Open Geospatial Consortium

Closing Plenary consolidated slides

The 124th OGC Member Meeting

Meeting sponsor

MPA SINGAPORE

SLA SINGAPORE LAND AUTHORITY

GeoWorks SINGAPORE

Scott Simmons, OGC
6 October 2022

Thank you!

Member Meeting and Singapore Geospatial Festival

Diversity luncheon

Agenda

- Welcome new members
  - General Authority for Survey and Geospatial Information (GASGI)
  - National Department of Agriculture Land Reform and Rural Development
- Quorum confirmation
- TC Presentations and Motions
  - GeoPackage Abstract Spec Topic: Jeff Yutzler
  - CoverageJSON: Chris Little
  - I3S: Tam Belayneh
  - GeoAPI 3.0.2: Martin Desruisseaux
  - 3D Tiles 1.1: Sean Lilley
  - Geo for Metaverse DWG: Nadine Alameh
- TC Chair announcements and motions
  - Building Blocks website: Joana Simoes
- Working Group reports with motions: 3 to Z
- “Important Things” discussion

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Welcome New Members!

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Author, Affiliation
DD October 2022

Strategic

Upgrade from Principal!

Technical

Upgrade from Startup!

Associate

Koninklijk Nederlands Meteorologisch Instituut
Ministerie van Infrastructuur en Waterstaat

National Défense
Defence nationale

At the heart of the remote sensing industry
RESTEC Remote Sensing Technology Center of Japan

S2C

LS TECHNOLOGIES

PIESAT

안양대학교
ANYANG UNIVERSITY

EDGYBEES

武漢理工大學
WUHAN UNIVERSITY OF TECHNOLOGY

Improving Aviation

University of Stuttgart

ALTZ TECHNOLOGIES

NVIDIA

skoed.io

长江空间信息技术工程有限公司（武汉）
ChangJiang Spatial Information Technology Engineering Co.LTD.(wuhan)

웨이버스 WAVUS

Chauhan, Lokendra

TC Presentations and Motions

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GeoPackage SWG Closing Plenary Report

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Jeff Yutzler,
Image Matters LLC
6 October 2022

Conceptual and Logical Model Introduction

- The GeoPackage Encoding Standard (GES) was originally devised to be an SQLite encoding.
- The Conceptual and Logical Model allow GeoPackage to be untethered from SQLite so that it can be implemented using other technologies (i.e., other relational databases).
  - Since it is abstract, the SWG proposes it as an Abstract Specification Topic.
- It is not a direct transcription of the GES.
  - Requirements classes are organized logically and do not map directly to extensions.
  - Idiosyncracies in the GES (probably due to its roots in SpatiaLite and MBTiles) have been ironed out.
  - Some terms match OGC Baseline terms, not GES ones (e.g., “coordinate reference system” vs. “spatial reference system”).
  - Requirement numbering is aligned to the GES, but SQLite-specific requirements are dropped.
- *UML is currently rendered with PlantUML, not Enterprise Architect, but this may change.*

A Tour of 21-052

- Clause 0, 1, 2, 3: Perfunctory
- Clause 4: terms and definitions for the standard itself
- Clause 5: conventions
  - References to GeoPackage Encoding Standard (italics)
  - UML (association, aggregation, inheritance, realization, multiplicity, null)
- Clause 6: standardization targets (informative: how the document is to be used)
- Clause 7: Conceptual Model (key concepts)
  - Organized into Core, Features, Tiles, Attributes, Extensions, Metadata, Schema, Tiled Gridded Coverages, Related Tables requirements classes
- Clause 8: Logical Model
  - UML: classes, enumerations, and properties
  - Requirements classes and requirements

Vote Approval Motion

- The GeoPackage SWG recommends that the OGC Technical Committee approve start of an electronic vote for [OGC 21-053r1] “Abstract Specification Topic 23 – GeoPackage Conceptual and Logical Model” as an OGC Abstract Specification Topic.
  - There was no objection to unanimous consent

Open Geospatial Consortium

CoverageJSON Candidate Community Standard Progress Report

The 124th OGC Member Meeting

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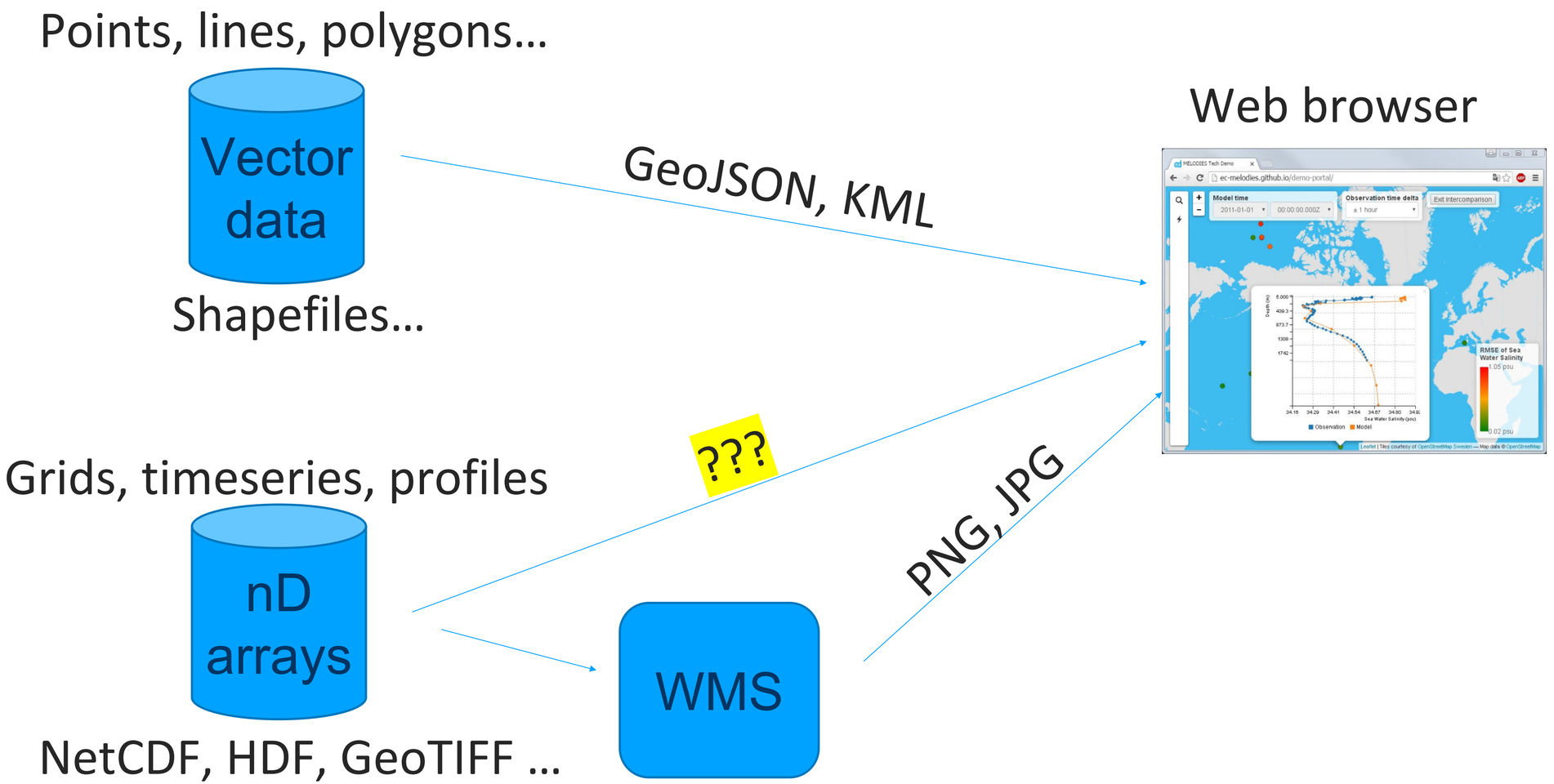
Jon Blower, NOC
Chris Little, Met Office
5 October 2022

CoverageJSON Progress Report Agenda

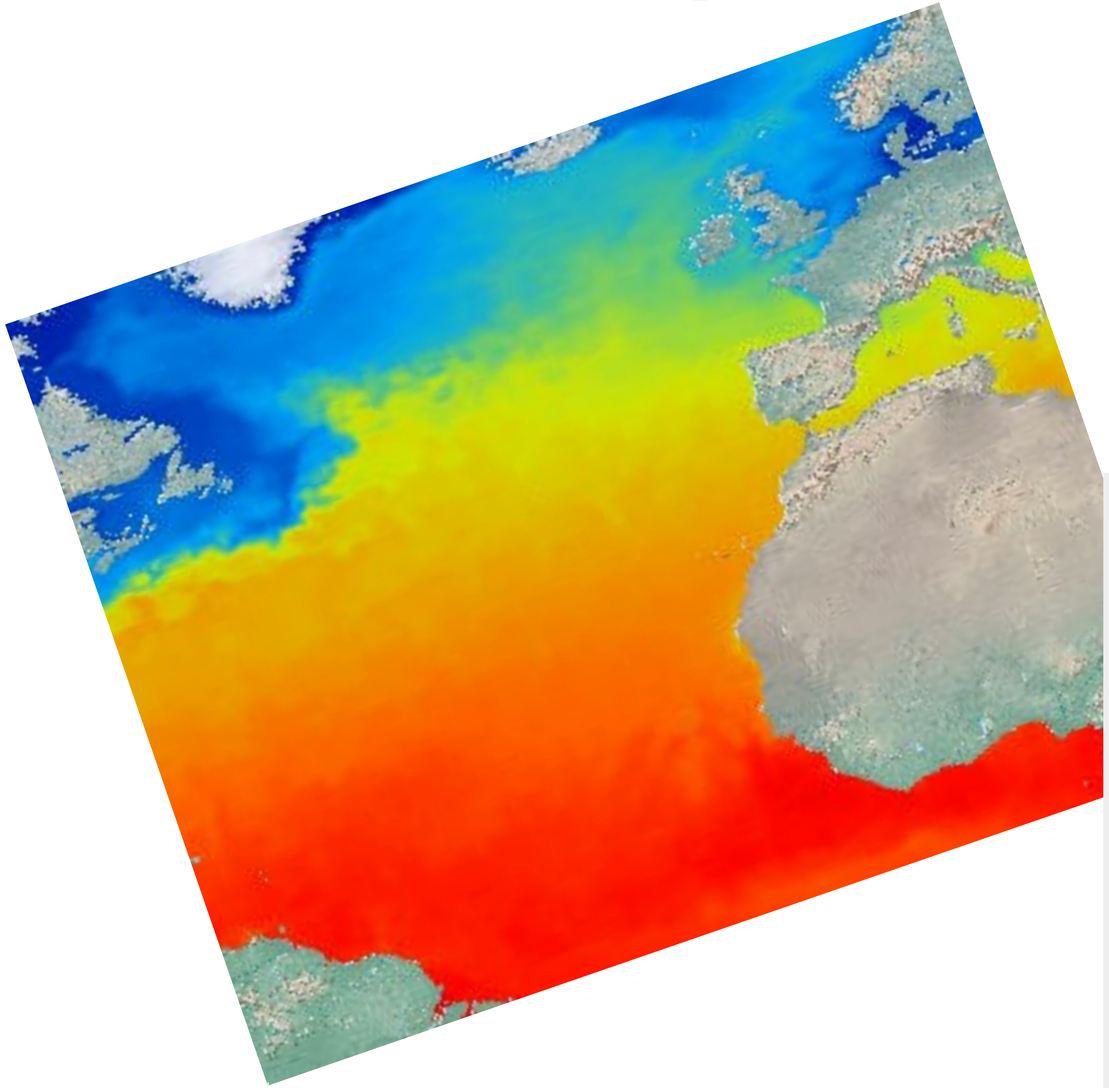
- Background
- Supporters
- Agreed plan
- Progress
- Questions and discussion

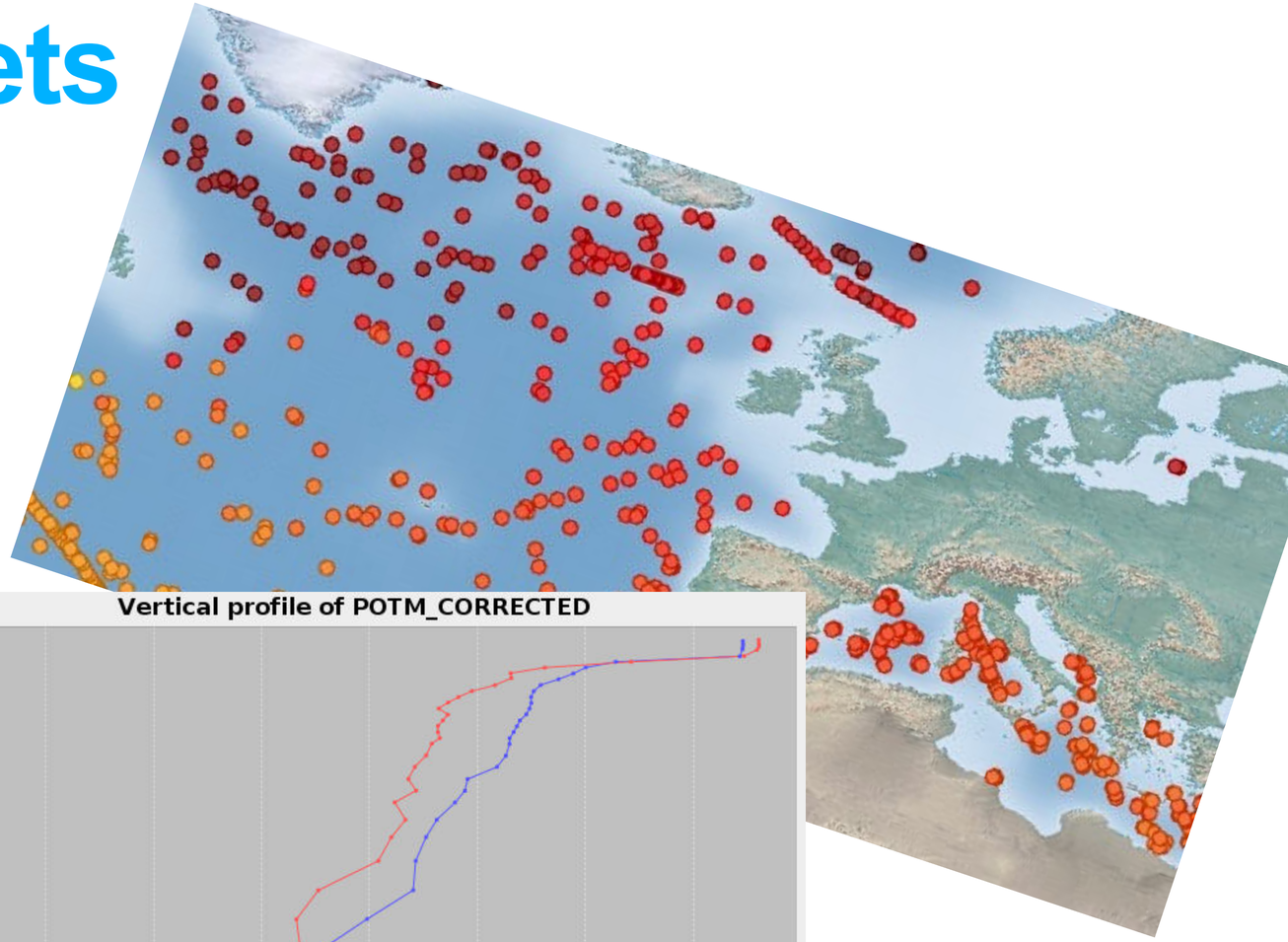
Motivation

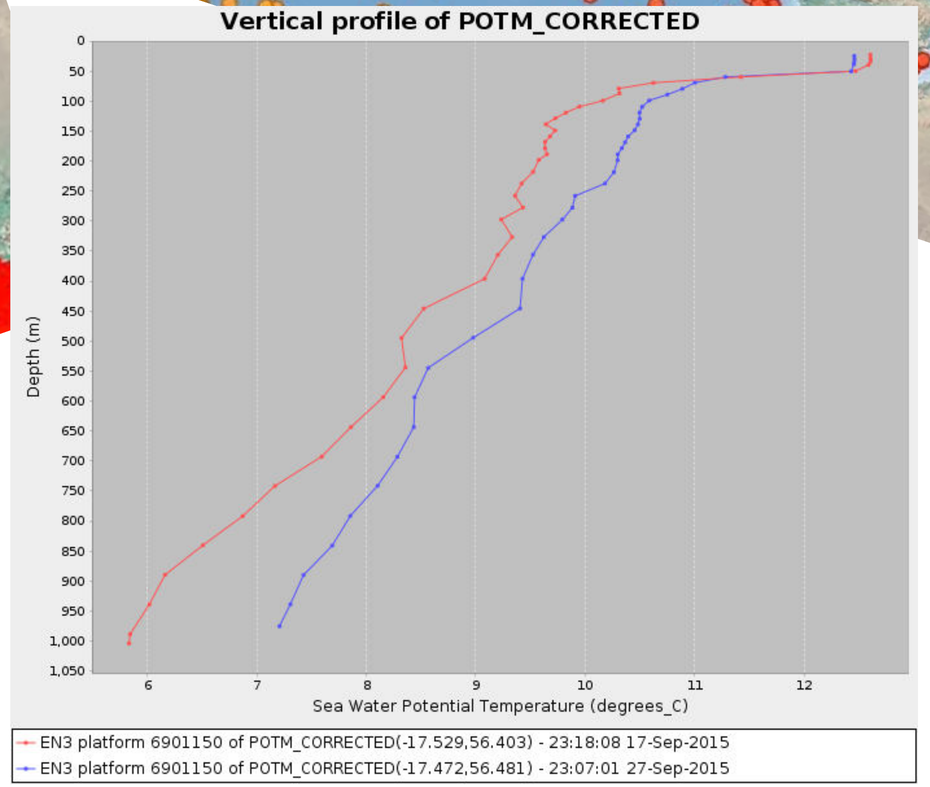
Geoscientists build a lot of web-based interactive data tools …



Some example datasets







value = f(position, time, ...)

