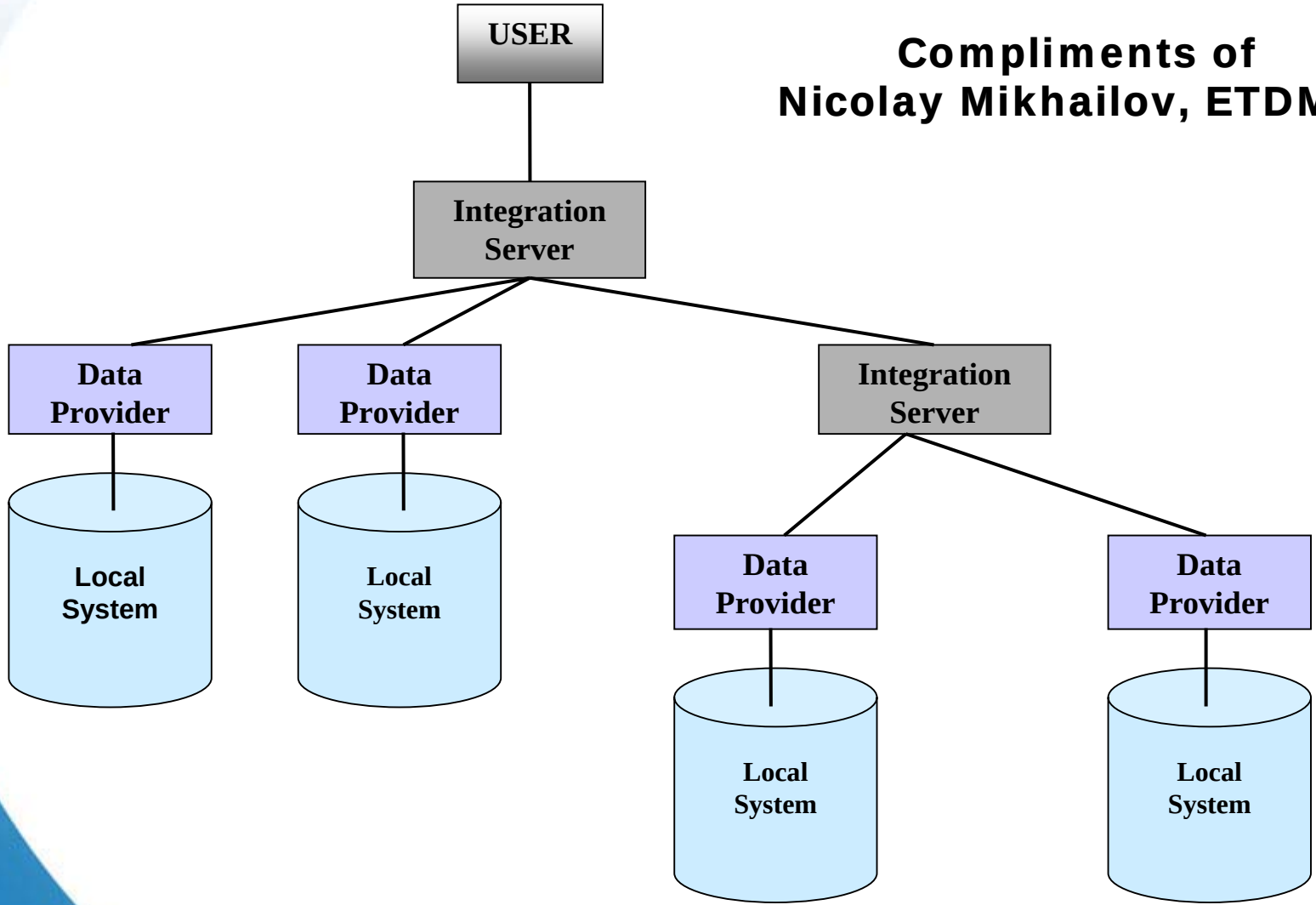
Compliments: Keita FURUKAWA and Tsuneki SAKAIBARA

