Open Geospatial Consortium

FAIR

A geospatial context

2022-12-16 | Scott Simmons, Chief Standards Officer, OGC

FAIR, a convenient acronym

- Findable
- Accessible
- Interoperable
- Reusable

Open Geospatial Consortium

FAIR, a convenient acronym

- Findable - first, you have to find the data
- Accessible
- Interoperable
- Reusable

Open Geospatial Consortium

FAIR, a convenient acronym

- Findable
- Accessible – then you need to get to the data
- Interoperable
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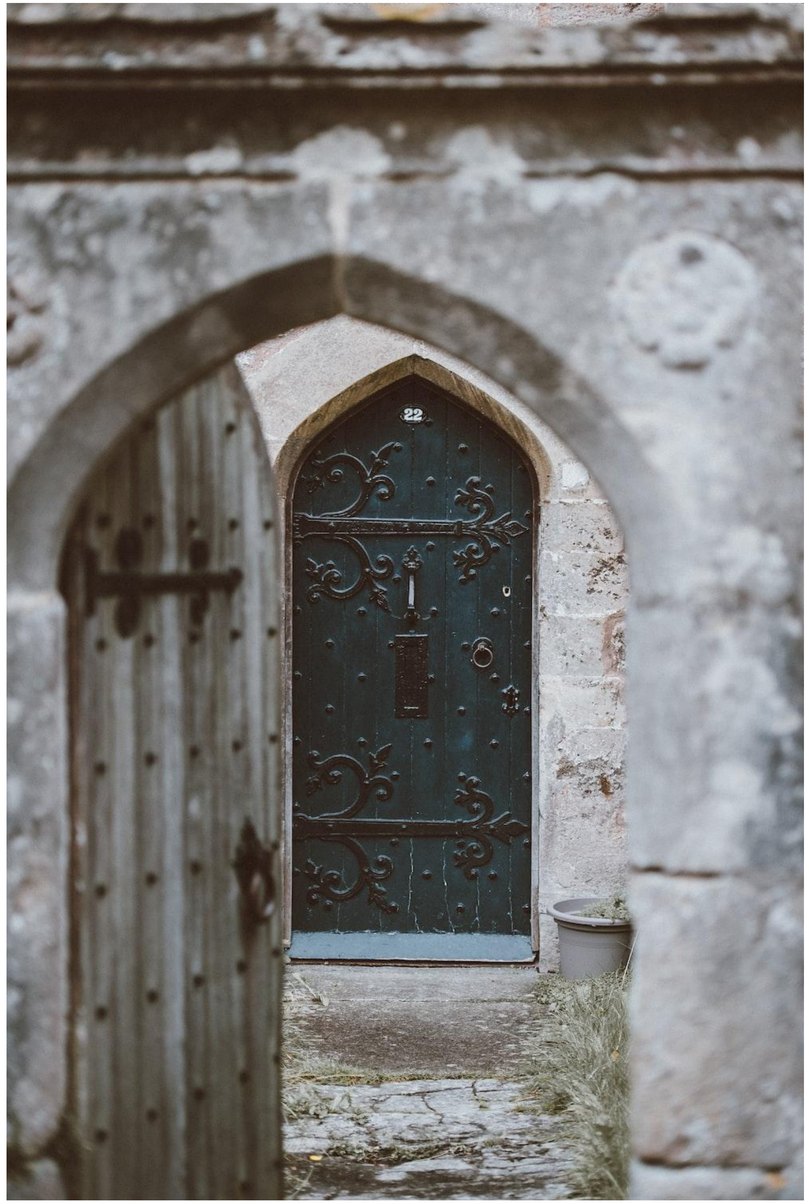


FAIR, a convenient acronym

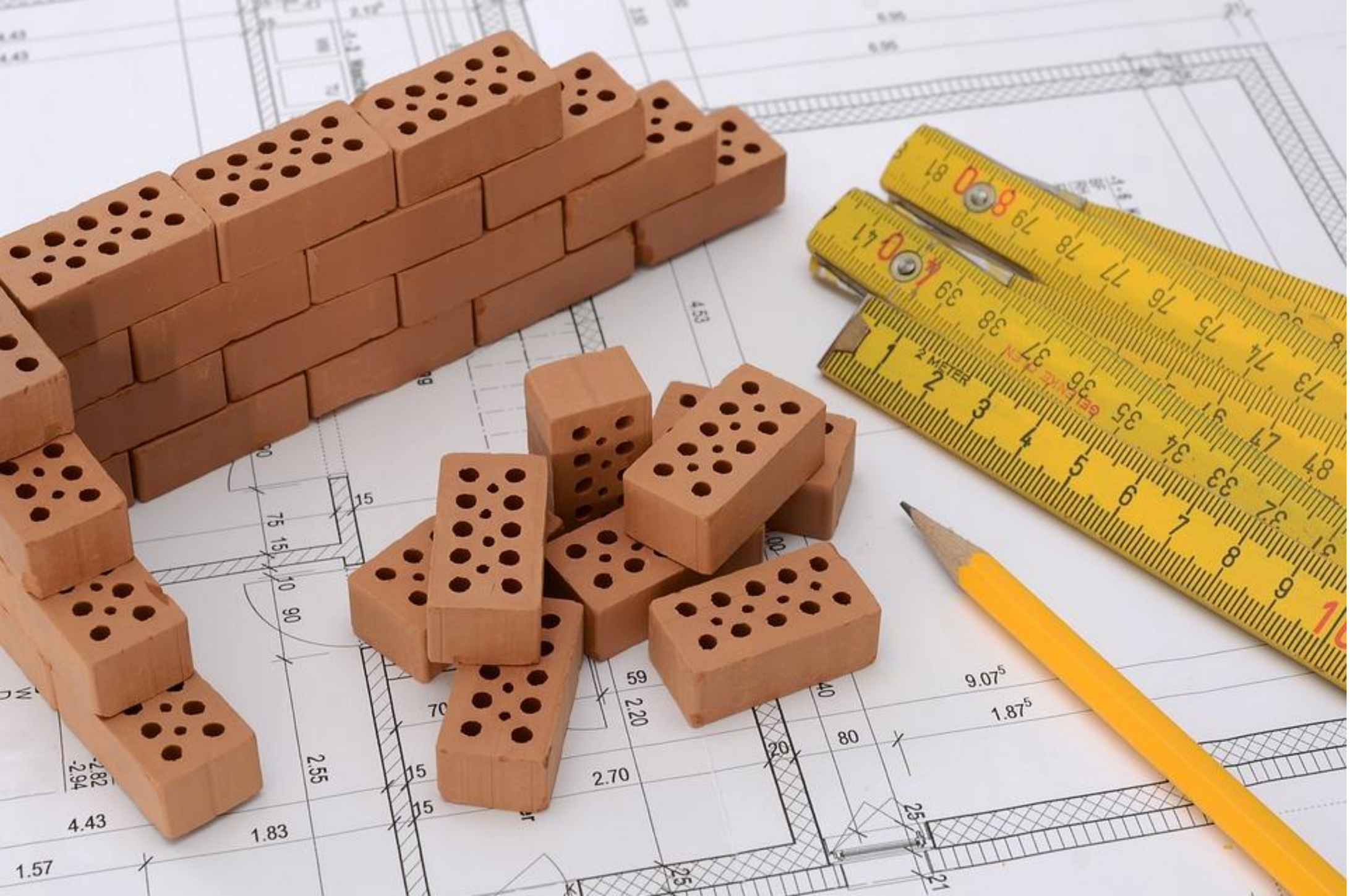
- Findable
- Accessible
- Interoperable – once accessed, the data should work with other data
- Reusable

Open Geospatial Consortium

FAIR, a convenient acronym

- Findable
- Accessible
- Interoperable
- Reusable – interoperate to satisfy many scenarios