Common issues

(circa. 2015, when we started this work)

- Lack of “off the shelf” JavaScript libraries for plotting geoscience data adequately
- Existing geospatial/scientific APIs not well suited to modern web environment
- No widely-used JSON format for geoscience data

=> Lots of reinvention of code between web portal developments

CoverageJSON Overview

- Developed and defined at Reading University, as part of EU funded project
- See https://covjson.org/ for specification, playground, tools, demos
- Readily used with browser plugin to use & visualize environmental data
  - Supports both coverage, feature and observation data models
- Performance important for useful amounts of data
  - nD arrays stored as single dimension array with axis order, length of rows (‘shape’)
  - Strings rather than nested Objects
- Uses JSON-LD to point to some metadata
  - JSON-LD 1.0 implies no links from inside nested objects
  - JSON-LD1.1 alters this assumption
  - Can be partially converted to RDF automatically

CoverageJSON tries to…

- Provide an easy-to-use format for geoscience data for web development
  - “GeoJSON for geoscience data”
- Encompass many different common scientific data types
  - **Images, regular and irregular grids, point clouds, timeseries-at-a-point, vertical profiles, trajectories…**
  - Continuous and categorical data
- Behave well in a Web environment
  - Avoid large monolithic documents
  - Enable linking between documents and concepts (semantics)
  - Enable internationalization
  - Dovetail with modern ways of designing web APIs
- Be *conceptually* compatible with ISO19123 *abstract* spec and “coverage” definition

CoverageJSON does *NOT* try to…

- Be a format for archiving large datasets
- Encode all nuances of the source data
  - Focus is on visualization and simple processing
  - Not a replacement for CF-NetCDF or other “deep” formats!
- Encode “related matters” such as provenance and sensor characteristics
  - Can be linked
- Comply with *concrete* CIS Coverage specification
  - But discussions are ongoing about mapping/harmonization

CoverageJSON OGC Progress

- 2013-2016 EU Melodies project
- 2016 CoverageJSON published (V0.2 Draft)
- 2019 Several server implementations, several clients, tools, widespread use
  - Met Ocean DWG and OGC/W3C SDW WG recommend standardization
  - Chartered SWG proposed, WCS SWG offered to host, added to WCS SWG work plan
- (2020-01 EDR API SWG formed and chose CoverageJSON as recommended payload)
- 2020 Still in re-charted Coverages SWG work plan
- 2021 Supporters of OGC Standardization decide on Community Standard
  - 2021-03 TC Review: some OGC Member Objections and Responses
  - 2021-06 Public Comments and Responses, proposed plan
  - 2021-09 OGC TC Motion for full TC vote
    - 2021-11 Vote passed with quorum: 20 Yes / 14 Abstain / 5 No with Comments
- 2021-12 GitHub issues work with Coverages SWG started
- 2022-05 Final publication edits finished
- 2022-07 OAB comments addressed
- 2022-09 Public comments addressed

CoverageJSON Supporters

Original Business Justification members

- Chris Little, UK Met Office (Technical Member)
- Ethan Davis, Unidata UCAR (Technical Member)
- Tom Kralidis, Meteorological Service of Canada (Associate Member)
- Jon Blower, University of Reading (Associate/University Member)
- Steve Olson, US NWS/NOAA (Principal Member)
- Lewis McGibbney, US ESIP/JPL/NASA (Strategic Member)

New supporters or actively involved on GitHub

- Jérôme St-Louis, Ecere (Associate Member) WCS SWG Co-Chair

CoverageJSON Agreed Plan

- Adopt CoverageJSON as specified at https://covjson.org/ as OGC Community Standard
  - Fix errors
  - Remove vague or undefined aspects
  - Develop JSON Schema for testing tools
- Produce detailed CoverageJSON and CIS JSON comparison document via WCS SWG
  - Keen volunteers identified, more needed
- Request and propose improvements to CoverageJSON. E.g:
  - Support for JSON-LD V1.1
  - Support for multiple time axes
  - Other backward compatible improvements (Version 1.0.x and 1.x.0)
  - Identify and plan V2.x
- Convergence with ISO 19123-1 and ISO19123-2 CIS would be a goal
- Continued community support and performance would also be a goal

Progress https://github.com/opengeospatial/CoverageJSON

Adopt CoverageJSON as specified at https://covjson.org/ as OGC Community Standard:

- Editorial: Standard->Specification, adopted OGC template DONE
- Fix errors, remove vague or undefined aspects DONE
- Alt-Range, to link to binary encoding, not well understood, agreed to remove DONE
- Develop full JSON Schema for testing tools DONE
- Add text to explain relation to ISO standards DONE
- Reply to each comment in the TC vote DONE
- Address original 22 issues DONE: Most closed, rest for future development

Produce detailed CoverageJSON and CIS JSON comparison document via WCS SWG

- Table of assertions from standard ISO19113/ATS 6 and ISO CD19113-2 DONE
- Add NetCDF to the comparison (CF-NetCDF3 is an extension of WCS & CIS) DONE
- Do the analyses TBD
- ISO ballot on CD19123-1 will end 2022-05. Await outcome, not predict

Other progress

- Community Website already updated automatically from OGC spec
- Community Sandbox/Playground incorporates full JSON Schema for testing
  - Will need additional tests that schema can’t validate (c.f. XML)
  - Python validator tool planned to augment the schema
- IPR currently invested in University of Reading with an open licence
  - Amenable to change
- Community starting to test against the JSON Schema
  - Reading University suite
  - Hyrax OpenDAP server

Skeleton CoverageJSON document

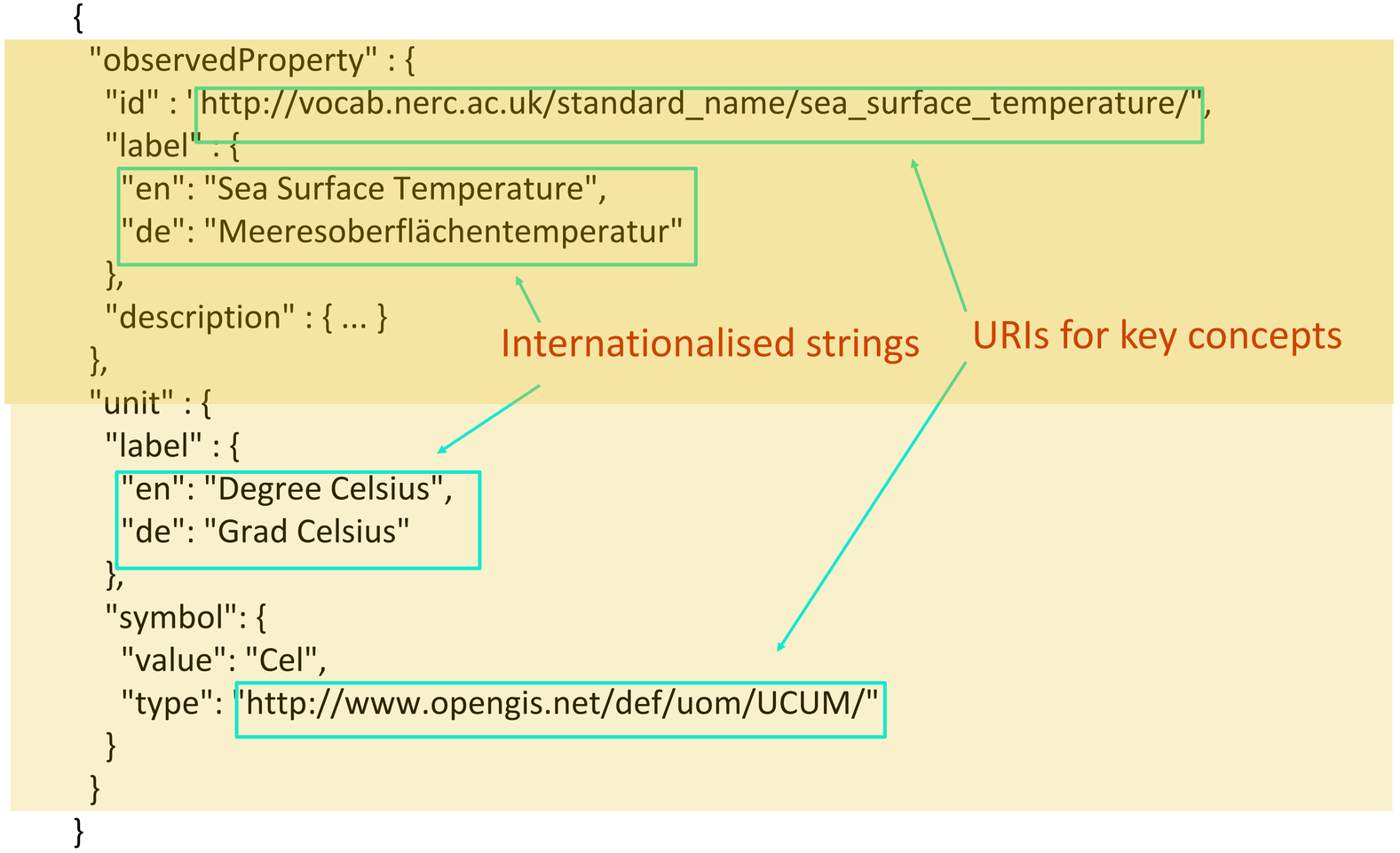
```
{
 "domain" : {
  ...
  "referencing" : [ ... ]
 },
 "parameters" : {
  ”SST" : { ... },
  ”sea_ice" : { ... }
 },
 "ranges" : {
  ”SST" : { ... },
  ”sea_ice" : { ... }
 }
}
```