GML

- **Intimidating – 529 pages**
- **“*... for the modelling, transport and storage of geographic data*”**
- **feature – “*an abstraction of real world phenomenon; it is a geographic feature if it is associated with a location relative to the Earth*”**
- **GML observation schema**


gml
observation
dynamic feature
coverage
topology
defaultSytle
coordinate Reference System
feature
value
grids
geometry Complexes
datums
coordinate Systems
coordinate Operations
reference Systems
data Quality
geometry Aggregates
geometry Primatives
geometry Basic2d
smil20
direction
geometry Basic0d1d
smil language
measures
temporal
units
dictionary
xlinks
gmlBase
basicTypes

JCOMM ETDMP Concept

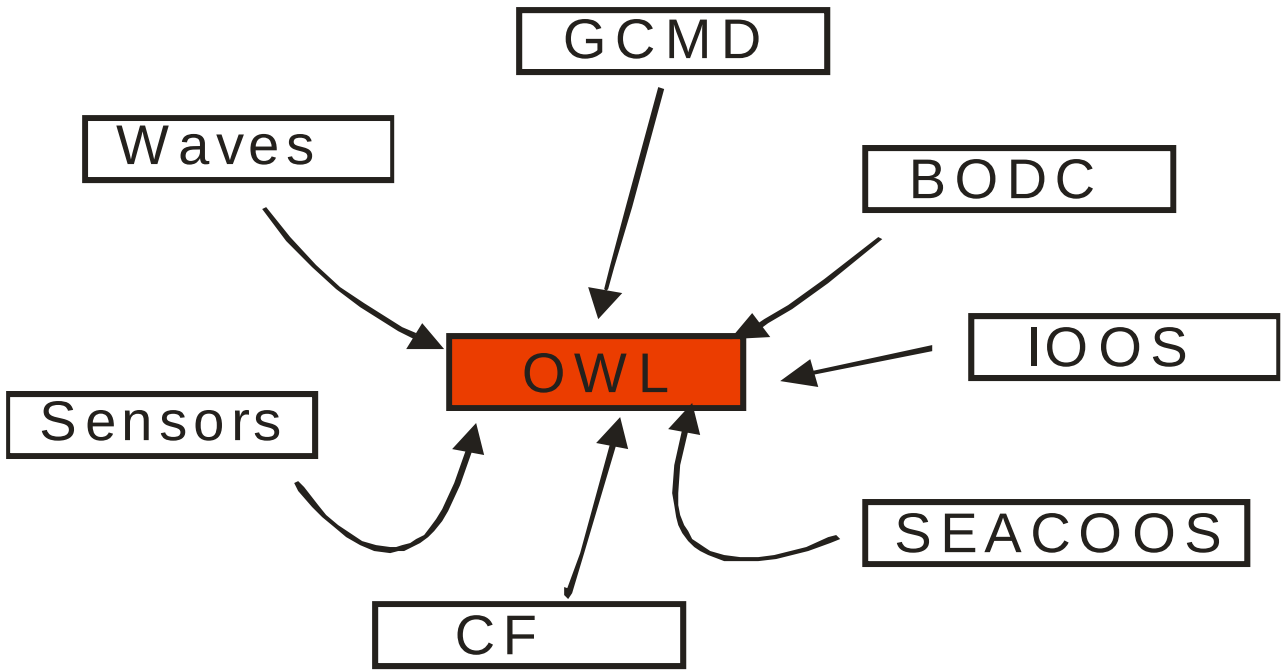


Compliments of
Nicolay Mikhailov, ETDMP.

Marine Metadata Interoperability

- Many aims, main one is:
  - Solve the “meta” part of the data interoperability problem
- Harmonizing vocabularies

Marine Metadata Interoperability



So, why has it not been solved?