Open Geospatial Consortium



DESIGN

Open Geospatial Consortium

To make things FAIR, we have to design to FAIR

- Bottom-up design
  - **R**: design a content model that maximizes **Reusability**
  - **I**: ensure the content model is **Interoperable**, may have to reduce some Reusability
  - **A**: encode the data in a format that is **Accessible** to the user community
  - **F**: create metadata and offer the content via a **Findable** service


Reusable

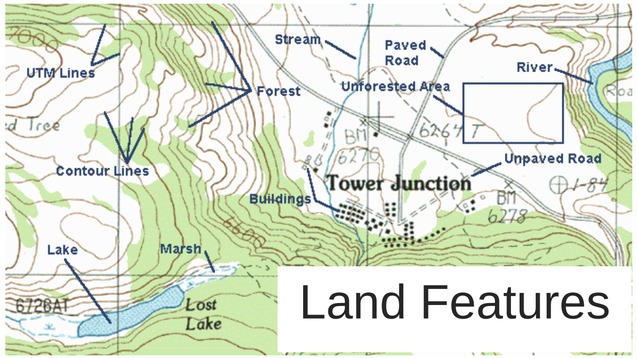
Example: engineering and geosciences

- InfraGML + GeoSciML + WaterML >> MUDDI and Geotech


NO ROCK
CLIMBING
OR DIVING
14FT 5IN

LandInfra / InfraGML

http://www.opengeospatial.org/standards/landinfra

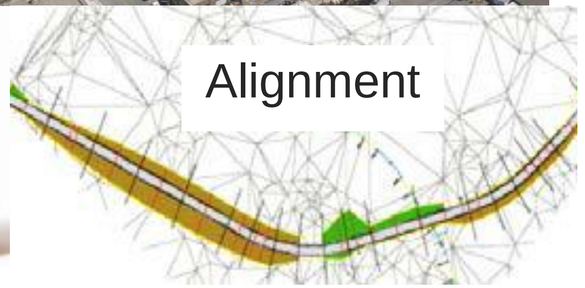


Land Features

Core

Facilities

Projects



Alignment

Land Division

Roads

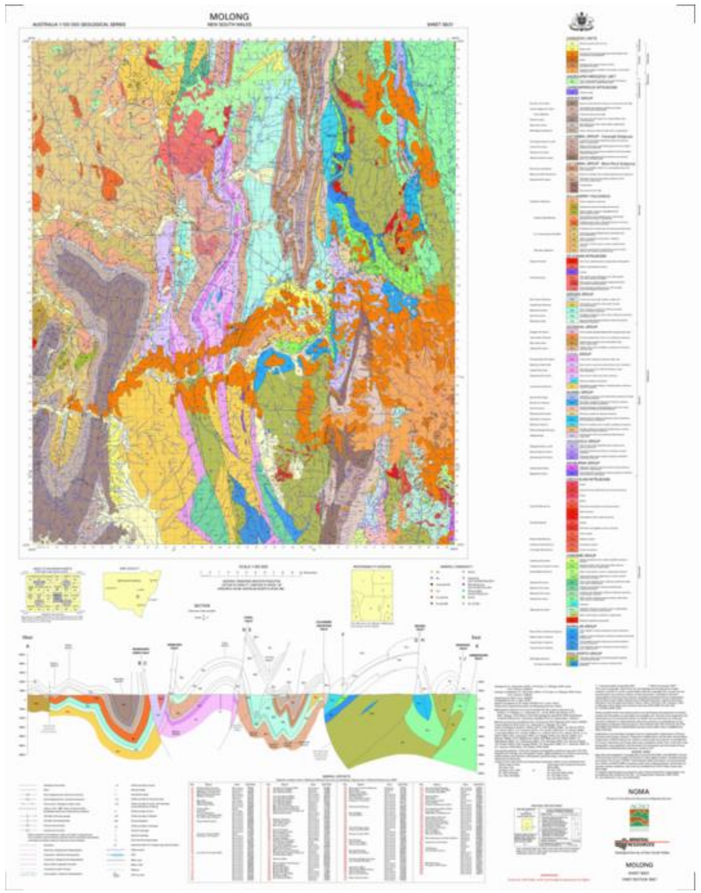
Railway

Survey

Condominiums

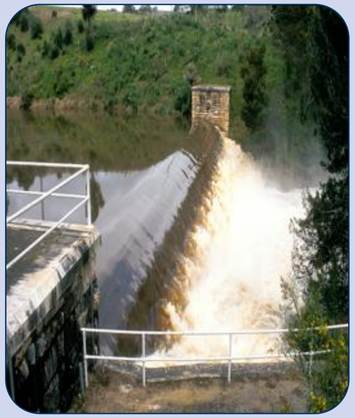
GeoSciML

- GeoScience Markup Language
  - the original use case was to exchange data typically found on a geological map
    - geologic units, geologic time, faults, folds, etc
  - the scope of GeoSciML has expanded over the last 13 years to also cover geological sampling and analytical data

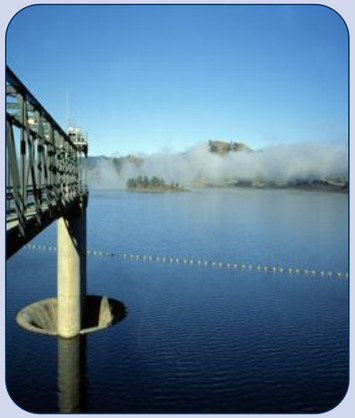


WaterML2.0 Standards

Part 1 - Timeseries



Part 2 – Ratings, Gaugings and Sections

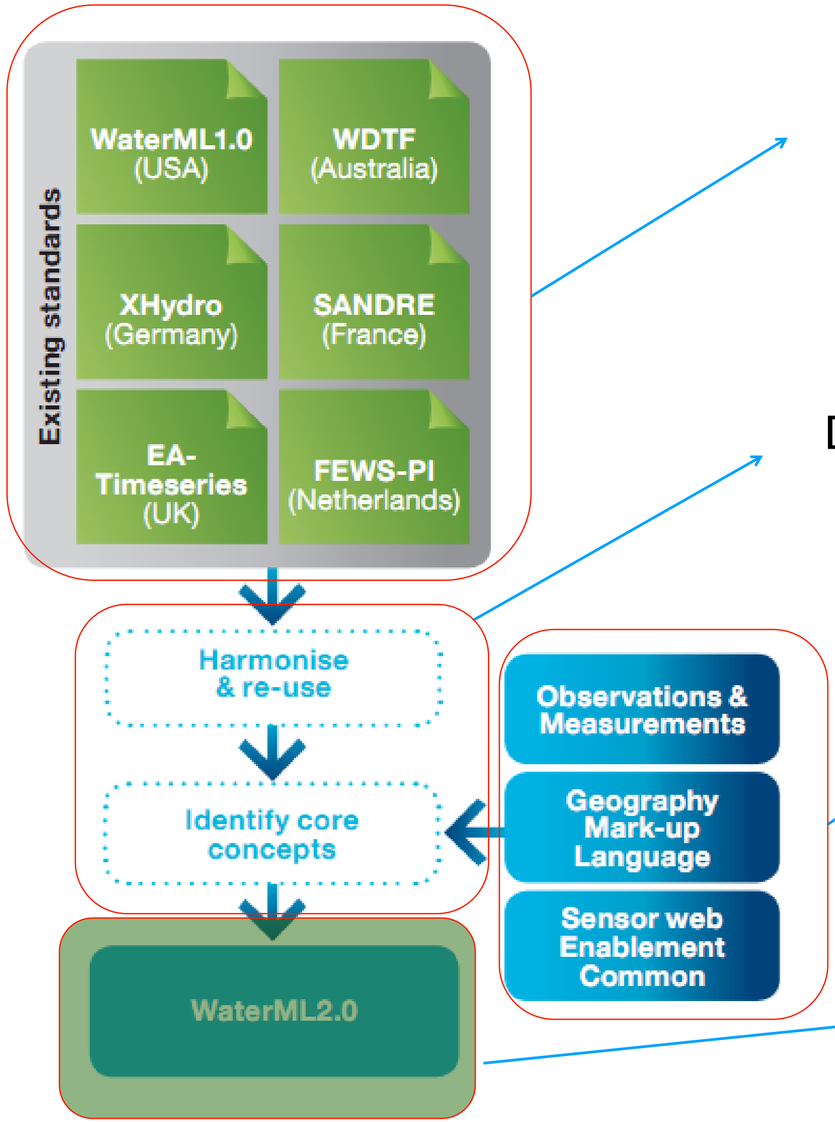


Part 3 – Surface water features

Part 4 – Groundwater

Part 5 – Water quality (best practice)