Coordinates of data points and referencing information

Metadata describing data values

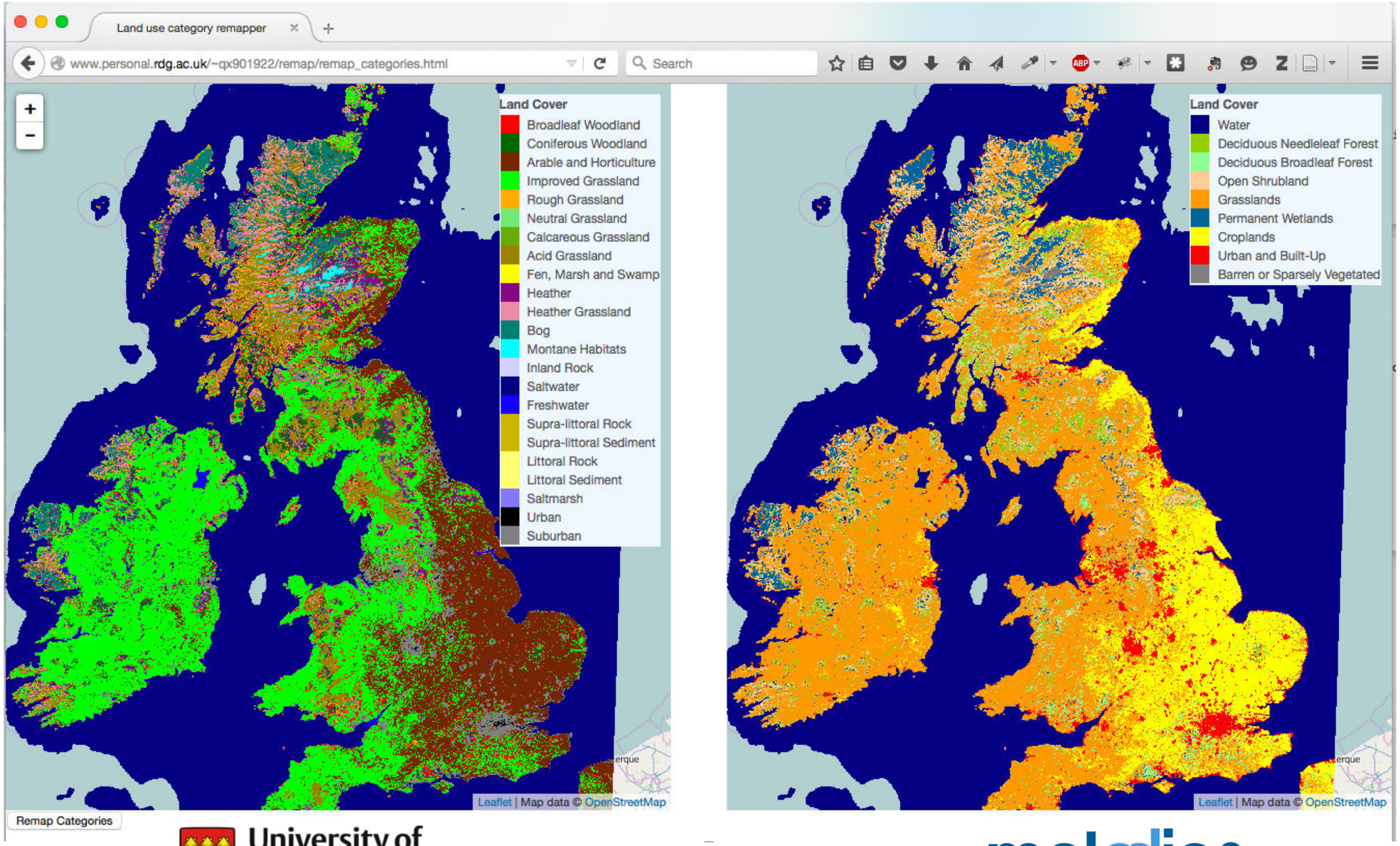
Data values as nD arrays

Metadata sample



Interactive, in-browser reclassification of land cover maps

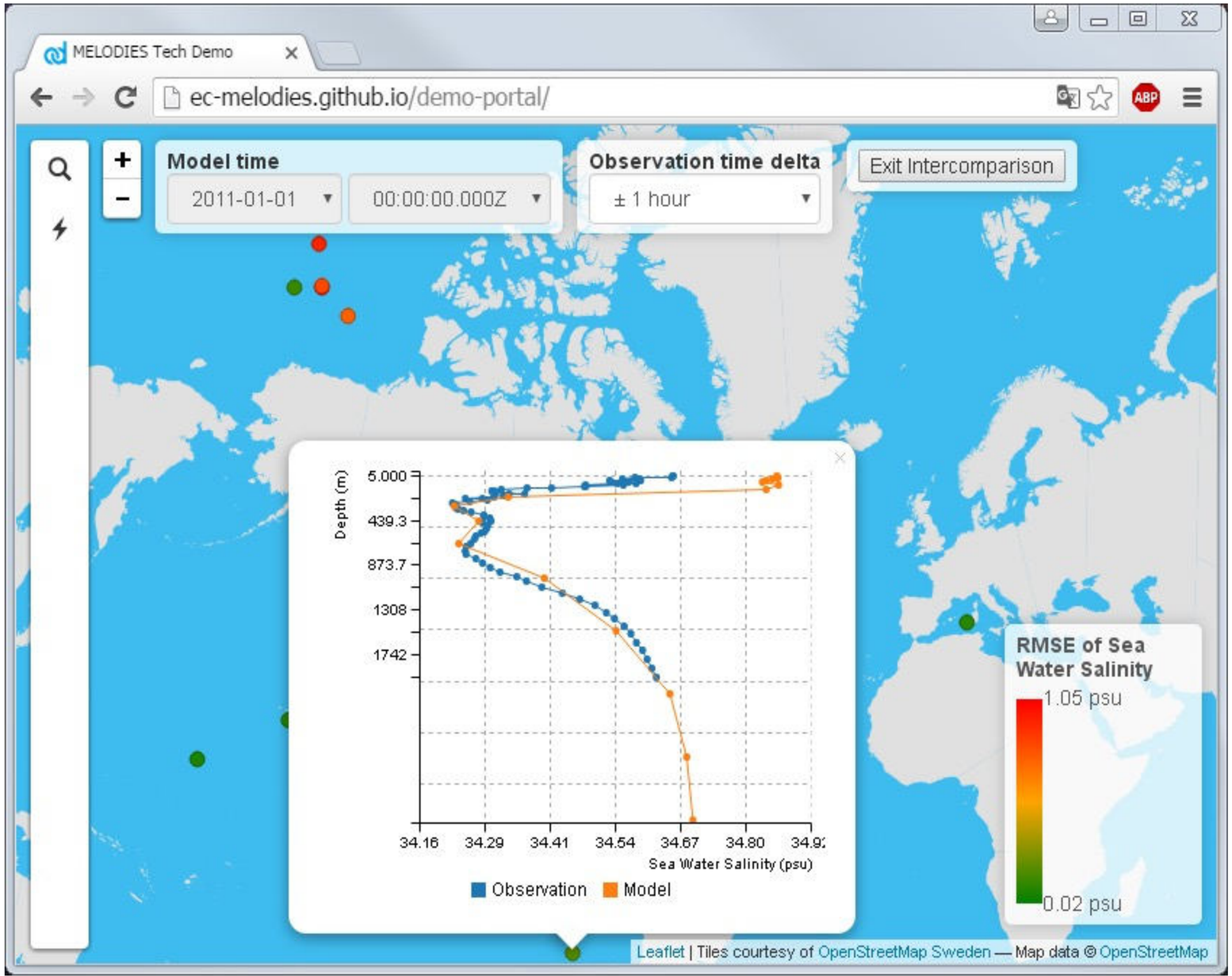
http://youtu.be/dxfmTkBdn90

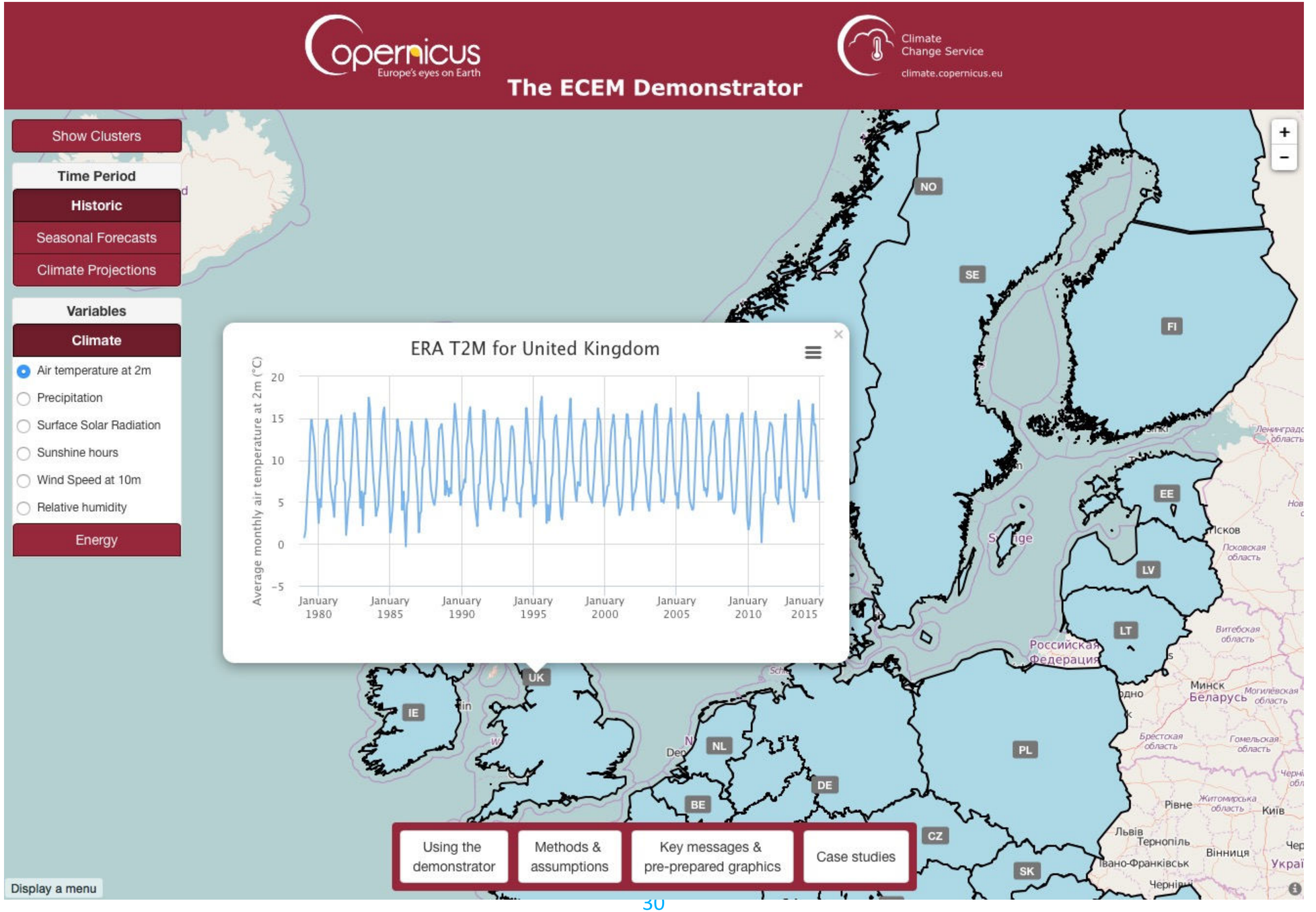


University of Reading

melodies
exploiting open data

In-browser intercomparison of models and observations




Copernicus
Europe's eyes on Earth
Climate Change Service
climate.copernicus.eu
The ECEM Demonstrator
Show Clusters
Time Period
Historic
Seasonal Forecasts
Climate Projections
Variables
Climate
Air temperature at 2m
Precipitation
Surface Solar Radiation
Sunshine hours
Wind Speed at 10m
Relative humidity
Energy
ERA T2M for United Kingdom
Average monthly air temperature at 2m (°C)
20
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10
5
0
-5
January 1980
January 1985
January 1990
January 1995
January 2000
January 2005
January 2010
January 2015
NO
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FI
EE
LV
LT
UK
IE
NL
BE
DE
PL
CZ
SK
Using the demonstrator
Methods & assumptions
Key messages & pre-prepared graphics
Case studies
Display a menu

Conclusions

- CoverageJSON aims to make it easier to build dynamic web applications based on geoscience data
  - Gridded and non-gridded
  - Regular and irregular
  - Continuous and categorical
- Tiling mechanism enables scaling to large datasets
- Support for JSON-LD and internationalization
- Tools and example applications are available
  - Validator coming soon


Any Questions?

Request of an electronic vote

- The CoverageJSON submitters recommend that the OGC Technical Committee approve an electronic vote to approve release of [OGC 21-069r2] “CoverageJSON” as an OGC Community Standard.
  - There was no objection to unanimous consent

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Candidate I3S Version 1.3 Community Standard

Keith Ryden, Carl Reed, Tamrat Belayneh

October 6, 2022, Singapore

I3S | Indexed 3D Scene Layers

Support multiple Profiles and Layer Types

3D Objects

- 3D Shapes
- Trees
- Buildings
- Infrastructure

Point Scene Layer

- Point locations
- Symbolize with 3D Object Styling
- Can visualize

Integrated Mesh Scene Layer

- Skin of the Earth
- Textured with imagery
- Captured by Drone2Map or other

Point Cloud Scene Layer

- LiDAR
- Photogrammetric points
- Style by elevation, color, classification

Building Scene Layer

- Detailed building models
- Typically Sourced from format such as Revit/IFC
- Supports Filter categories and floors

OGC I3S 1.0 – Initial Specification - Adopted August 2017

OGC I3S 1.1 – Added Point Cloud Scene Layers - Adopted January 2020

OGC I3S Version 1.2

OGC I3S 1.2 – Index Optimization and Advanced Materials Handling - Adopted November 2021

OGC I3S Version 1.3

OGC I3S 1.3 – Added Building Scene Layers – Pending Adoption Q4 2022

I3S Version 1.3: Building Scene Layers (BSL)

- A Building Scene Layer (BSL) is a 3D representation of a building model
- Building Scene Layers (BSL) were introduced in the public I3S GitHub community version 1.6 in 2019 https://github.com/Esri/i3s-spec
- Proposed I3S Version 1.3 OGC Community Standard:
  - Introduces Building Scene Layers
  - Based on the I3S GitHub community version 1.8
  - With a “snapshot” date of April 2022.
  - 1.3 Work Item Proposal OGC Document 22-008r1 (June 2022)
  - OAB Review and approval August 9, 2022
  - Public Comment Period ended September 19, 2022 . No comments.

Specification compatibility

- OGC I3S 1.3 is fully backward compatible with I3S versions 1.0, 1.1 and 1.2
- I3S 1.3 achieves compatibility by making available all required I3S 1.0, 1.1 and 1.2 resources as part of I3S 1.3 Community Standard
- Compatibility can be demonstrated with both commercial and open-source solutions. For example:
  - GeoScene releases prior to the I3S 1.3 support can consume later versions of I3S
  - V2.1 versions of loaders.gl & deck.gl introduced support for I3S 1.2 can be shown consuming I3S 1.3 without any problem

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Building Scene Layers - Overview

What is a Building Scene Layer (BSL) ?

- A 3D representation of a building model capturing the organization of construction data into standard engineering disciplines based on *ISO 16739-1:2018 Industry Foundation Classes (IFC)*

- Can be created from several sources including AutoCAD Revit, BIM/IFC encodings, and Geodata feature layers

- BSL encapsulates the semantic structure of the information in the building model while capturing geometry and attributes that can be used in an application

How is a Building Scene Layer Organized ?

- A BSL is organized in discipline layers (groups) such as Architectural, Electrical, Mechanical, Piping and Structural and category layers representing content such as walls or windows

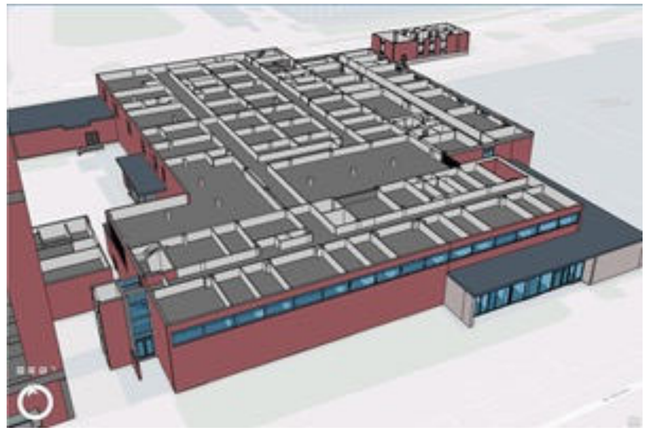
- As a 3D building model as a single layer composed of sublayers, using the following structure.
  - An Overview – An optional layer that allows the user to view the building(s) as a single layer
  - Discipline – Organizes feature layers into the different work disciplines
  - Category layer – Category layers (feature layers) represent individual categories, such as windows or walls, organized in disciplines
  - Filters – Buildings are complex features, and it is therefore essential to be able to filter individual elements by their characteristics

How are filters used?

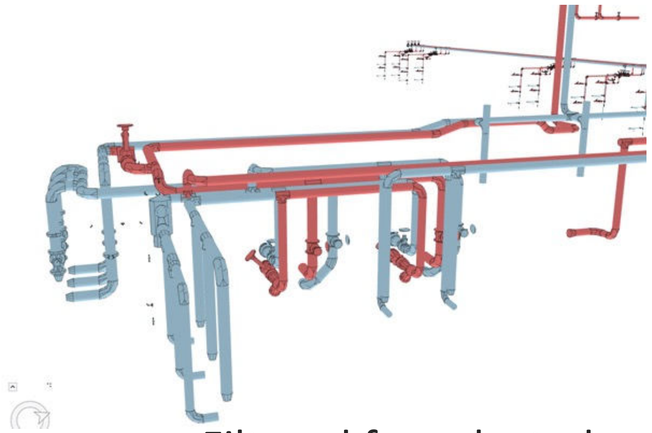
- Building Scene Layers are visually complex. Filtering elements or parts of a building to see only the relevant or important information is very useful

- A building filter enables making elements of a building visible as solid or wireframe. Each building filter contains one or more filter blocks. Filter blocks define what is visible in the BSL

Complex Building Model



With a filter applied



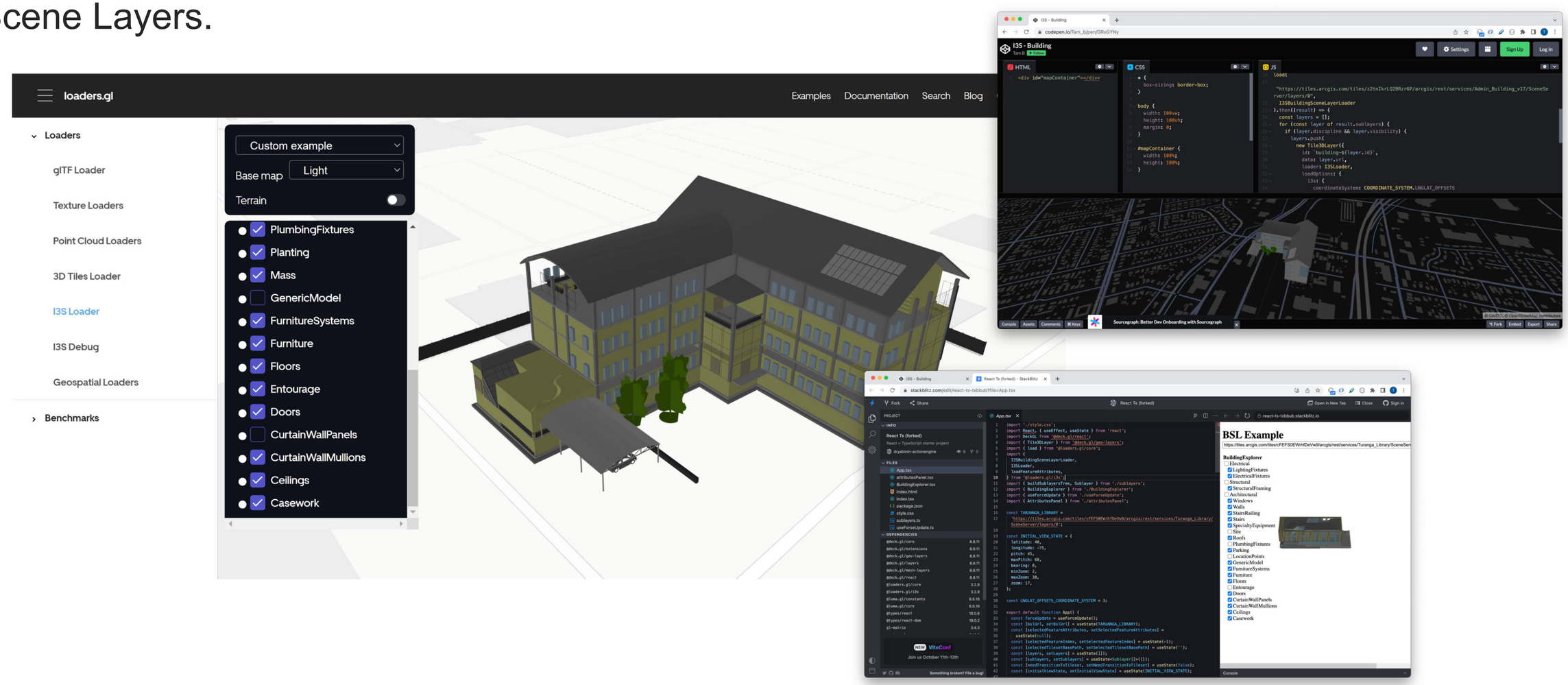
Filtered for selected plumbing only

Open Geospatial Consortium

Evidence of Implementation

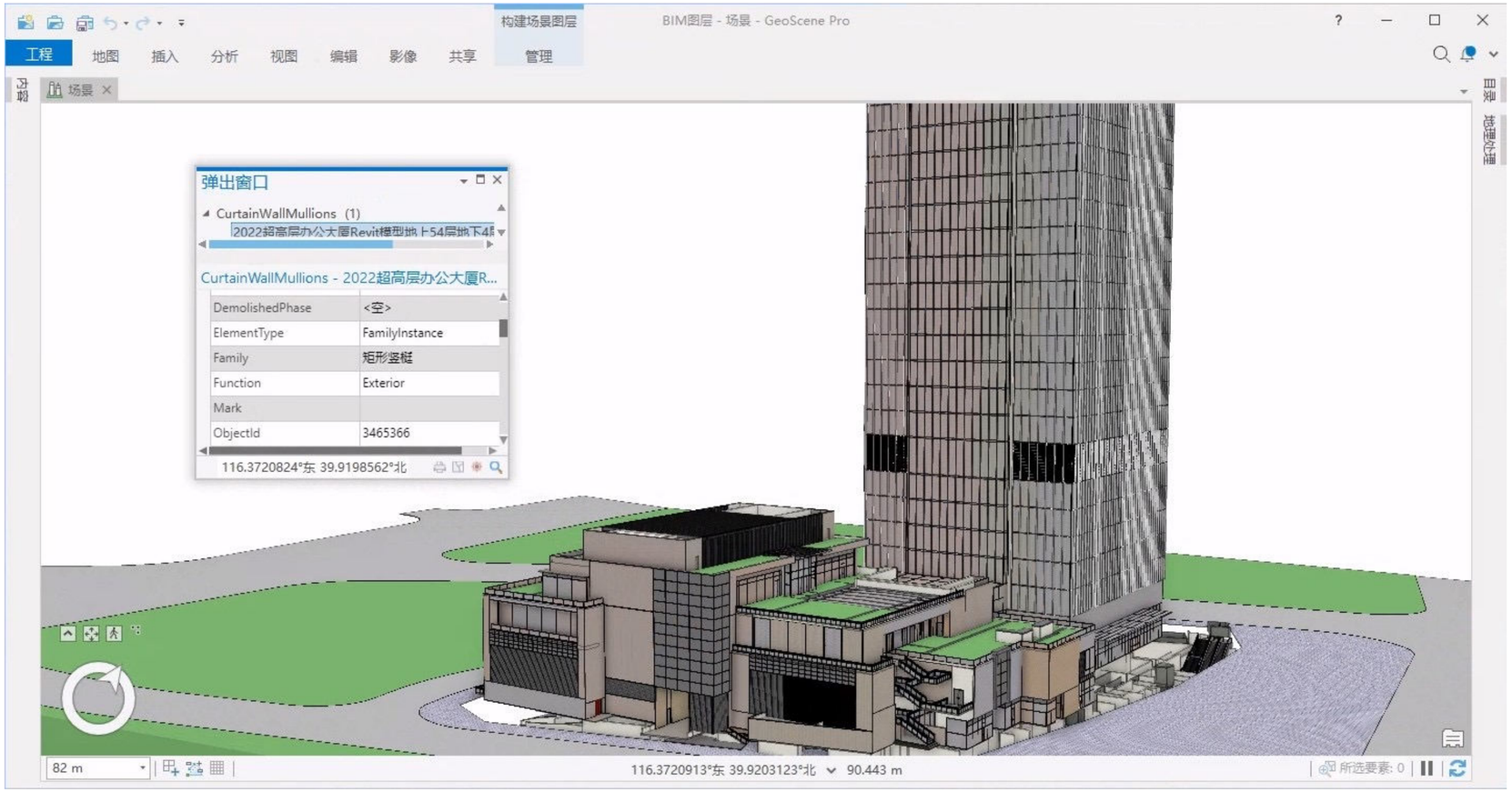
I3S Implementations: Vis.gl

- Vis.gl: Loaders.gl/deck.gl framework has support for I3S OGC 1.2 and the current version has added support for loading, visualizing and layer filtering of I3S Building Scene Layers.