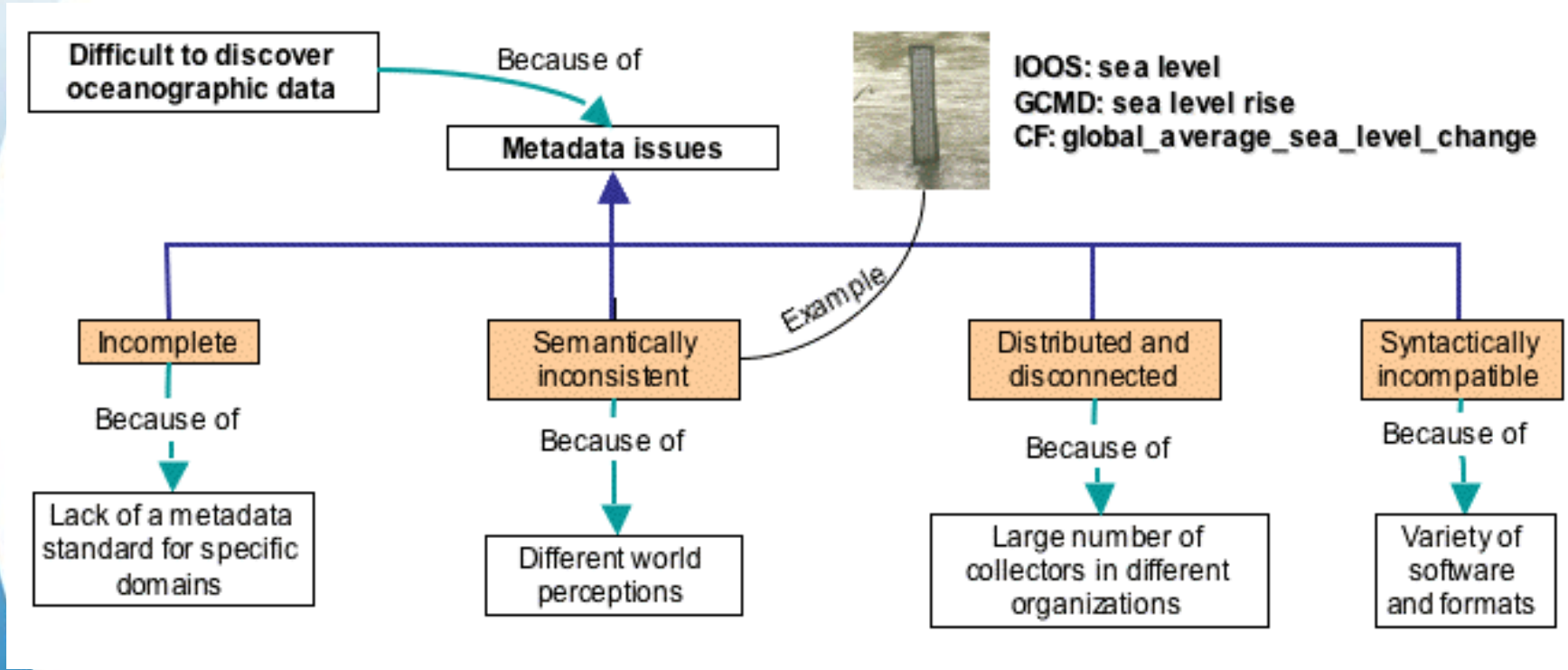


Image adapted from "HOW: Hydrologic Ontology for the Web".
Luis Bermudez, Michael Piasecki, Dec, 2003. (AGU Poster.)

To Conclude

- Models of Data Exchange
  - Informal, Formal, Wrapper
- SGXML Efforts
  - Metadata, Parameter Dict., Data in XML
- GML
- JCOMM ETDMP
  - Wrapper model implementation
- Marine Metadata Interoperability (MMI)
  - OWL to Harmonize vocabularies
- Why it is still unsolved

Thank you.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References

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   - Isenor, Describing Generic Ocean Environmental Data Objects Using the Geography Markup Language, available at http://pubs.drdc-rddc.gc.ca/pubdocs/pcow1_e.html
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