WaterML2: Part 1 – Timeseries Harmonization



Scope

Requirements

Design

Do Work

Constraints

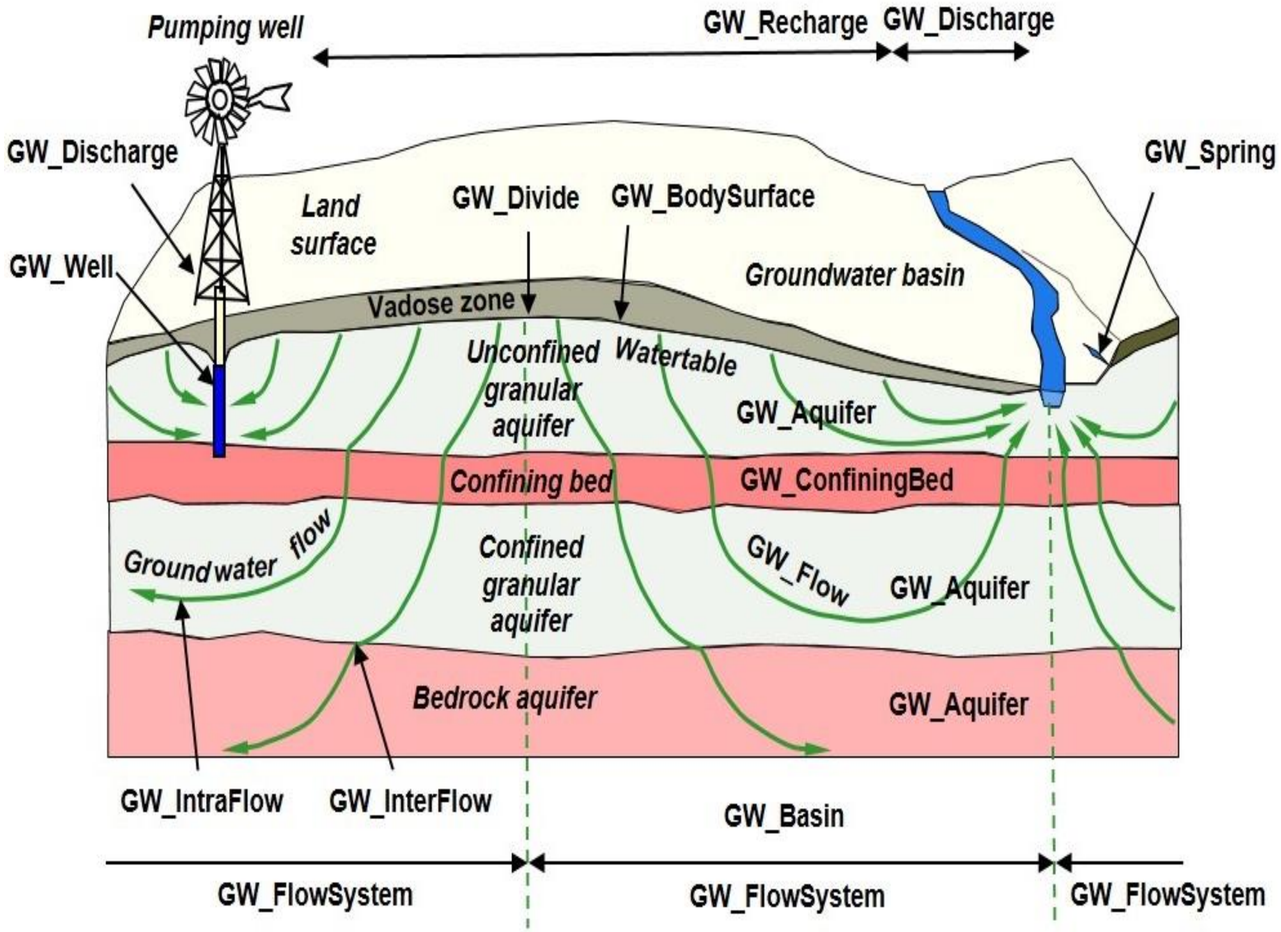
A new environment

Best practices

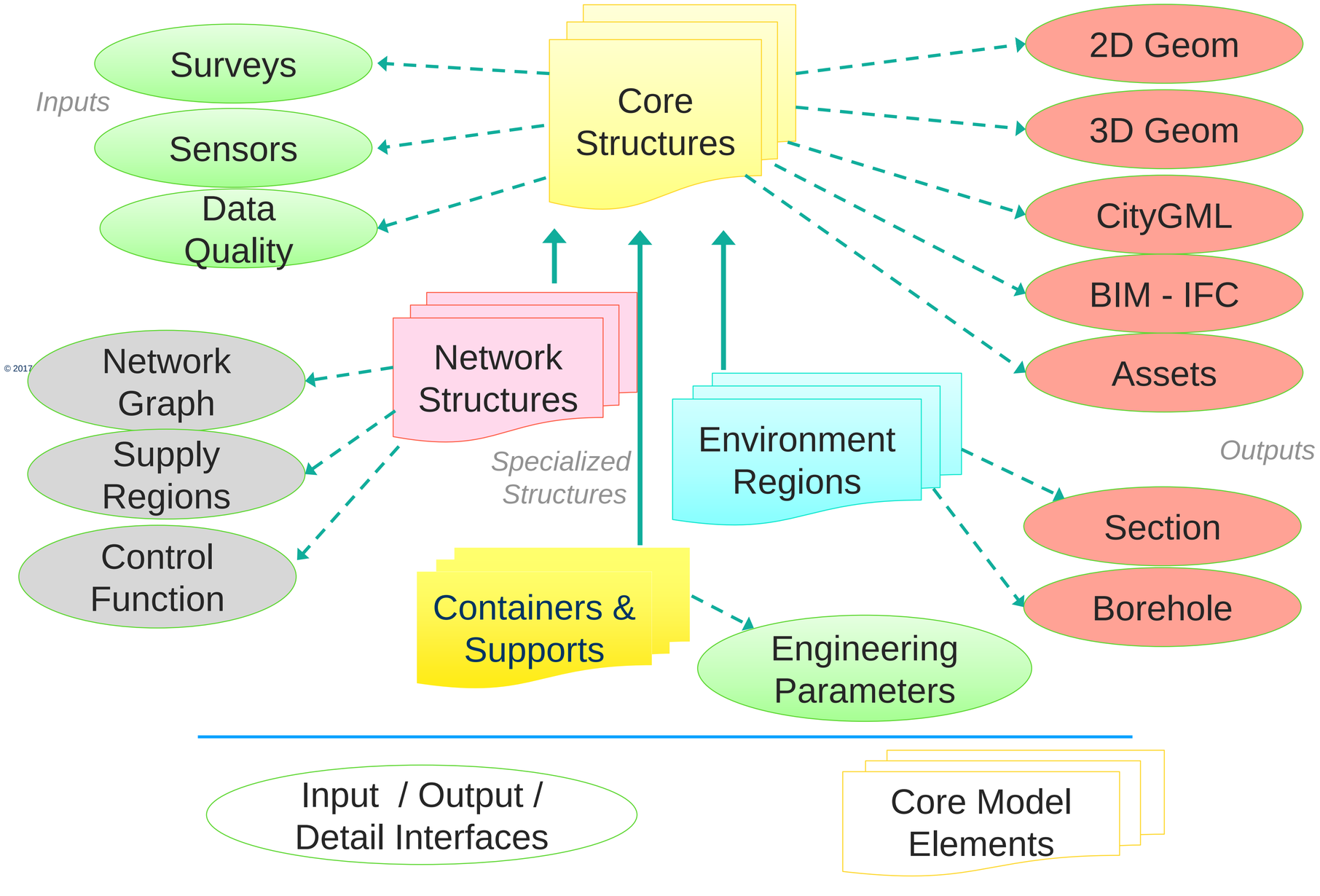
WaterML 2.0: Part 1 –Timeseries

WaterML2: Part 4 – GroundWater Markup Language 2 (GWML2)