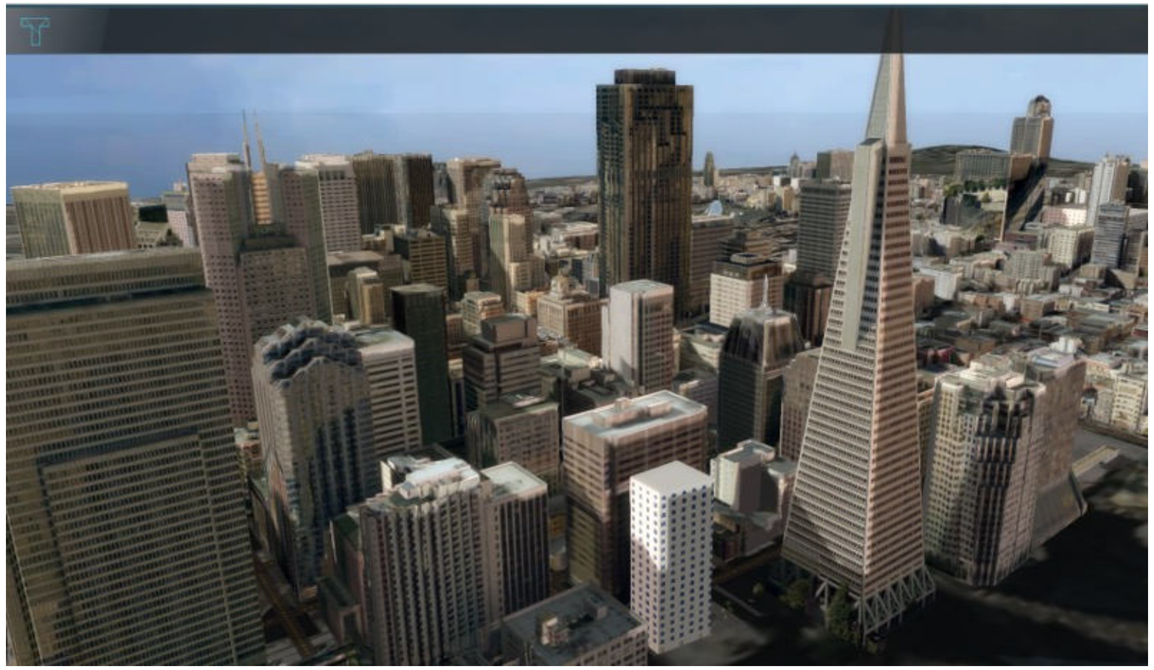
I3S 1.3 Implementations: GeoScene

- GeoScene 2.1 provides I3S data construction, Enterprise services, and client applications to create, host, visualize and process OGC I3S 1.x content including BSLs.



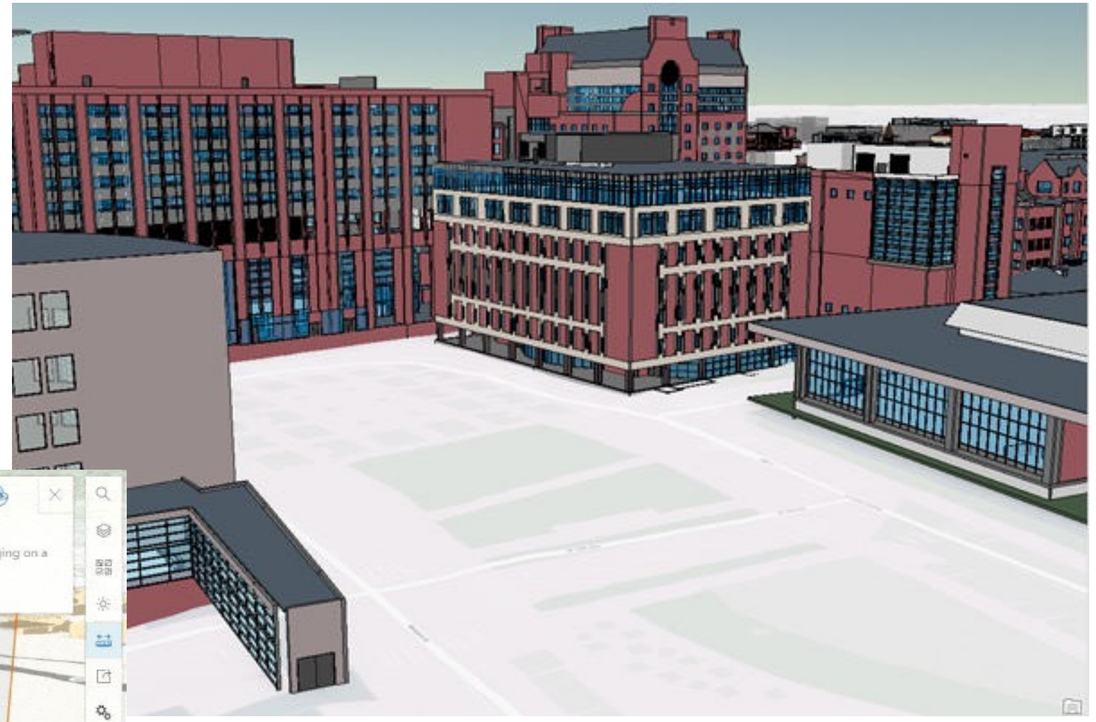
I3S 1.3 Implementations: Tygron

- Date of most recent version: Feb 2020. Starting at Version 2020.5.6, Tygron has:
  - Support for the "Building Scene Layer" type, used by BIM models such as Revit.
  - Support for "Visibility" flag in Building Scene Layer Sub Layers.



I3S implementations: ArcGIS

- ArcGIS PRO (desktop)
- ArcGIS Enterprise (server)
- ArcGIS Online (web)



Demonstration

BSL support in Loaders.gl/deck.gl

loaders.gl

https://loaders.gl

loaders.gl

Examples Documentation Showcase Search Blog GitHub

LOADERS.GL

Loaders for Big Data Visualization

GET STARTED

- Parsers and encoders for many major 3D, geospatial and tabular formats.
- Loaders and Writers can be used with any visualization framework.
- Move your code between browser, worker threads and Node.js and rely on your loaders to keep working.

BSL support in Loaders.gl/deck.gl dev experience

stackblitz.com/edit/i3s-ogc-bsl?file=App.tsx

Save | Fork | Share | I3S OGC 1.3 BSL Developer Sample | Open in New Tab | Close

PROJECT

Connect repository

INFO

FILES

- App.tsx
- attributesPanel.tsx
- BuildingExplorer.tsx
- index.html
- index.tsx
- package.json
- style.css
- sublayers.ts
- useForseUpdate.ts

DEPENDENCIES

@deck.gl/core	8.8.11
@deck.gl/extensions	8.8.11
@deck.gl/geo-layers	8.8.11
@deck.gl/layers	8.8.11
@deck.gl/mesh-layers	8.8.11
@deck.gl/react	8.8.11
@loaders.gl/core	3.2.9
@loaders.gl/i3s	3.2.9
@luma.gl/constants	8.5.16
@luma.gl/core	8.5.16
@types/react	18.0.8
@types/react-dom	18.0.2
gl-matrix	3.4.3
mapbox-gl	2.10.0
react	18.1.0
react-dom	18.1.0
react-map-gl	5.0.0

Enter package name

Something broken? File a bug!

App.tsx

```tsx
import './style.css';
import React, { useEffect, useState } from 'react';
import DeckGL from '@deck.gl/react';
import { Tile3DLayer } from '@deck.gl/geo-layers';
import { load } from '@loaders.gl/core';
import {
  I3SBuildingSceneLayerLoader,
  I3SLoader,
  loadFeatureAttributes,
} from '@loaders.gl/i3s';
import { buildSublayersTree, Sublayer } from './sublayers';
import { BuildingExplorer } from './BuildingExplorer';
import { useForceUpdate } from './useForseUpdate';
import { AttributesPanel } from './attributesPanel';

const TARUANGA_LIBRARY =
  'https://tiles.arcgis.com/tiles/cFEFS0EWrhfDeVw9/arcgis/rest/services/Turanga_Library/
  SceneServer/layers/0';

const INITIAL_VIEW_STATE = {
  latitude: 40,
  longitude: -75,
  pitch: 45,
  maxPitch: 60,
  bearing: 0,
  minZoom: 2,
  maxZoom: 30,
  zoom: 17,
};

const LNGLAT_OFFSETS_COORDINATE_SYSTEM = 3;

export default function App() {
  const forceUpdate = useForceUpdate();
  const [bslUrl, setBslUrl] = useState(TARUANGA_LIBRARY);
  const [selectedFeatureAttributes, setSelectedFeatureAttributes] =
    useState(null);
  const [selectedFeatureIndex, setSelectedFeatureIndex] = useState(-1);
  const [selectedTilesetBasePath, setSelectedTilesetBasePath] = useState('');
  const [layers, setLayers] = useState([]);
  const [sublayers, setSublayers] = useState<Sublayer[]>([]);
  const [needTransitionToTileset, setNeedTransitionToTileset] = useState(false);
  const [initialViewState, setInitialViewState] = useState(INITIAL_VIEW_STATE);
```

react-ts-uvhbtv.stackblitz.io

BSL Example

https://tiles.arcgis.com/tiles/cFEFS0EWrhfDeVw9/arcgis/rest/services/Turanga_Library/SceneServ

BuildingExplorer

- [ ] Electrical
  - [x] LightingFixtures
  - [x] ElectricalFixtures
- [ ] Structural
  - [x] StructuralFraming
- [ ] Architectural
  - [x] Windows
  - [x] Walls
  - [x] StairsRailing
  - [x] Stairs
  - [x] SpecialtyEquipment
  - [ ] Site
  - [x] Roofs
  - [ ] PlumbingFixtures
  - [x] Parking
  - [ ] LocationPoints
  - [x] GenericModel
  - [x] FurnitureSystems
  - [x] Furniture
  - [x] Floors
  - [ ] Entourage
  - [x] Doors
  - [x] CurtainWallPanels
  - [x] CurtainWallMullions
  - [x] Ceilings
  - [x] Casework

Console

BSL support in GeoScene

BSL support in JSAPI

BSL Creation Support in ArcGIS

Reference Materials

- I3S 1.3 review documents are on pending and in the OGC Git Repo:
  - Candidate I3S Community Standard Version 1.3 (core document)
  - I3S Version 1.3 Release Notes
- The I3S Work Item Justification for Version 1.3 update (Document 22-008r1)
  - https://portal.ogc.org/files/?artifact_id=101083&version=1
- The I3S Work Item Justification for Version 1.2 update (Document 20-093)
  - https://portal.ogc.org/files/?artifact_id=95594&version=2
- The I3S Work Item Justification for Version 1.1 update (Document 19-006)
  - https://portal.opengeospatial.org/files/?artifact_id=82971&version=1
- Original I3S Work Item Justification (Document 16-133r2)
  - https://portal.opengeospatial.org/files/?artifact_id=71232&version=2
- OGC I3S Community Standard
  - http://www.opengeospatial.org/standards/i3s
- Source Community I3S GitHub repository
  - https://github.com/esri/i3s-spec

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

Request of an electronic vote

- The Indexed 3D Scene Layer (I3S) submitters recommend that the OGC Technical Committee approve an electronic vote to approve release of [OGC 17-014r10] “I3S Community Standard v. 1.3” as an OGC Community Standard.
  - There was no objection to unanimous consent

Open Geospatial Consortium

GeoAPI 3.0.2

The 124st OGC Member Meeting

Martin Desruisseaux (Geomatys)
6 October 2022

GeoAPI 3.0.2

Content

- Corrigendum for GeoAPI 3.0.1 (released in 2017)
  - 0 critical change, 5 substantive changes, 2 administrative changes
  - OGC 21-076 in pending documents
  - https://github.com/opengeospatial/geoapi/tree/3.0.2-RC1
- Addition of module-info with "**org.opengis.geoapi**" module name
  - Java modules did not existed at the time of GeoAPI 3.0.1 release
  - All other Java files are identical to GeoAPI 3.0.1
- Upgrade Unit API dependency from 1.0 (JSR-363) to 2.0 (JSR-385)

Validation

- Executed GIGS tests on PROJ-JNI and on Apache SIS

module-info.java

```
module org.opengis.geoapi {
    requires transitive java.measure;                  // JSR-385 (previously JSR-363)
    requires transitive static java.desktop;           // Optional dependency to java.awt.geom.Point2D

    exports org.opengis.annotation;
    exports org.opengis.util;
    exports org.opengis.metadata;
    exports org.opengis.metadata.acquisition;
    exports org.opengis.metadata.citation;
    exports org.opengis.metadata.constraint;
    exports org.opengis.metadata.content;
    exports org.opengis.metadata.distribution;
    exports org.opengis.metadata.extent;
    exports org.opengis.metadata.identification;
    exports org.opengis.metadata.lineage;
    exports org.opengis.metadata.maintenance;
    exports org.opengis.metadata.quality;
    exports org.opengis.metadata.spatial;
    exports org.opengis.parameter;
    exports org.opengis.referencing;
    exports org.opengis.referencing.datum;
    exports org.opengis.referencing.cs;
    exports org.opengis.referencing.crs;
    exports org.opengis.referencing.operation;
}
```

1.1 revision update

October 5, 2022

Sean Lilley
sean@cesium.com

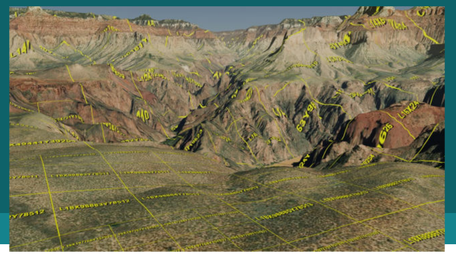
3D Tiles™

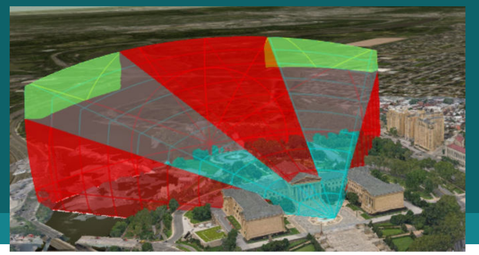
Today's Topics

- Overview of 3D Tiles 1.1 specification
- Current state of the ecosystem
- OGC Community Standard update