- Subsurface water features and observations
  - Hydrogeological units, Aquifers, Voids, Fluid bodies, Hydraulic conductivity, Water wells, Springs



MUDDI Model Structure



Geotech Interoperability Experiment

Based on existing working groups / organizations on February 2022

buildingSMART International

Lead: IFC Tech Team

IFC Implementation

Is realized by

buildingSMART International

Lead: IFC Tunnel Geosubgroup

bSI Conceptual Model for Geotechnics

Is realized by

Open Geospatial Consortium

Lead: GeoSciML SWG, GWML2 SWG, etc…

OGC Logical model

Is realized by

Open Geospatial Consortium

Lead: GeoScienceDWG

CGI Commission for the Management and Application of Geoscience Information

OGC Conceptual Model for Geotechnics

Is realized by

AGS

DIGGS DATA INTERCHANGE FOR GEOTECHNICAL AND GEOENVIRONMENTAL SPECIALISTS

…

Is realized by

Common Conceptual model for Geotechnics

SIMSG ISSMGE

ISSMGE TC222

Geotechnical BIM & Digital Twins

As representative of FedIGS

FedIGS

SIMSG ISSMGE

ENGEOL

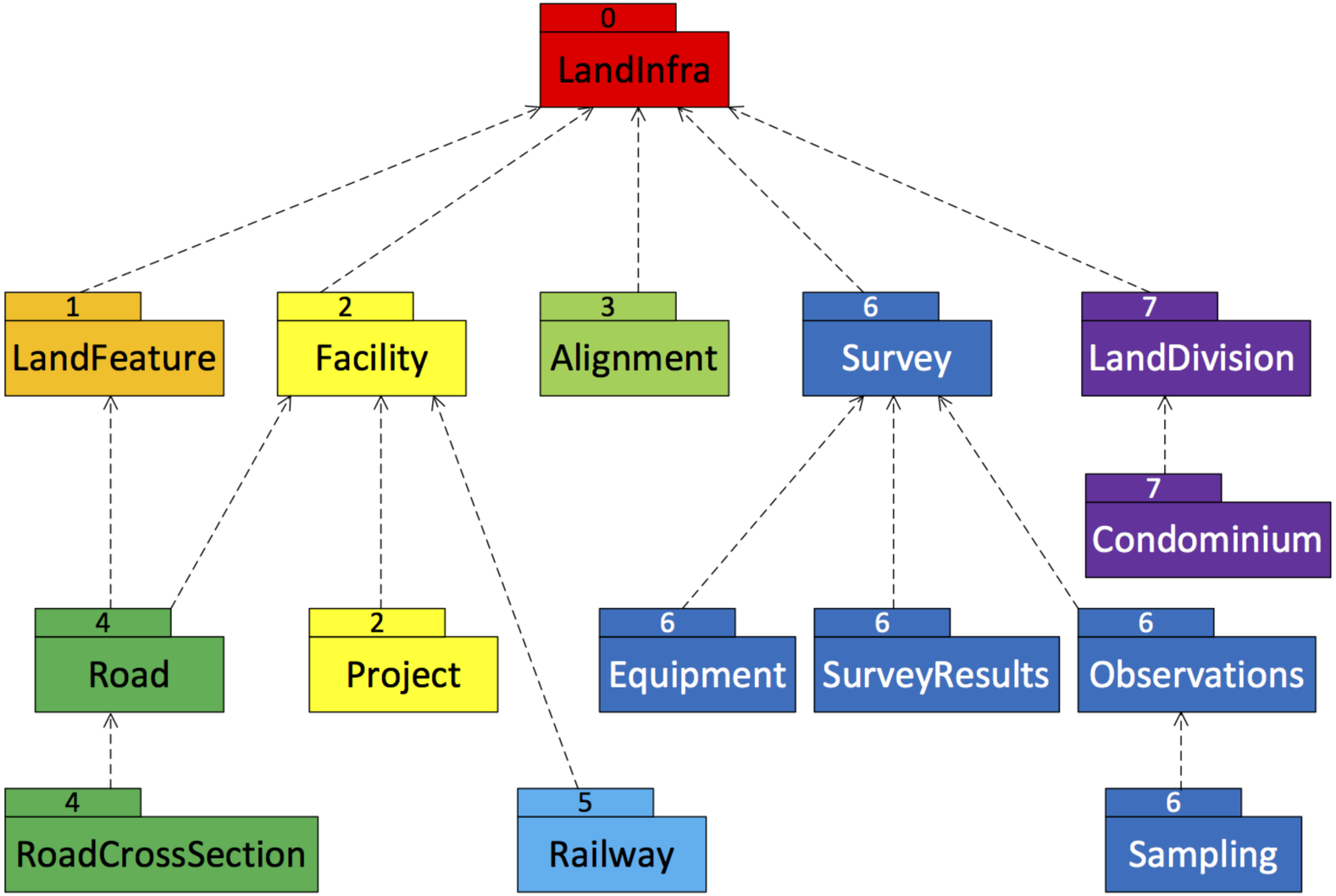
ISRM

igs

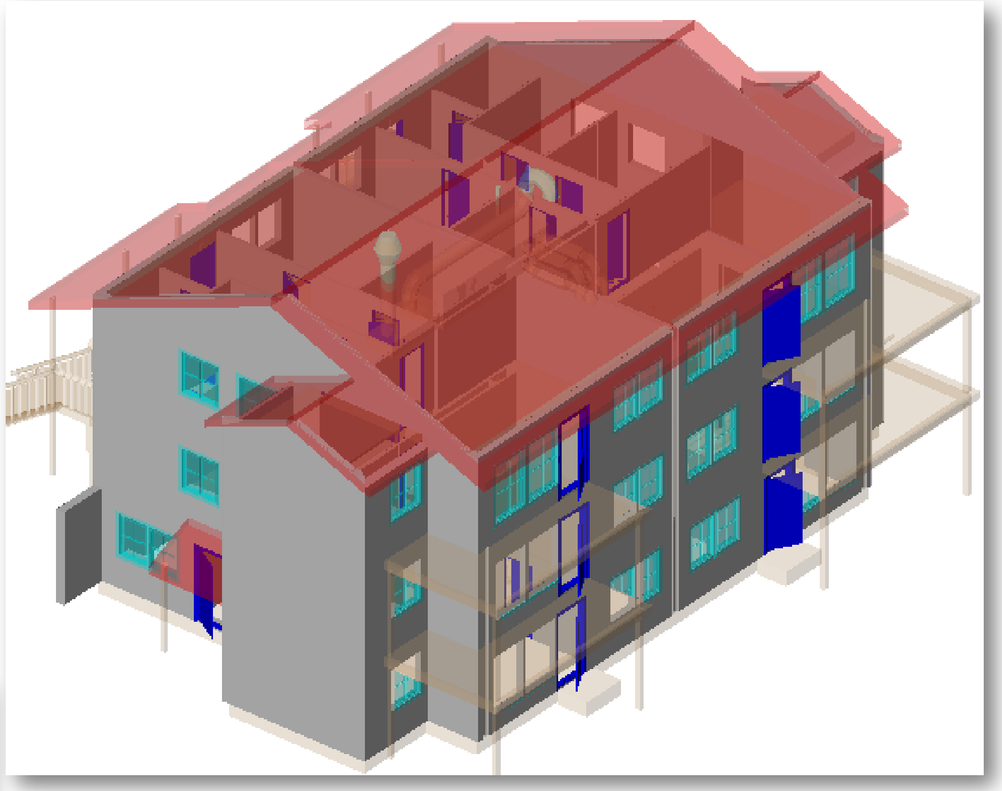

Interoperable

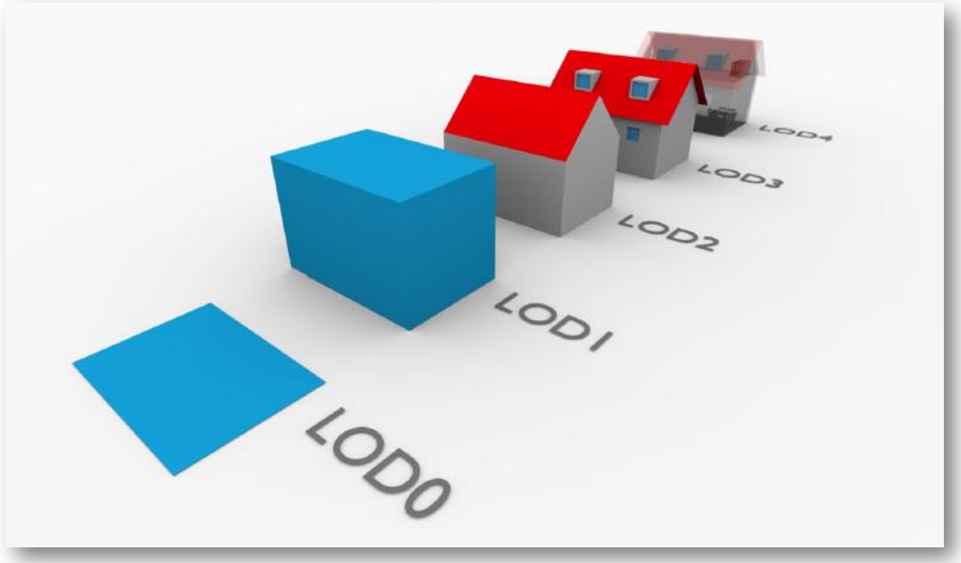
GML application profiles for the built environment

LandInfra / InfraGML

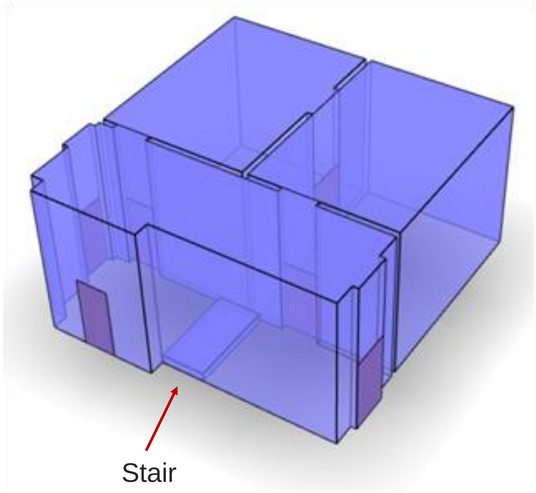


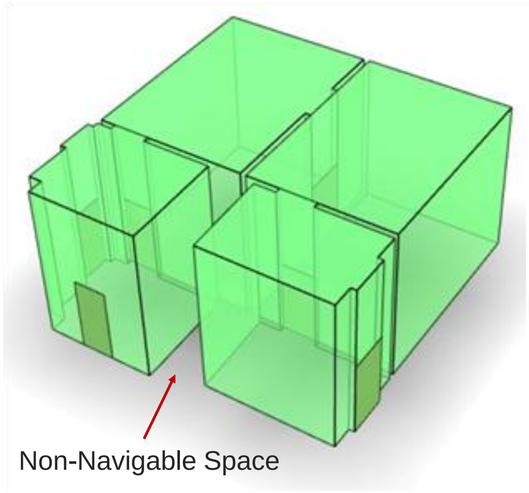
CityGML

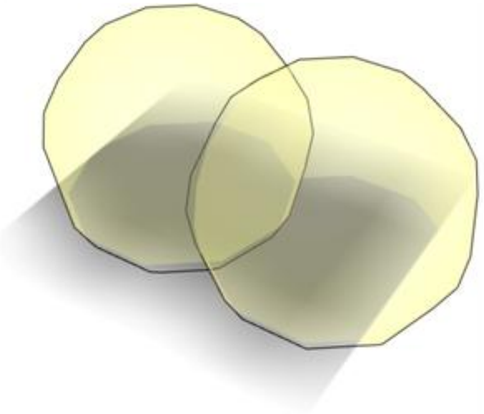


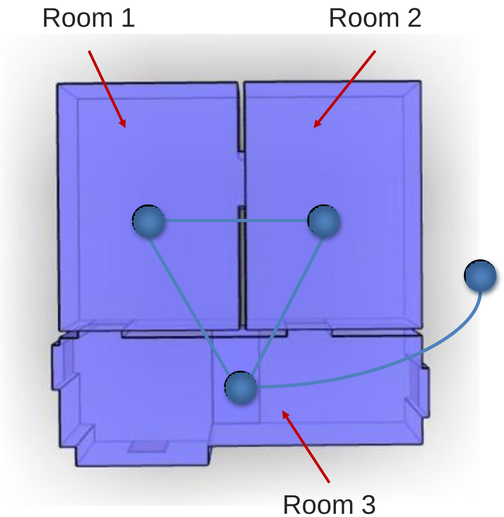


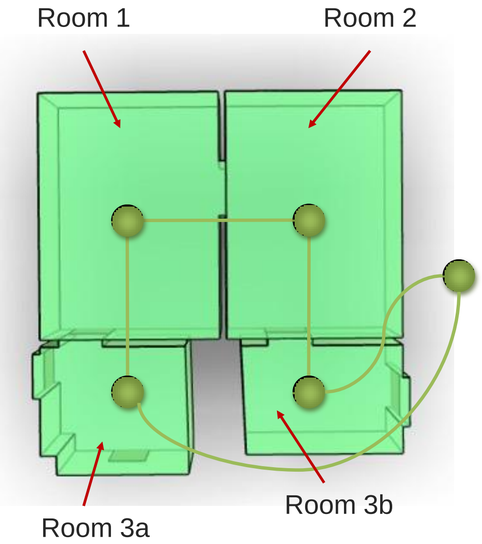
IndoorGML – Multi-Layered Space

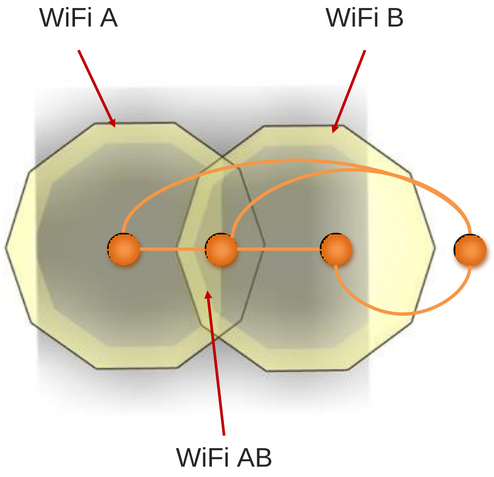













Accessible

Popular and performant encodings

- XML
- JSON (or GeoJSON or JSON-FG)

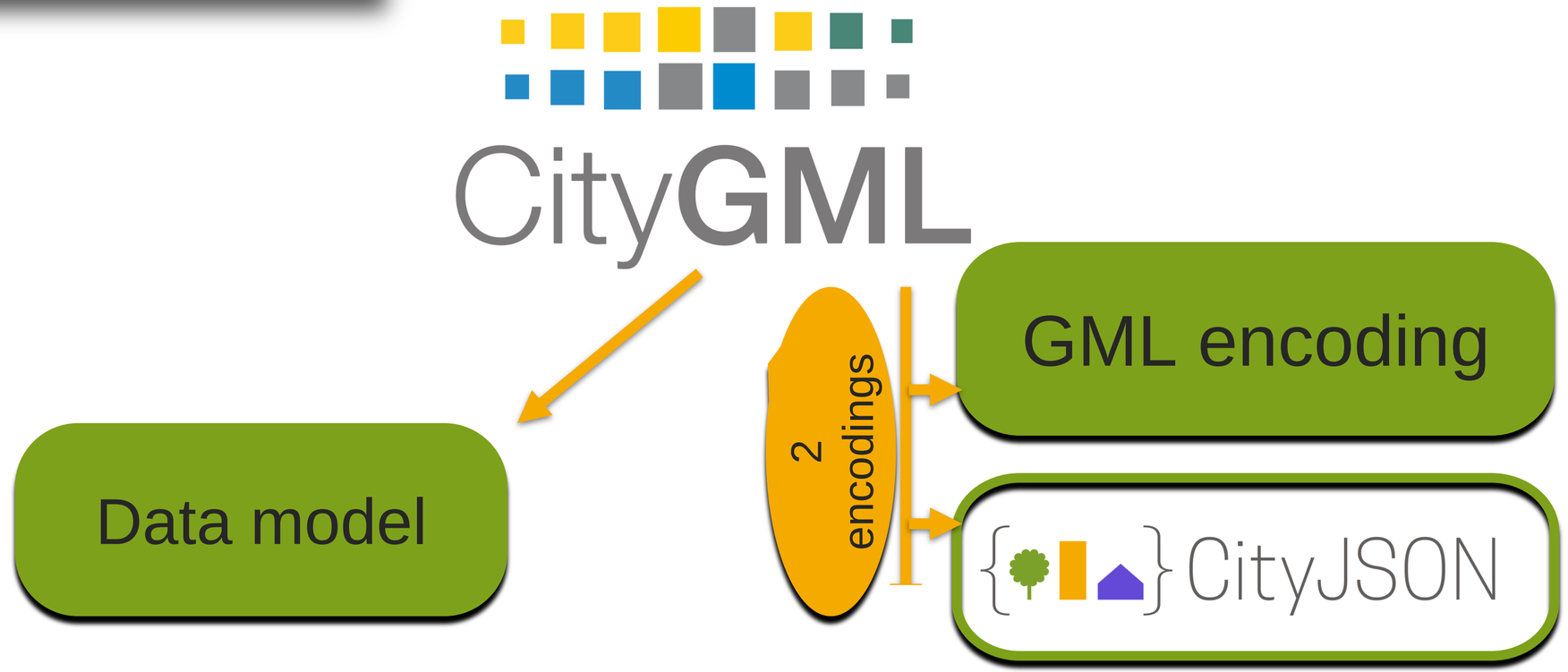

Ledoux *et al. Open Geospatial Data, Software and Standards* (2019) 4:4
https://doi.org/10.1186/s40965-019-0064-0

Open Geospatial Data, Software and Standards

ORIGINAL ARTICLE Open Access

CityJSON: a compact and easy-to-use encoding of the CityGML data model

Hugo Ledoux*, Ken Arroyo Ohori, Kavisha Kumar, Balázs Dukai, Anna Labetski and Stelios Vitalis



CityJSON: a compact and easy to use encoding of the CityGML data model

CityGML 3.0 GML encoding

```
<gml:Dictionary gml:id="roofTypes">
    <gml:metaDataProperty>
        <cmd:CodeListMetaData>
            <cmd:dataType>RoofTypeValue</cmd:dataType>
            <cmd:namespace>http://www.opengis.net/citygml/building/3.0</cmd:namespace>
            <cmd:language>en</cmd:language>
            <cmd:authority>xyz</cmd:authority>
            <cmd:version>1.0</cmd:version>
        <cmd:CodeListMetaData>
    </gml:metaDataProperty>
    <gml:description>Roof type values</gml:description>
    <gml:identifier codeSpace="https://ogc.org/citygml/3.0/codelists/gml/rooftypes">RoofTypeValue</gml:identifier>
    <gml:dictionaryEntry>
        <gml:Definition gml:id="id1">
            <gml:description>roof primarily a single plane, not necessarily level</gml:description>
            <gml:identifier codeSpace="https://ogc.org/citygml/3.0/codelists/gml/rooftypes">1000</gml:identifier>
            <gml:name>flat roof</gml:name>
        </gml:Definition>
    </gml:dictionaryEntry>
    <gml:dictionaryEntry>
        <gml:Definition gml:id="id2">
            <gml:description>a roof that has a ridge and two gables</gml:description>
            <gml:identifier codeSpace="https://ogc.org/citygml/3.0/codelists/gml/rooftypes">3100</gml:identifier>
            <gml:name>saddle roof</gml:name>
        </gml:Definition>
    </gml:dictionaryEntry>
</gml:Dictionary>
```

CityJSON


```
{
"type": “CityJSON",
"version": “1.0”,
"metadata": {
"referenceSystem":
"urn:ogc:def:crs:EPSG::7415",
},
"CityObjects": {
"id-1": {
"type": "Building",
"attributes": {
"measuredHeight": 22.3,
"roofType": "gable",
"owner": “Elvis Presley"
},
"geometry": [
{
"type": "MultiSurface",
"boundaries": [
[[0, 3, 2, 1]], [[4, 5, 6, 7]], [[0, 1, 5, 4]]
]
}
]
}
},
"vertices": [
[23.1, 2321.2, 11.0],
[111.1, 321.1, 12.0],
...
],
"appearance": {
"materials": [],
"textures":[],
"vertices-texture": []
}
}
```


human-readable file

computers prefer this over XML

ready for the web

~6X more compact than CityGML


Findable

Metadata and APIs

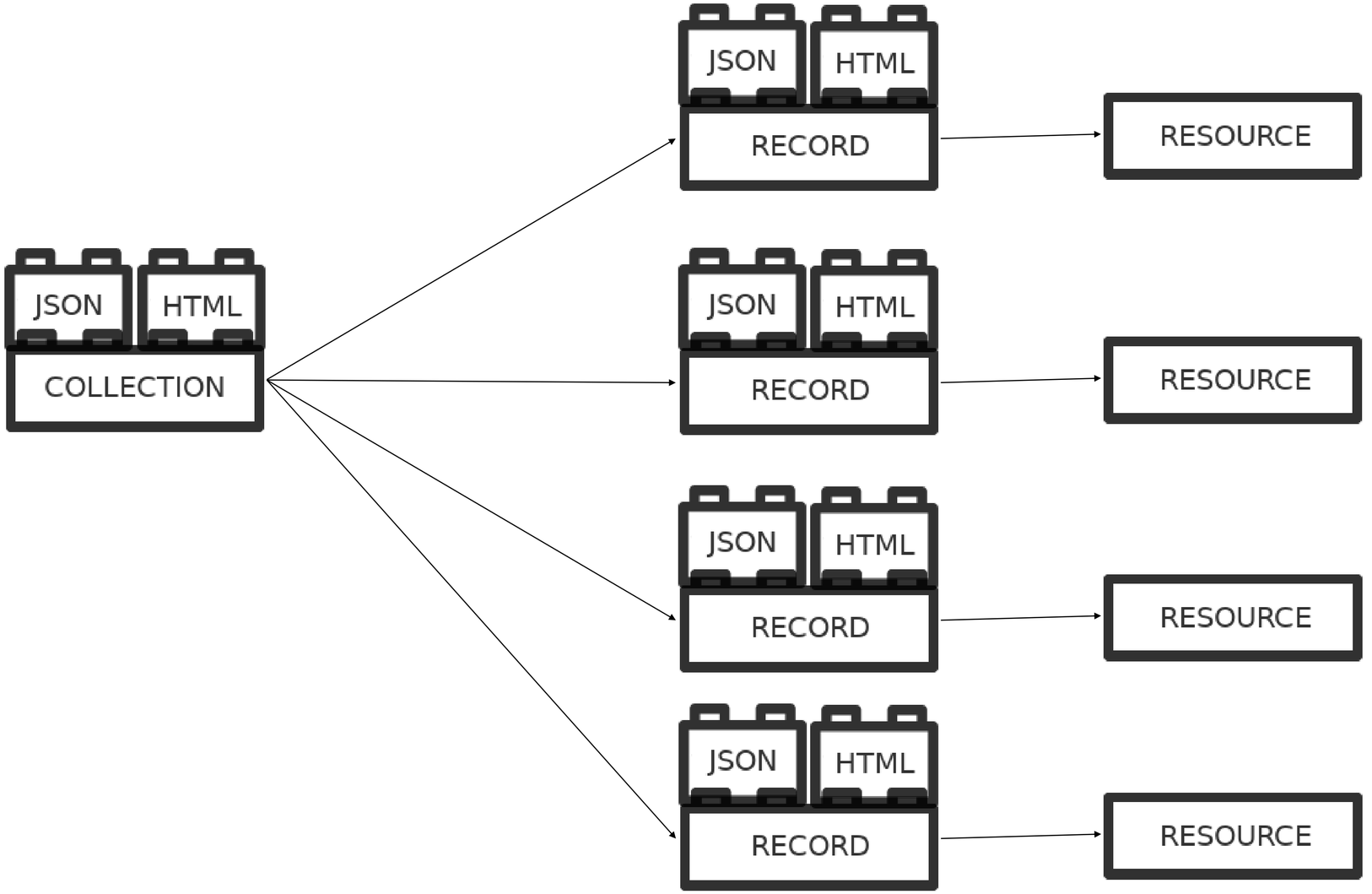
- Write good metadata
- Expose metadata to a discovery API
- Provide data via a resource-applicable API