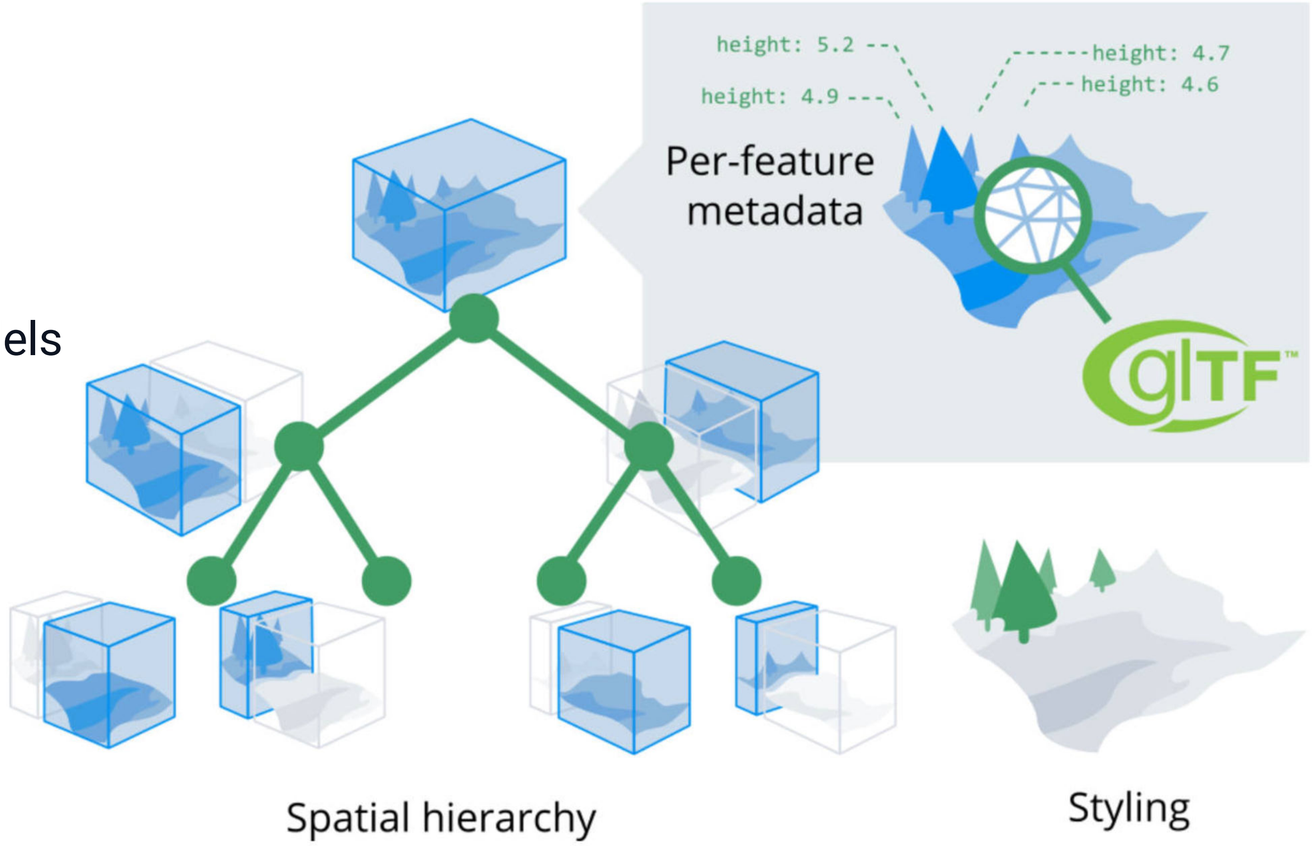
Data: Aerometrex

3D Tiles™



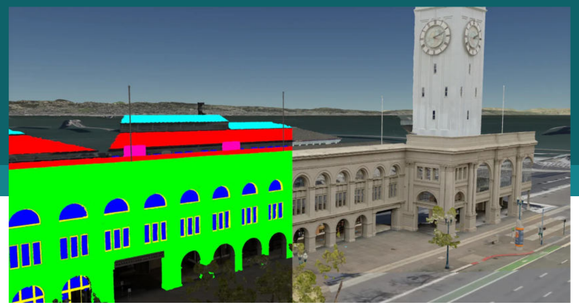


- Open standard for streaming massive heterogeneous 3D geospatial data
  - Terrain & imagery, 3D buildings, photogrammetry, point clouds, BIM models, interiors, etc.
  - Multiple source data types, one runtime format
- Visualization + analysis
- Combine:
  - Flexible spatial data structure in JSON
  - “Runtime ready” binary tile formats
  - Khronos glTF open standard for 3D models
  - Vertex-level metadata
  - Declarative styling

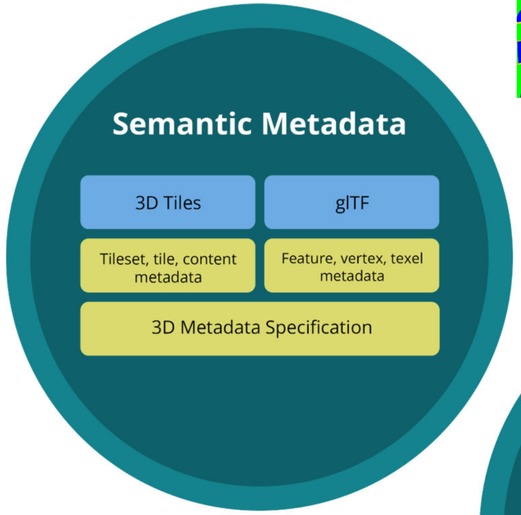


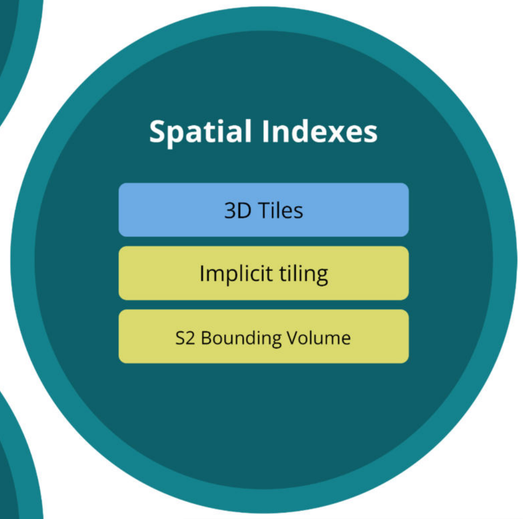
OGC® Making location count. KHRONOS GROUP CESIUM®

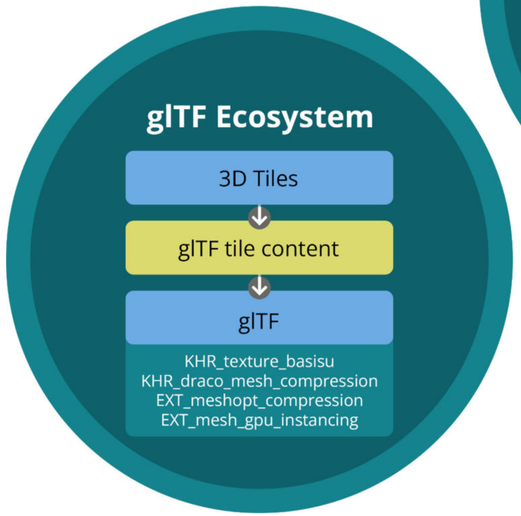
3D Tiles 1.1

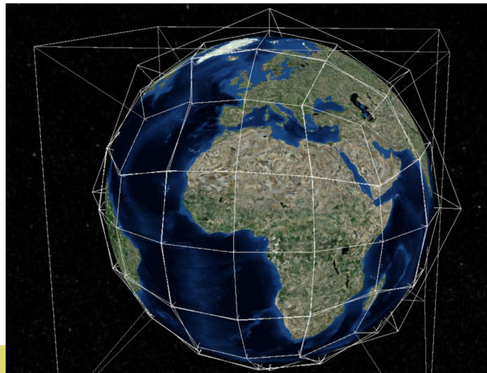


- Upcoming revision for 3D Tiles
- Previously called 3D Tiles Next
- New capabilities:
  - More robust and efficient semantic **metadata**
  - **Implicit tiling**: compact, sparse quadtrees and octrees for massive simulations and analytics
  - Cleaner integration with the **glTF ecosystem**





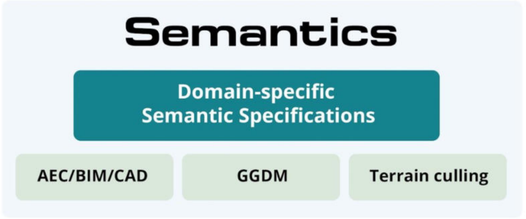


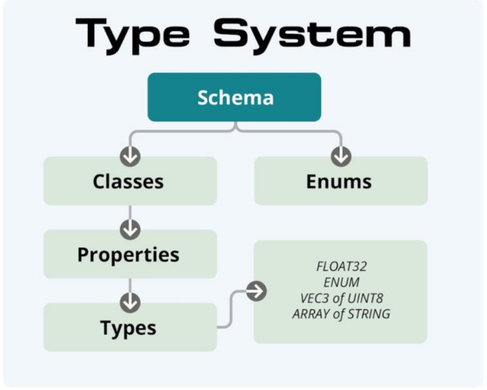


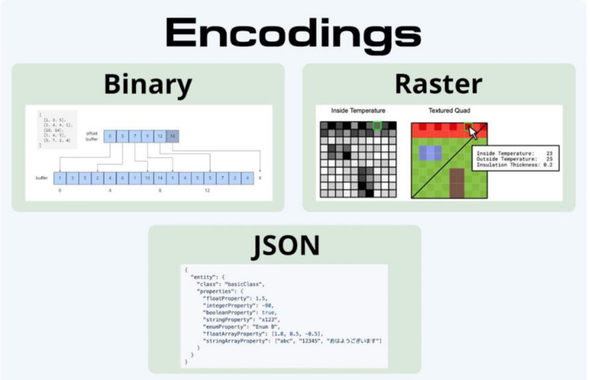
https://cesium.com/blog/2021/11/10/introducing-3d-tiles-next/

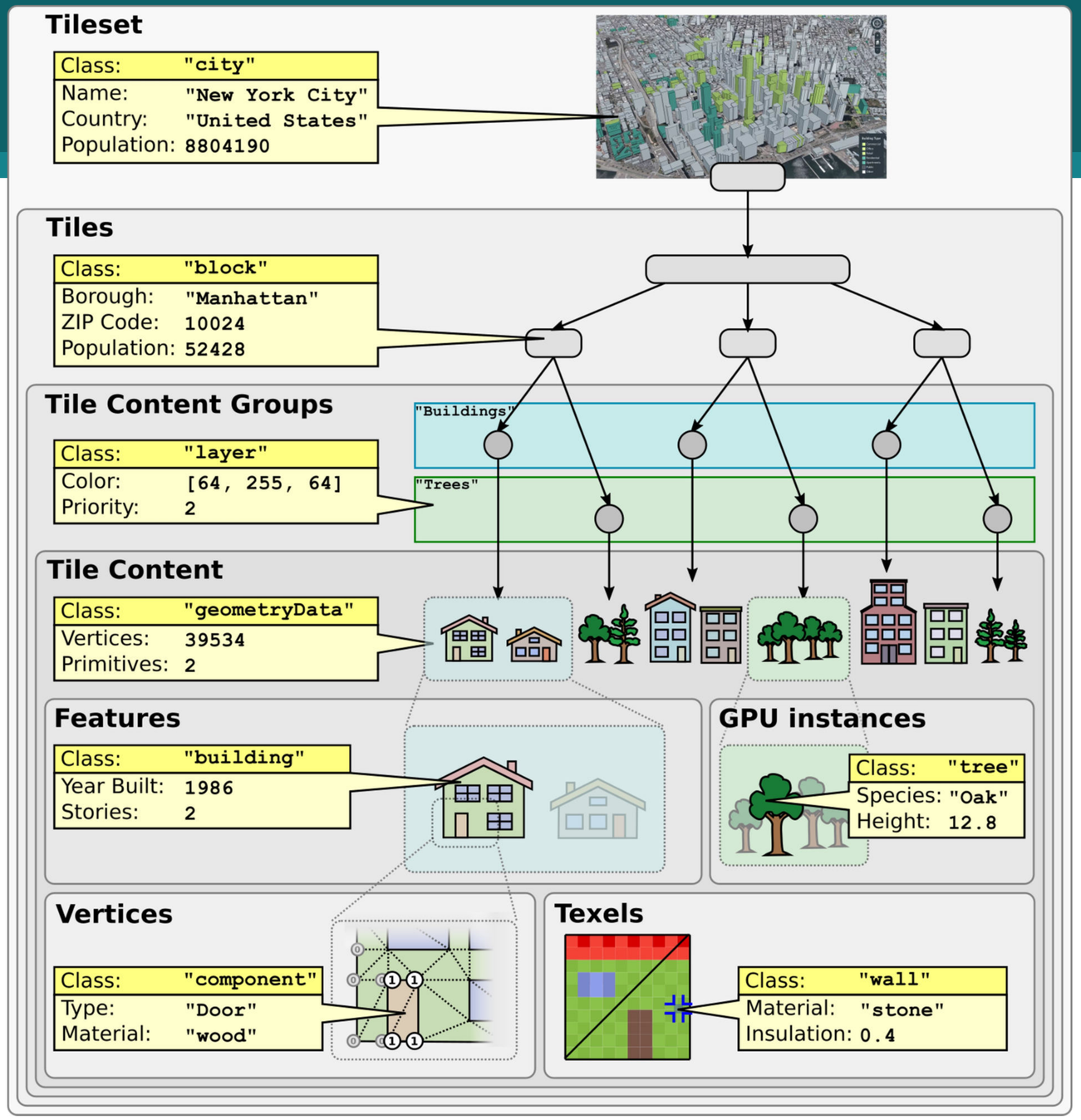
Metadata

- Augment real-world data with semantics from AI and machine learning
- Metadata at many granularities
- Decoupled design: semantics, type



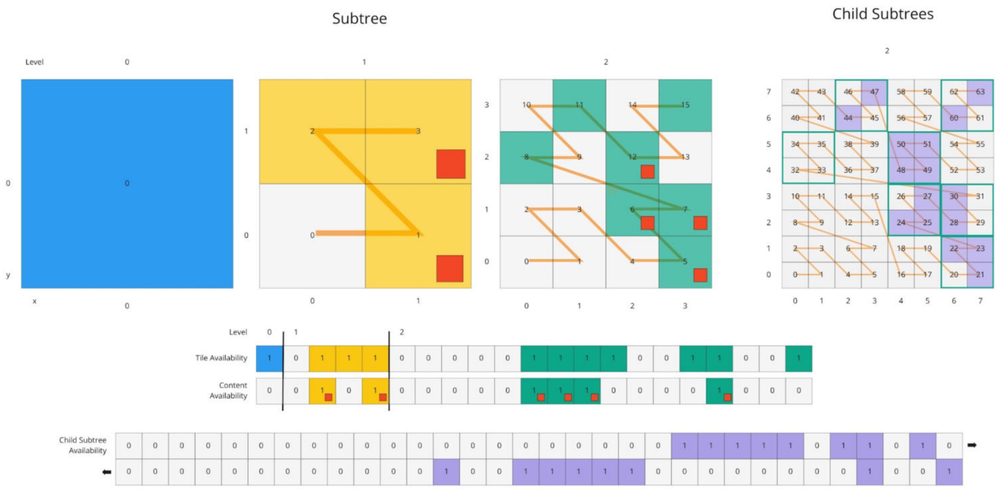


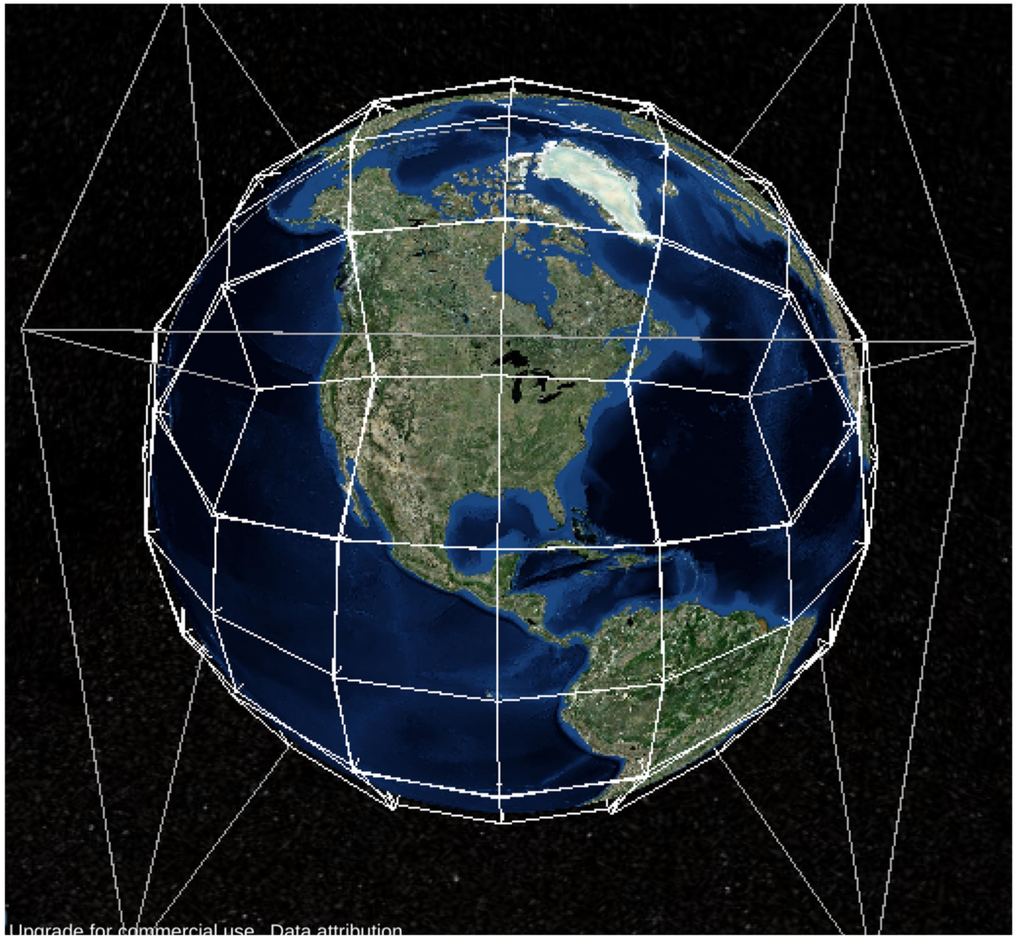




Implicit Tiling

- Compact representation of octrees and quadtrees
- Tiles located directly by (level, x, y, [z])
- Random access provides
  - Accelerated spatial queries
  - Efficient traversal at runtime
  - Efficient partial updates for changing scenes