ISO Geospatial Metadata

The ISO19115 family tree

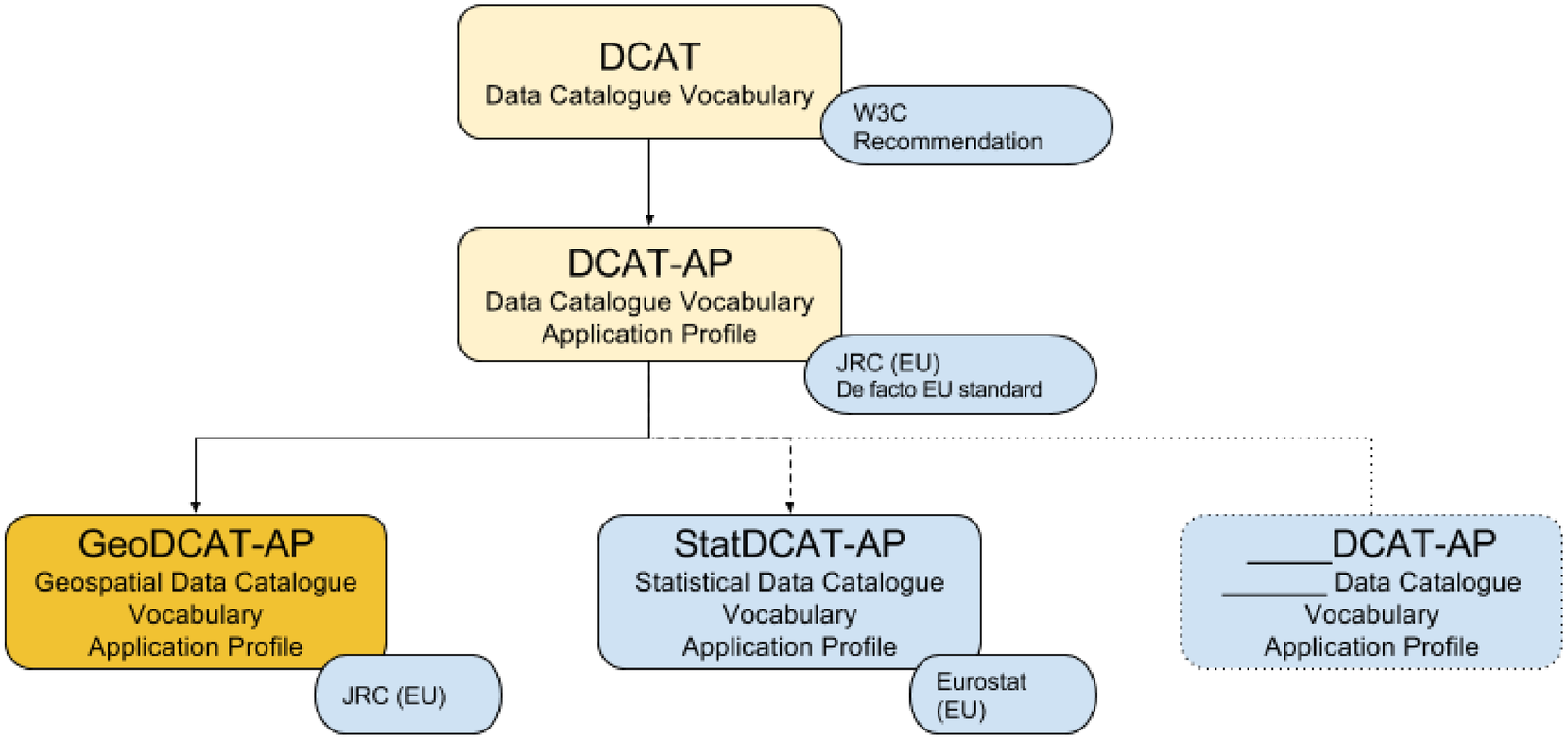
- ISO TC211 - Geographic information/Geomatics
- ISO19115:2003 & ISO19139
  - ISO19119 Geographic information — Services
  - ISO 19110:2016 Methodology for Feature Cataloguing
- ISO19115-1:2014, amd.1:2018 and amd.2-2020 - not backwards compatible
- ISO19115-3:2016 Geographic information — Metadata — Part 3: XML schema implementation for fundamental concepts

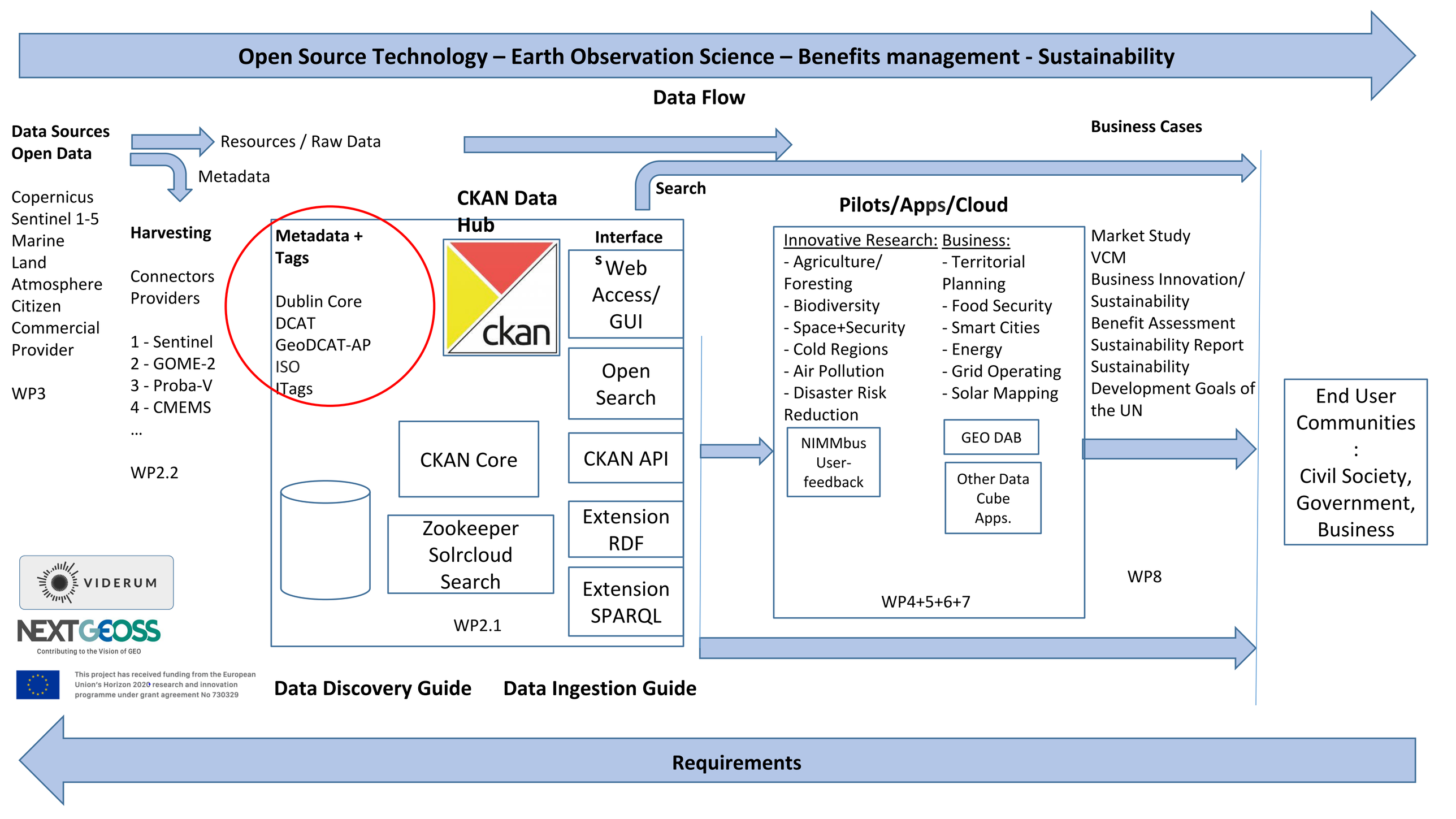
OGC API – Records: Crawlable Catalogue



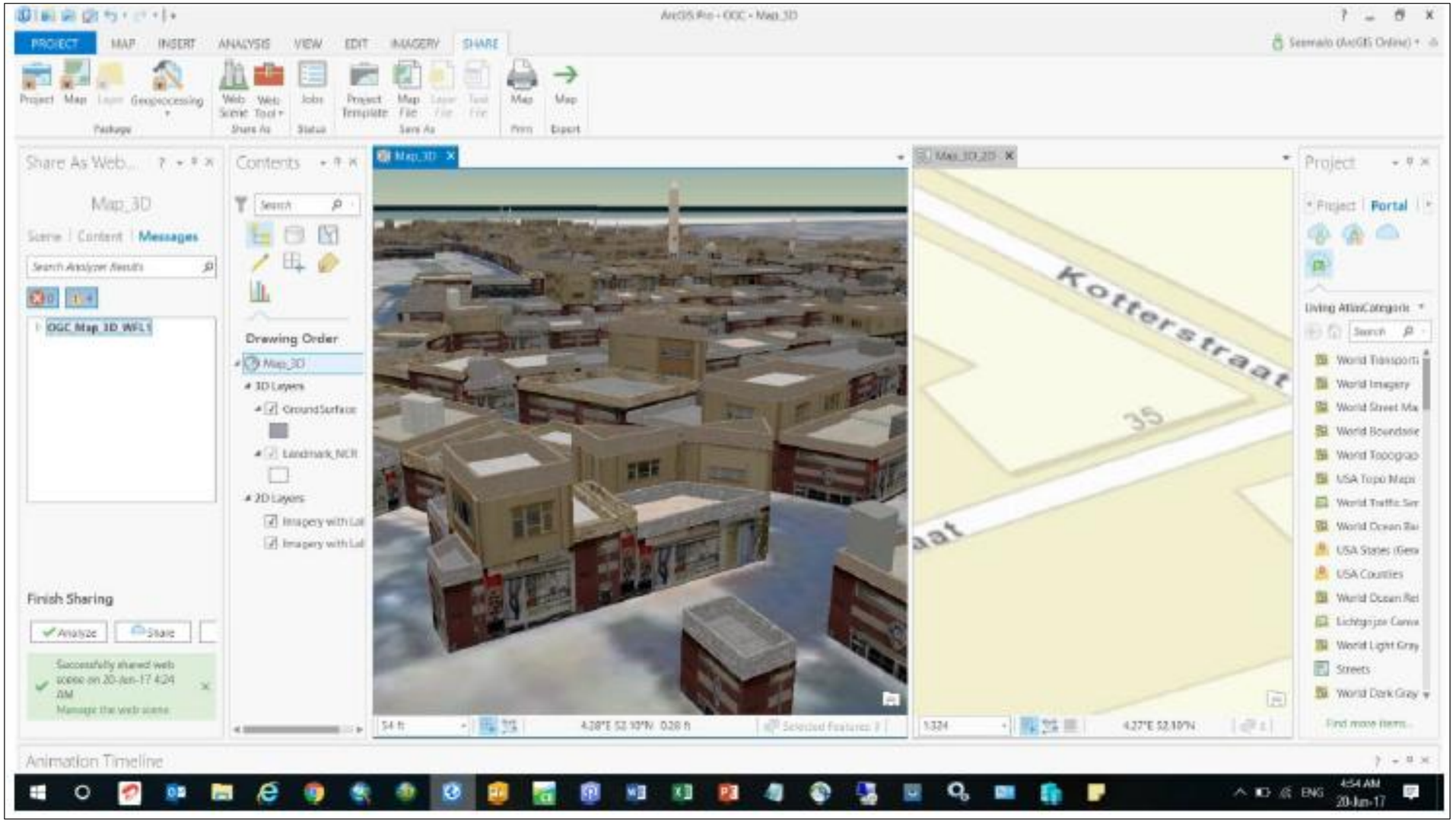
GeoDCAT: modern web library science

- DCAT – Family based on the core DCAT W3C recommendation (= standard)




Open Source Technology – Earth Observation Science – Benefits management - Sustainability
Data Flow
Data Sources
Open Data
Copernicus
Sentinel 1-5
Marine
Land
Atmosphere
Citizen
Commercial
Provider
WP3
Resources / Raw Data
Metadata
Harvesting
Connectors
Providers
1 - Sentinel
2 - GOME-2
3 - Proba-V
4 - CMEMS
…
WP2.2
CKAN Data Hub
Metadata + Tags
Dublin Core
DCAT
GeoDCAT-AP
ISO
ITags
ckan
Interfaces
Web Access/ GUI
Open Search
CKAN API
Extension RDF
Extension SPARQL
CKAN Core
Zookeeper Solrcloud Search
WP2.1
Search
Business Cases
Pilots/Apps/Cloud
Innovative Research:
- Agriculture/ Foresting
- Biodiversity
- Space+Security
- Cold Regions
- Air Pollution
- Disaster Risk Reduction
Business:
- Territorial Planning
- Food Security
- Smart Cities
- Energy
- Grid Operating
- Solar Mapping
NIMMbus User-feedback
GEO DAB
Other Data Cube Apps.
WP4+5+6+7
Market Study
VCM
Business Innovation/ Sustainability
Benefit Assessment
Sustainability Report
Sustainability Development Goals of the UN
WP8
End User Communities :
Civil Society, Government, Business
VIDERUM
NEXTGEOSS
Contributing to the Vision of GEO
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730329
Data Discovery Guide
Data Ingestion Guide
Requirements

Indian Plugfest



Courtesy OGC India

Thank You

Community

500+ International Members

110+ Member Meetings

60+ Alliance and Liaison partners

50+ Standards Working Groups

45+ Domain Working Groups

25+ Years of Not for Profit Work

10+ Regional and Country Forums

Innovation

120+ Innovation Initiatives

380+ Technical reports

Quarterly Tech Trends monitoring

Standards

65+ Adopted Standards

300+ products with 1000+ certified implementations

1,700,000+ Operational Data Sets

Using OGC Standards