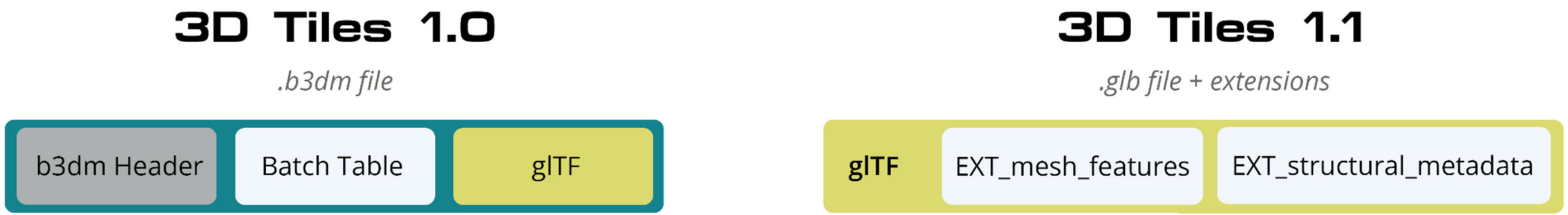




S2 Base Globe Sandcastle

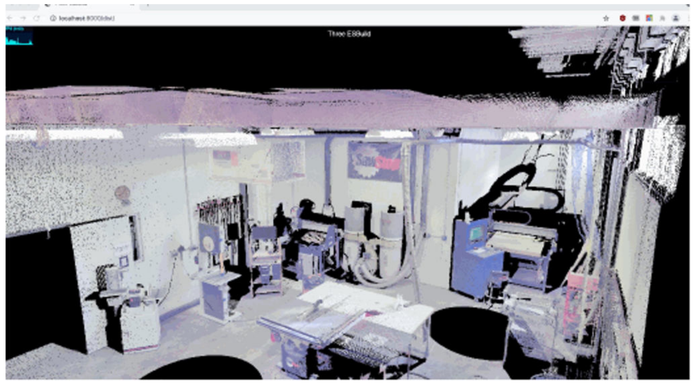
3D Tiles and glTF

- 3D Tiles now references glTF directly
- Leverage more glTF tools & extensions
  - Compression: KTX 2.0, MESHOPT, Draco
  - GPU instancing
  - More physically-based materials: specular, clearcoat, sheen, etc.
- New glTF extensions for fine-grained metadata
  - EXT_mesh_features: https://github.com/KhronosGroup/glTF/pull/2082
  - EXT_structural_metadata: https://github.com/KhronosGroup/glTF/pull/2151



State of the Ecosystem

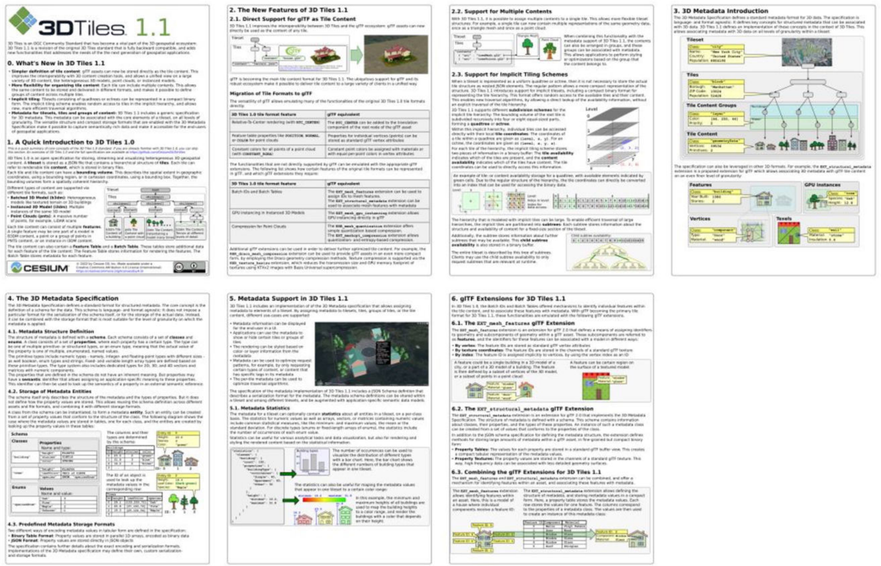
CESIUMJS	Implemented in 1.96 (CHANGES.md)
CESIUM FOR UNREAL CESIUM FOR O3DE	glTF content, implicit tiling, and S2 bounding volumes
CESIUM Native	In progress (#386)
AUTODESK	glTF content, implicit tiling https://github.com/wallabyway/minimal-pointcloud-gltf
VIS.GL	glTF content, implicit tiling https://github.com/visgl/loaders.gl/tree/master/modules/3d-tiles
CDB to 3D Tiles Next	(#58)
Sample Data	3d-tiles-samples



Tracking ecosystem growth here: #560

3D Tiles 1.1 Resources

- 3D Tiles 1.1 specification
- **3D Tiles 1.1 validator (new!)**
- 3D Tiles 1.1 Sample Data
- 3D Tiles 1.1 Reference Card
- 3D Tiles Ecosystem & Resources



OGC Community Standard Update

- Candidate Community Standard
  - https://portal.ogc.org/files/102132
- Backwards compatible with 3D Tiles 1.0
- Requesting to approve the start of electronic vote

Request of an electronic vote

- The 3D Tiles submitters recommend that the OGC Technical Committee approve an electronic vote to approve release of [OGC 22-025r2] “3D Tiles Standard v. 1.1” as an OGC Community Standard.
  - There was no objection to unanimous consent

Open Geospatial Consortium

Proposed Geo for Metaverse DWG

The 124th OGC Member Meeting

Meeting sponsor

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SLA SINGAPORE LAND AUTHORITY

GeoWorks SINGAPORE

Dr. Nadine Alameh, OGC
6 October 2022

Geo For Metaverse WG

Purpose of WG

- Provide a forum for discussion and documentation of interoperability requirements for Open and Interoperable Metaverse components and services.
- Capture and communicate the value of geospatial tech and expertise and advocate for interoperability and standards that will ensure the successful adoption of and widespread innovation for the Metaverse.
- Link with other standards bodies and other types of community or stakeholder efforts, that will help to accelerate the enabling of value of geospatial in the Metaverse.
- Collective experimentation and demonstration around use cases
- Identify community standards to bring into OGC.
- Develop Change Requests (CR's) for existing OGC standards, as needed, to meet Metaverse requirements.
- Coordinate with other DWGs in OGC (Digital Twins, Sensor Web Enablement, ISG, etc.).
- Host community building sessions at OGC events.
- Ensure inclusive, accessible recommendation, adoption, and implementation of Metaverse standards and technologies promoted by OGC.

Charter members

- Tamrat Belayneh, Esri; Christopher Covert, Microsoft; Leonard Daly, the Khronos Group; Christine Perey, Open AR Cloud; Apurva Shah, Duality Robotics; Stan Tillman, Hexagon; Patrick Cozzi, Cesium; Ashley Antonides, Anno.AI; Nazih Fino, Global Nomad Services; Jordan Dauble, SimBlocks LLC; Patrick Hogan, NASA; Tamrat Belayneh, Esri; Christopher Covert, Microsoft; Leonard Daly, the Khronos Group; Christine Perey, Open AR Cloud; Apurva Shah, Duality Robotics;Stan Tillman, Hexagon;Patrick Cozzi, Cesium; Ashley Antonides, Anno.AI; Nazih Fino, Global Nomad Services; Jordan Dauble, SimBlocks LLC ; Patrick Hogan, NASA Emeritus ; Ki-Joune Li, Pusan University

Key activities

- While the scope of this DWG is broad, it will emphasize key activities:
  - Establishing a list of standards (OGC and more) that are applicable;
  - Define and prioritize geospatial requirements for an open and interoperable Metaverses;
  - Identify and prioritize interoperability gaps;
  - Identify community standards that could be brought into OGC (e.g., 3D Tiles Next);
  - Address the semantic interoperability gap; and
  - Set up representative demonstrations to communicate the value of geospatial to be FAIR, open, collaborative.

Request of an electronic vote

- The Geo for Metaverse ad hoc recommends that the OGC Technical Committee approve an electronic vote to approve formation of the Geo for Metaverse DWG per the charter [OGC 22-015].
  - There was no objection to unanimous consent

TC Chair Announcements and Motions

It’s coming

- A major revision of the TC Policies and Procedures has been drafted
- PC initial review tomorrow for alignment with Standards development strategy
- Expect TC circulation by November

OGC Location Building Blocks

- ✓ **Geo-enable web applications.**
- ✓ **Promote the adoption of modular, standalone, reusable, components.**

Location-ready APIs✓

- One or multiple OGC API parts

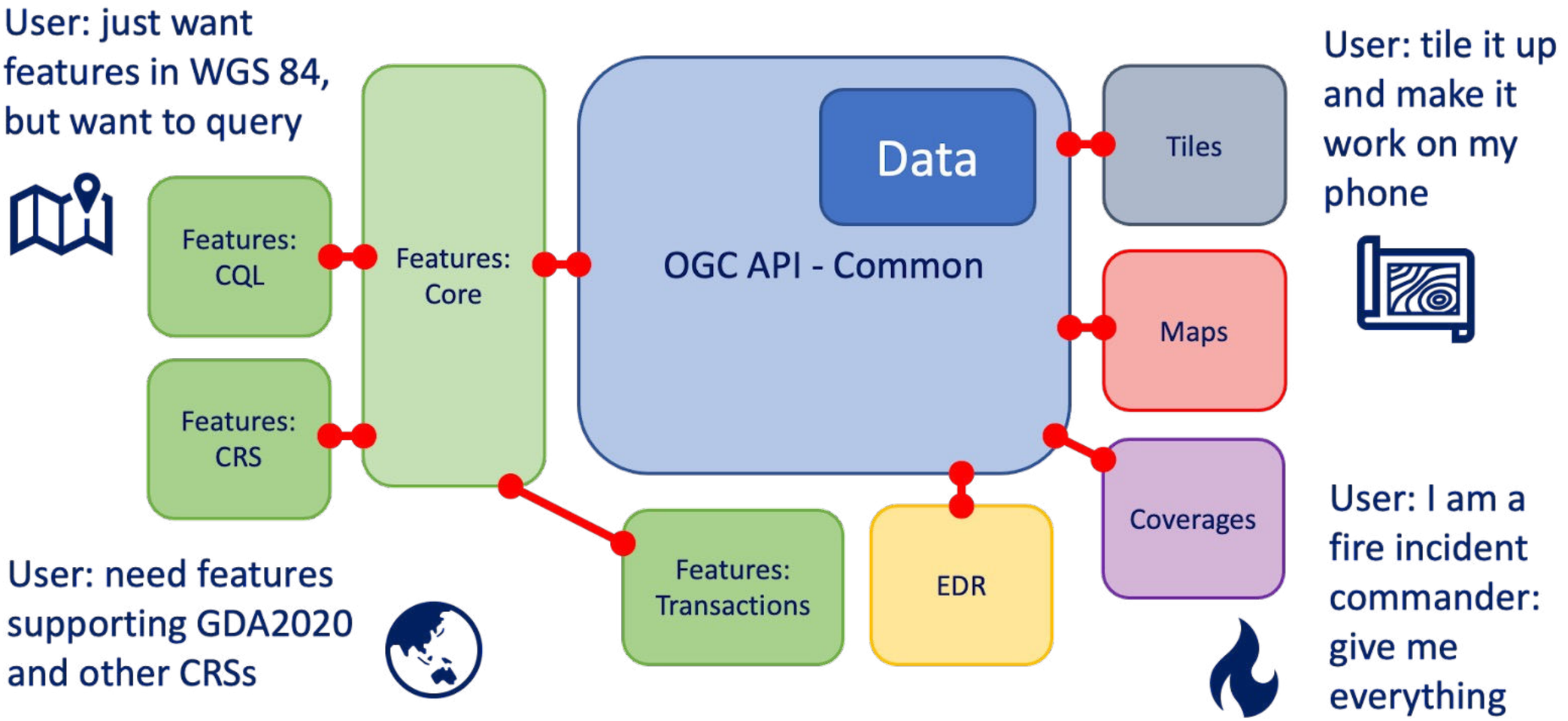
Granular Resources✓

- Data types
- Parameters
- Headers

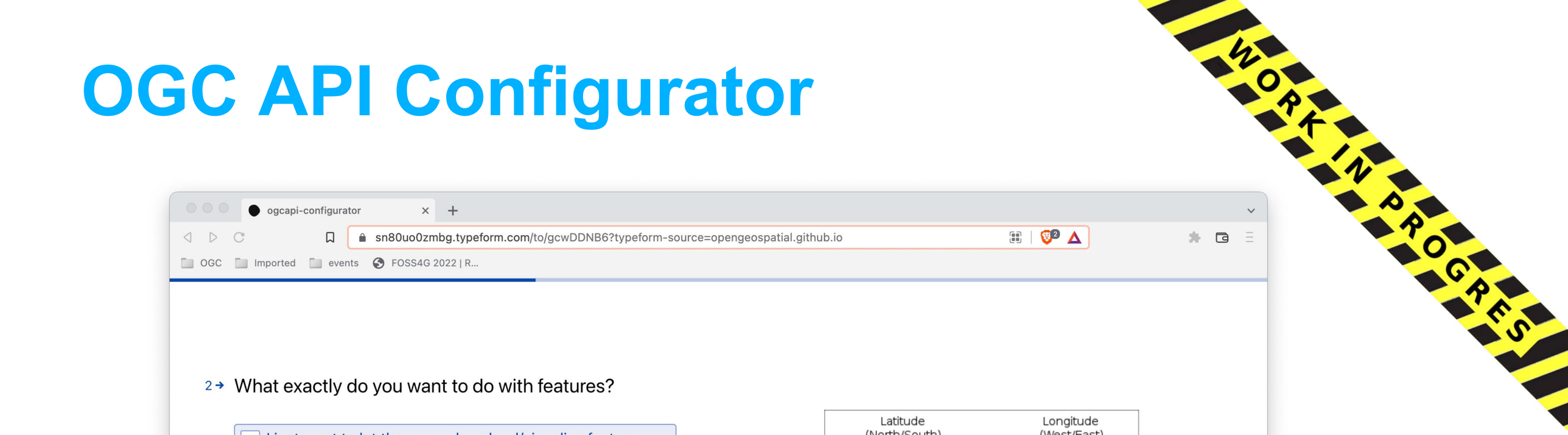
👉 https://opengeospatial.github.io/bblocks/

Open Geospatial Consortium

Modular architecture based on OGC APIs



OGC API Configurator



ogcapi-configurator

sn80uo0zmbg.typeform.com/to/gcwDDNB6?typeform-source=opengeospatial.github.io

OGC Imported events FOSS4G 2022 | R...

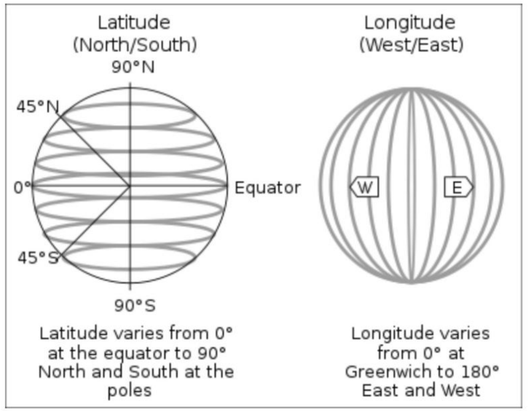
2 → What exactly do you want to do with features?

A I just want to let the users download/visualise feature data. I don't really mind if the CRS is WGS84.

B I need to be able to support a CRS which is not WGS84 (e.g.: a projected CRS like 3857 or a local grid).

C What is a CRS?

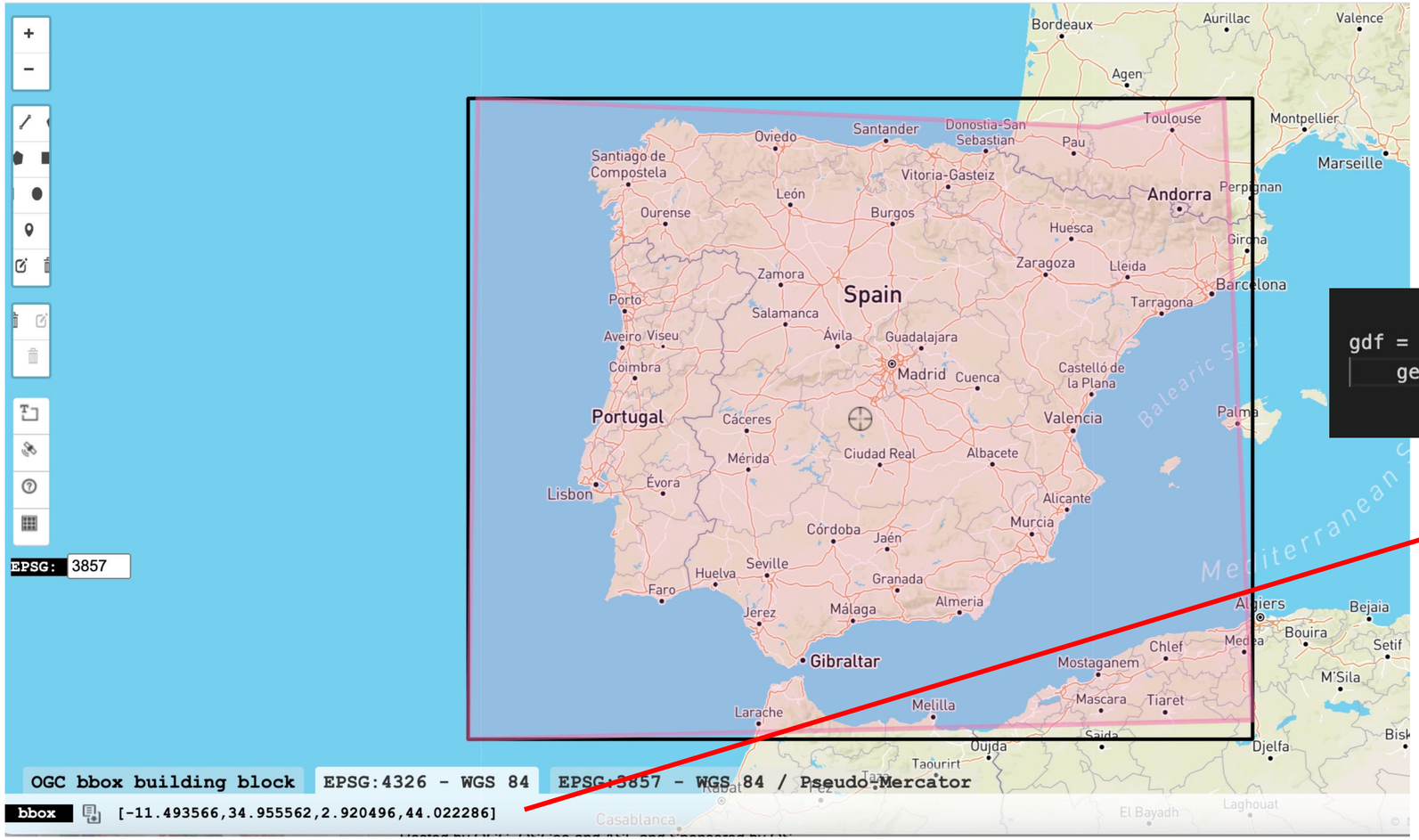
OK ✓



Powered by Typeform

Open Geospatial Consortium

bbox parameter




```
gdf = geopandas.read_file(
    geopandas.datasets.get_path("nybb"), bbox=bbox, )
```

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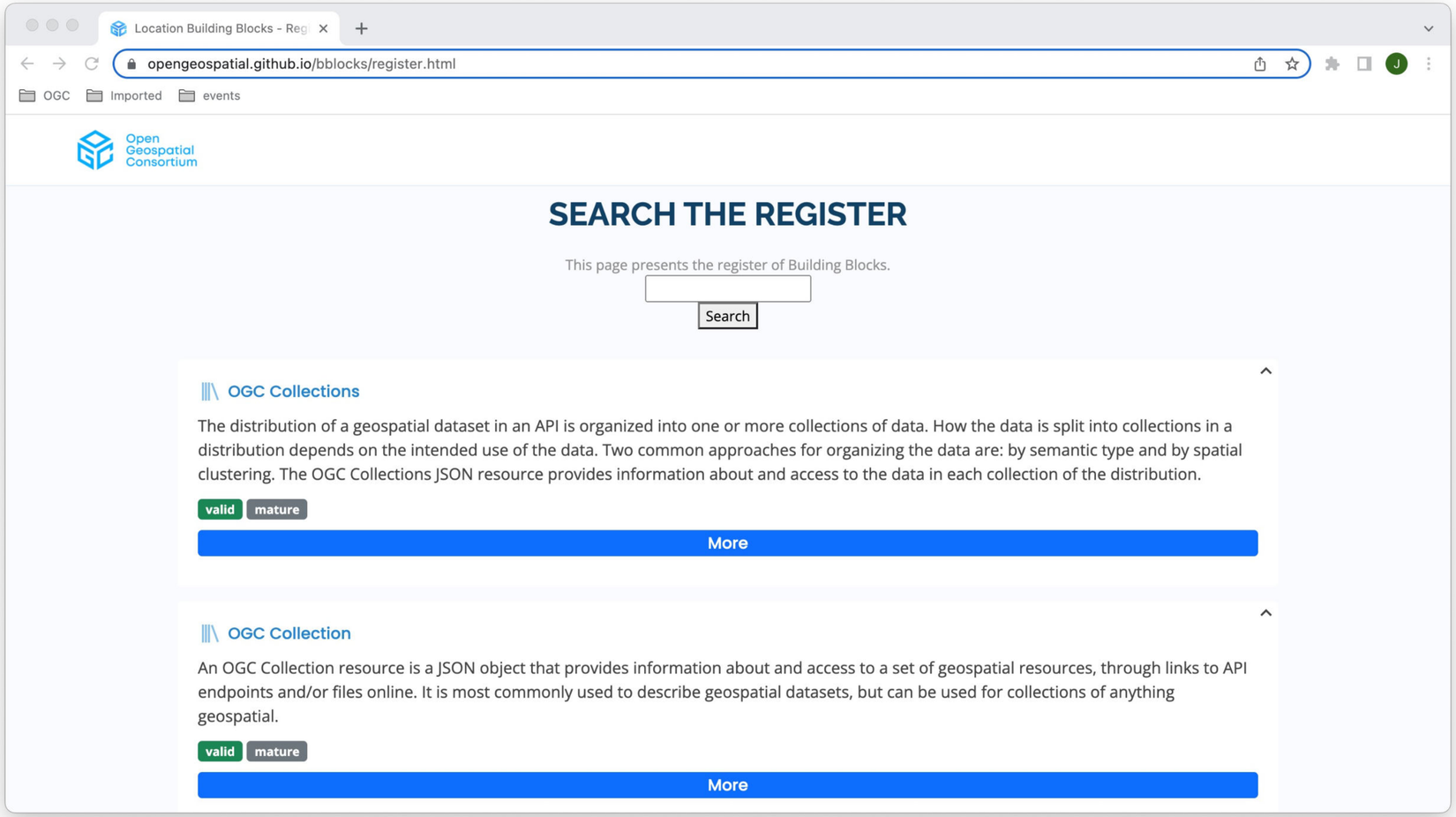
Building Block Register

👉 https://opengeospatial.github.io/bblocks/register.html



Source: 👉 https://github.com/cportele/ogcapi-building-blocks

What’s Next

Continue to improve developer resources about location building blocks

- Add a gallery of use cases displaying existing deployments of the API building blocks.
- Add interactive examples (e.g.: frontend applications) for the granular building blocks (Pilot? Testbed activity?).
- Integrate more building blocks, from other SWGs.
- Promote these resources within the wider developer community.

devrel@ogc.org

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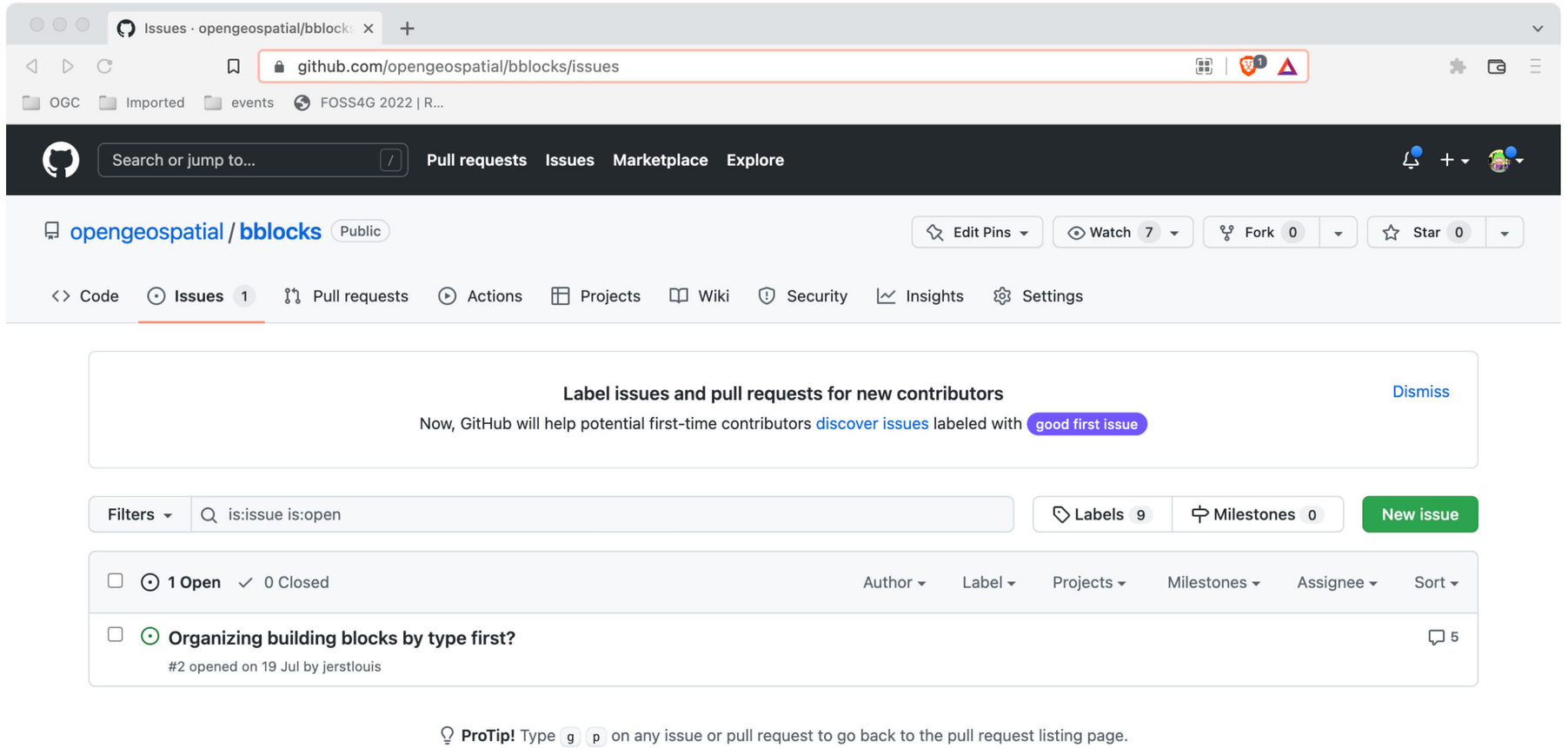
Call for Feedback



👉🏽 https://github.com/opengeospatial/bblocks

Open Geospatial Consortium

Upcoming OGC Member Meetings

Date	Location	Host/Sponsor
3 – 7 October 2022	Singapore	Singapore Land Authority
6 – 8 December 2022 Innovation Meeting	Washington, D.C.	
20 – 24 February 2023	Dubai	Dubai MC and Ordnance Survey
5 – 9 June 2023	Huntsville, AL USA	GeoHuntsville and more
Sept/Oct 2023	Singapore	Singapore Land Authority

We are looking for sponsors for future meetings

WG Reports not to be briefed

Not being briefed today, saving you 193 slides

- 3DIM DWG
- 3D Portrayal Service SWG
- CDB SWG
- CITE SC
- CityGML SWG
- Data Quality DWG
- DGGS DWG
- DGGS SWG
- EDR API SWG
- Energy & Utilities DWG
- EOXP DWG
- Features and Geometries JSON SWG
- Features API SWG
- GeoAI DWG
- Health DWG
- IndoorGML SWG
- ISG DWG
- Marine DWG
- Met Ocean DWG
- MUDDI SWG
- O&M SWG
- OGC API – Coverages SWG
- OGC API – Maps SWG
- OGC API – Processes SWG
- OGC API – Records SWG
- OGC API – Tiles SWG
- Point Cloud DWG
- Portrayal DWG
- Security DWG
- Simple Features SWG
- Styles and Symbology SWG
- Temporal DWG
- TrainingDML-AI SWG
- Urban Digital Twins Summit

WG Reports with TC Motions

3 to Z

Open Geospatial Consortium

Architecture DWG Report

The 124th OGC Member Meeting

Meeting sponsor

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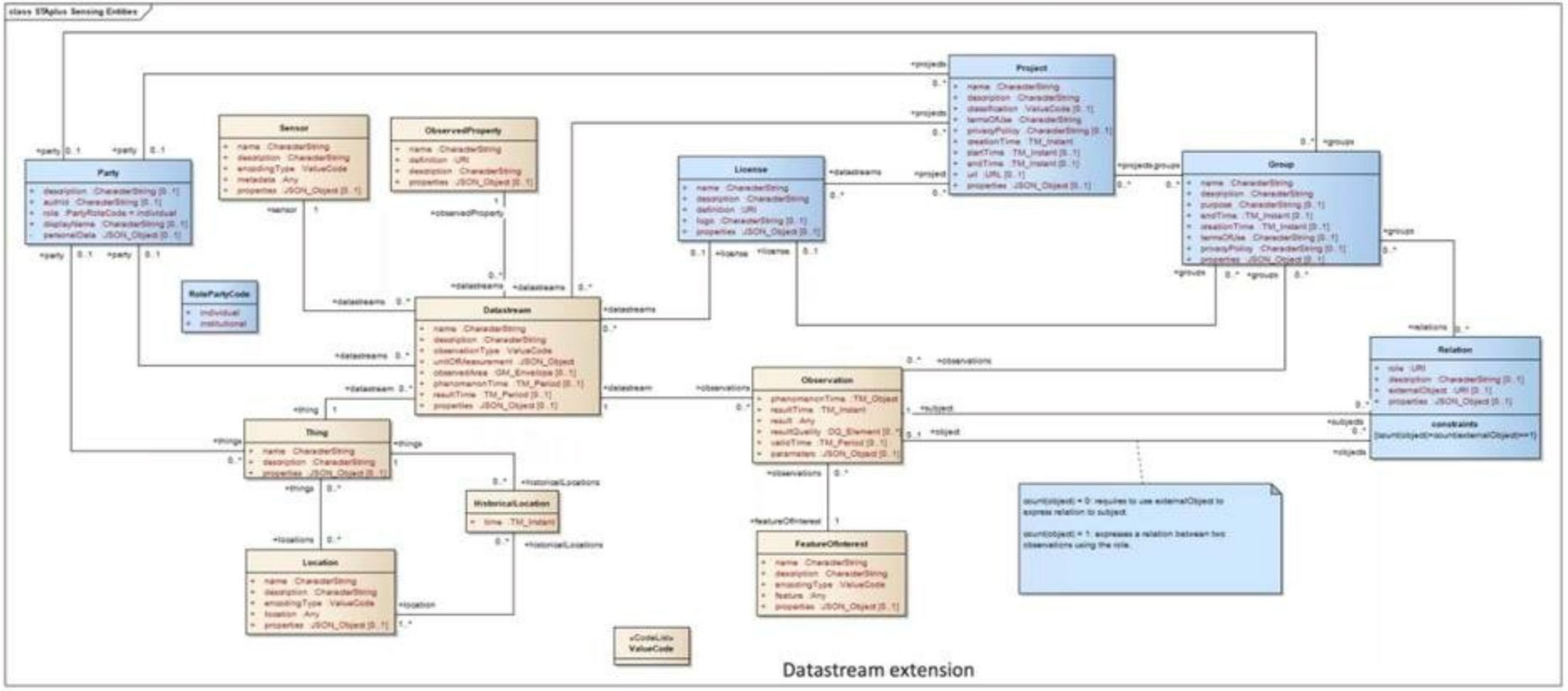
GeoWorks SINGAPORE

Joana Simoes, OGC
6 October 2022

What we talked about this week

- The STAPlus Data Model Extension
- The new interfaces to the UK National Geographic database, through the OS Data Hub
- The architecture of a CBD 2.0 data store

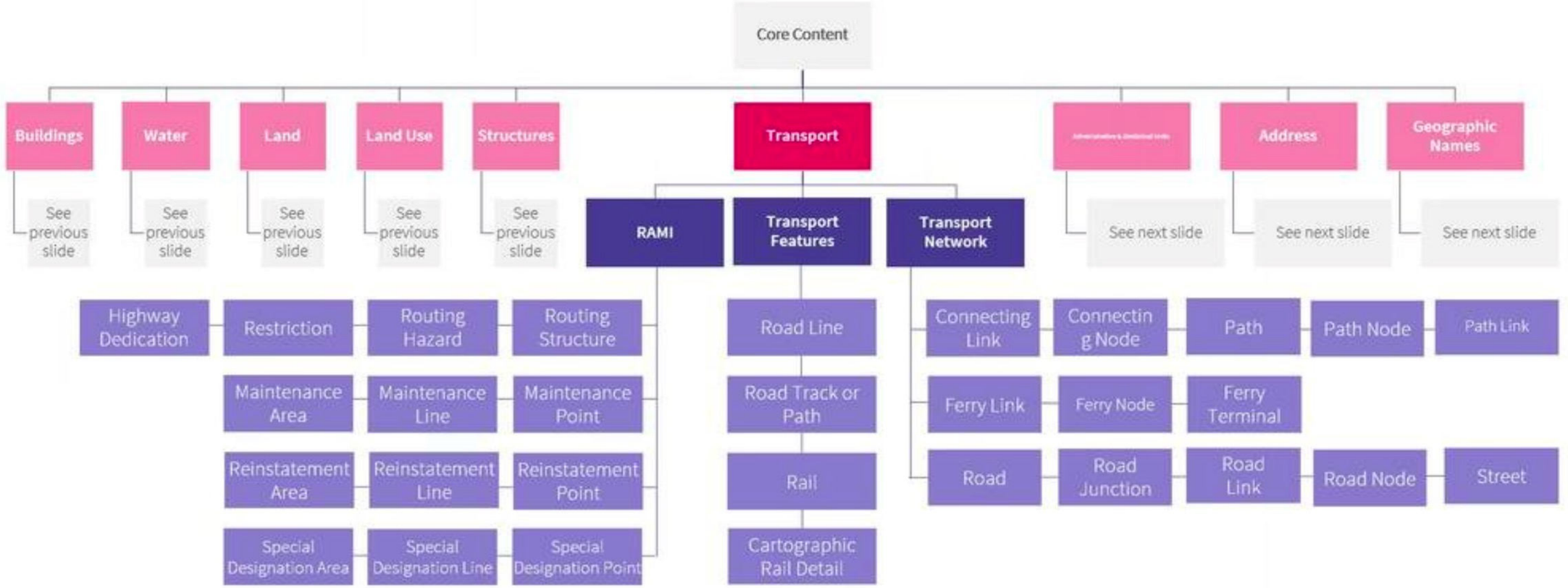
The STAplus Data Model (I / II)



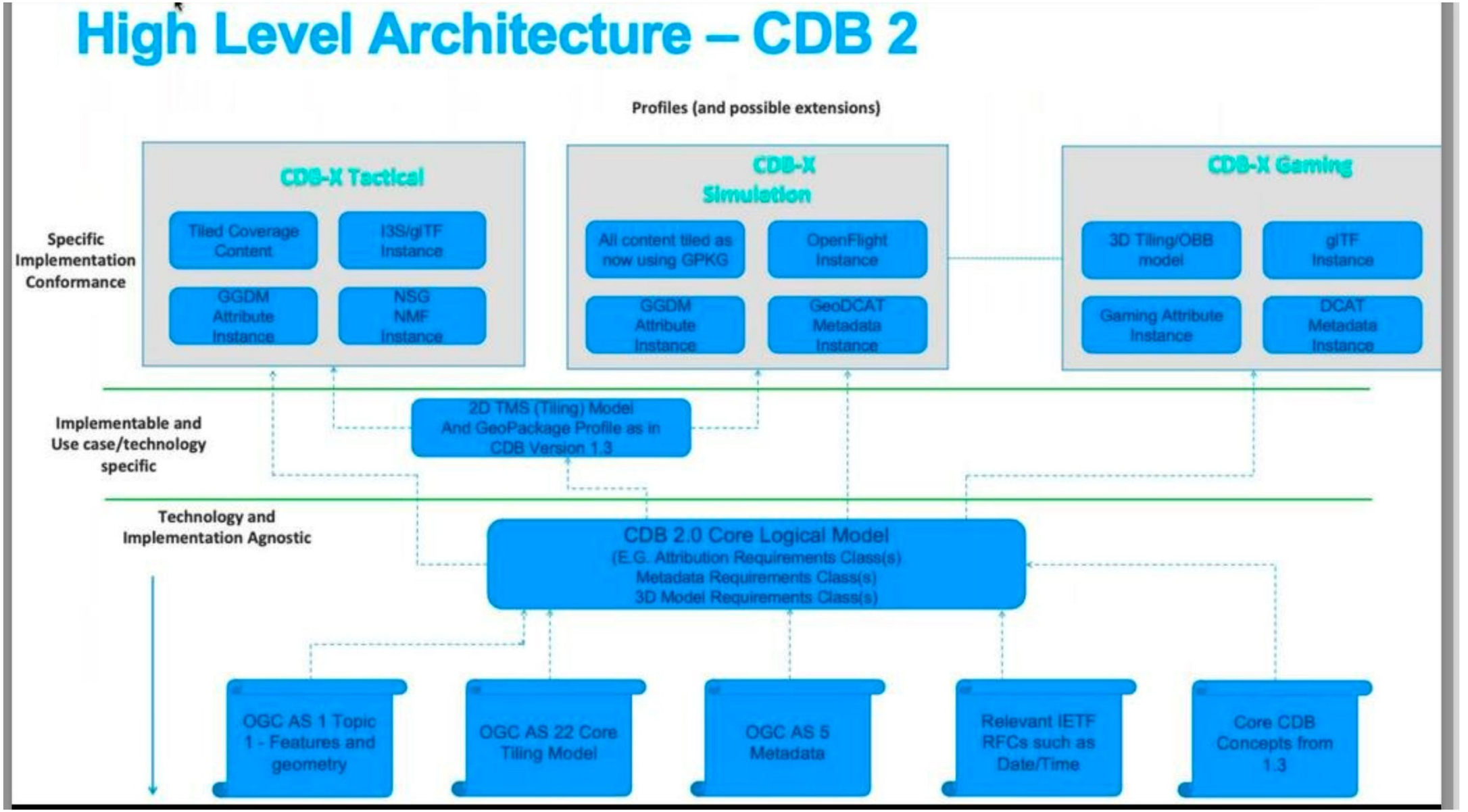
Source: SensorThings Best Practice in Citizen Science - Andreas Matheus, Joan Maso (Secure Dimensions / UAB-CREAF)

Data structure: in depth

9 themes | 13 collections | 81 feature types



Source: Next-Generation National Geospatial Database - Michael Gordon (Ordnance Survey)



Source: CDB 2.0 and its architecture - Carl Reed (Carl Reed and Associates)

Session Agenda

- Joint OGC OSGeo ASF Code Sprint 2022 Summary Engineering Report - Joana Simoes, Gobe Hobona (OGC)
- SensorThings Best Practice in Citizen Science - Andreas Matheus, Joan Maso (Secure Dimensions / UAB-CREAF)
- Next-Generation National Geospatial Database - Michael Gordon (Ordnance Survey)
- CDB 2.0 and its architecture - Carl Reed (Carl Reed and Associates)

Document Approval Motion

- The Architecture DWG recommends that the OGC Technical Committee approve release of 22-004 OGC 22-004 "Joint OGC OSGeo ASF Code Sprint 2022 Summary Engineering Report” as an an OGC Public Engineering Report.
  - There was no objection to unanimous consent
  - The code sprint facilitated the development and testing of prototype implementations of OGC Standards, enabled the participating developers to provide feedback to the editors of OGC Standards and provided a collaborative environment for OSGeo and ASF developers to fix open issues in products and develop prototype implementations.

Open Geospatial Consortium

HydroDWG

The 124th OGC Member Meeting

Meeting sponsors

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GeoWorks SINGAPORE

David Blodgett, USGS
05 October 2022

The most important thing for this WG is…

Consistent and simple methods for representing logical and physical models that implement conceptual models.

What we talked about this week

- Progress implementing HY_Features concepts for hydrologic models and river data integration.
- Representation of SW/GW interaction in feature models.
- The WaterQuality IE

Where we are headed in the coming year

- Implementation of useful physical models based on the WaterML2 suite of standards.
- We discussed progress on the long term goals on a number of fronts.
- Work is ongoing to build out conceptual and logical refinements of WaterML2 Part 3 HY_Features (Engineering Report moved this week)
- Work is ongoing on a Water Quality Interoperability experiment to progress hydro-domain implementation of existing standards.

Next Quarter WG Communications Plan

Join the WQIE on github!

https://github.com/opengeospatial/WaterQualityIE

Agenda

- 45 minutes:
  - Modeling framework and river corridors application with HY_Features Engineering Report Presentation
- 30 minutes:
  - Surface water - Groundwater Feature Relation Discussion
- 45 minutes:
  - Water Quality IE

Motion for release of OGC-22-040: Hydrologic modeling and river corridor applications of HY_Features concepts engineering report

- The Hydrology DWG recommends that the OGC Technical Committee approve release of OGC-22-040 “Hydrologic modeling and river corridor applications of HY_Features concepts engineering report” as an OGC Engineering Report.
  - There was no objection to unanimous consent

  This engineering report presents progress on formalizing a hydrofabric for drainage basins of the United States adhering to HY_Features concepts with focus on their use in modelling hydrologic process.

Open Geospatial Consortium

MetaCat Closing Plenary Report

The 124th OGC Member Meeting

Danny Vandenbroucke, Byron Cochrane
KU Leuven
6 October 2022

Meeting sponsor

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The most important thing for this WG is…

It was some time ago that the MetaCat DWG met and was active. The metadata topic is sometimes fading away, but always coming back (through the backdoor). In practice, many things are ongoing, in organizations, countries … Therefore it was good to capture some of this and to reinitiate the work.

What we talked about this week

- Several standards are used for describing (geospatial) data, services, assets … (ISO 19115 – old and new; DCAT, DC, STAC …)
- Focus of the work should therefore probably be on the transformation of metadata between different standards
- Should we also develop some guidance document to explain differences and similarities, which standard is more appropriate in different cases, … ?
- Open discussion on whether we want to further develop a Best Practice document on (Geo-)DCAT(-AP) implementations
- What with the further development, maintenance of GeoDCAT-AP?

Session Agenda

- Joint OGC and ISO Code Sprint 2022 Summary Engineering Report briefing, Gobe Hobona, OGC

- Guidance on tools and standards - Discussions on the roles – ISO19115, OGC API Records, STAC, DCAT, etc. Byron Cochrane - Open Discussion

- JSON encoding of ISO19115-1 - What Should this look like? - Byron Cochrane - Open Discussion

- An Introduction to GO-PEG https://www.go-peg.eu - Danny Vandenbrouke

- GeoDCAT and the role of the MetaCat DWG in update and maintenance - Danny Vandenbroucke

Joint OGC ISO Code Sprint 2022 Engineering Report

- The Engineering Report (ER) summarizes the main achievements of the second joint virtual code sprint, conducted between September 14th and 16th, 2022.

- The code sprint was hosted by the Open Geospatial Consortium (OGC) and the International Organization for Standardization (ISO).

- Sponsored by Ordnance Survey and Geonovum

Ordnance Survey

Gold-level Sponsor

GEONOVUM

Silver-level Sponsor

Role of STAC vs OGC API Records vs ISO19115

- Guidance is needed – MetaCat DWG to oversee effort?
  - *When to use which and How to use together*
- *First identify primary drivers:*
  - **STAC** is most appropriate for fine-level metadata - particularly cataloguing scenes in a collection of images to allow their discovery
  - **OGC API Records** focuses on the general discovery of spatial resources of any type. Because of this, it may not be useful or appropriate to capture in OGC API Records any ISO 19115-1 metadata that exists for purposes other than discovery.
  - **ISO 19115-1** exists to document and manage a resource fully. Provenance, structural, informative, administrative and other metadata elements exist in this standard catalogue. This resource is most useful after discovery.
  - **Others**?

JSON Encoding of ISO 19115-1

- What is required?
  - Fully compliance or discovery elements only?
- Which ISO19115 versions should we focus on?
- How should it be encoded?
  - GeoJSON, JSON-FG, other JSON?
- What about Namespaces –
  - Do we want these or not?
- Preliminary decisions –
  - Map discovery elements to OAPIR
  - Focus on GeoDCAT for full encoding

Where we are headed in the coming year

- Not decided yet, but the open questions will be discussed among the co-chairs first, then to the whole membership of the DWG
- Joint work Geosemantic and MetaCat DWG upcoming

Request of an electronic vote

- The Metadata and Catalogues DWG recommends that the OGC Technical Committee hold an electronic vote to release OGC 22-043 "Joint OGC and ISO Code Sprint 2022 Summary Engineering Report" as an OGC Public Engineering Report.
  - There was no objection to unanimous consent

Closing Plenary Report – OGC Naming Authority SC

The 124th OGC Member Meeting

Author, Affiliation
6 October 2022

Meeting sponsor

The most important thing for this WG is…

Currently the URIs of items registered in the Definitions Server are of the form MAJOR.MINOR meaning that requests are directed to the latest minor revision of a document (MAJOR.MINOR). Should it instead be configured to direct requests to the latest patch (MAJOR.MINOR.PATCH)?

What we talked about this week

- A missing ellipsoidalCS element in the GML representation of CRS84 definition (https://www.opengis.net/def/crs/OGC/1.3/CRS84)

- The process for delegating the update or addition of definitions to SWGs and DWGs.

- Whether the version number in URIs of definitions should include the patch number (i.e. MAJOR.MINOR.PATCH)

Where we are headed in the coming year

- **Action** regarding ellipsoidalCS discussion:
  - OGC-NA to liaise with the CRS DWG regarding incubation of a revised definition of CRS84
- **Action** regarding version number resolution:
  - OGC Staff to review what the implementation of version resolution is, and then report back to the OGC-NA for further discussion.

Session Agenda

- Gobe Hobona (OGC) - Documenting EllipsoidalCS in the CRS84 definition (15 min)
- Piotr Zaborowski (OGC) - Minor version resolution on definition server (15 min)
- Rob Atkinson (OGC) - Definitions Server update (15 min)

(Internal) Motion

- SWGs and DWGs should create GitHub Issues and assign a label named ‘register-update-support-requested’ in NamingAuthority repository to trigger registry update support from OGC Staff.
- This would be added to the OGC-NA Policy and Procedures when they are updated next.
- OGC Staff will look into assigning SWG/DWG representatives with the necessary privileges to assign labels.

- Result: NOTUC

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Closing Plenary Reports

Without motions

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TC Subgroups
6 October 2022

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3DIM DWG

The 124th OGC Member Meeting

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Carsten Rönsdorf
6 October 2022

The most important thing for this WG is…

The variety of 3D standards

What we talked about this week

- Strong 3DIM link with Urban Digital Twins
- Tool support (i3s tools, QGIS)
- External liaison, particularly Khronos on glTF

Session Agenda

- Results from 'Challenges to Digital Twins' study, Binyu Lei (NUS)
- Support for Building Scene Layers (BSL) in i3s, Tamrat Belayneh (ESRI)
- Status of the CityGML GML encoding standard and parallel activities in the Metaverse Standards Forum, Steve Smyth (Opensiteplan)
- QGIS Plugin for the 3D City Database, Giorgio Agugiaro (TU Delft)
- 3D+ Data Streaming ER that 3DIM,Jérôme St-Louis (Ecere)
- CDB for digital twin implementations, Carl Reed (CDB SWG)

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Closing Plenary Report – CITE SC

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Gobe Hobona, OGC
06 October 2022

The most important thing for this WG is…

Should standards that have fewer than 3 implementations of OGC Standards be removed from the Compliance Roadmap? If not, what should be the criteria for prioritization?

NOTE: The Compliance Roadmap provides scheduling of development of executable test suites.

What we talked about this week

- The Beta version of the Executable Test Suite of OGC API - Environmental Data Retrieval 1.0 has been on the OGC Validator for more than 6 months. There are two implementations that are very close to passing the test and will be encouraged to update their products over the next few weeks.
- The Beta version of the Executable Test Suite of Web Processing Service (WPS) 2.0 has recently been deployed on to the OGC Validator.
- Some of the executable test suites that have recently been developed have had fewer than 3 implementations. To optimize resources, it may be necessary to remove those executable test suites that have fewer than 3 recorded implementations from the Compliance Roadmap.

Where we are headed in the coming year

- Update the Executable Test Suite of OGC API EDR to support v1.0.1 and then work with implementers to complete Beta stage

- Arrange a mid-quarter telecon for a briefing from the Canadian Mapping & Charting Establishment (MCE) to brief about their review of implementations of GeoPackage

Session Agenda

- **Gobe Hobona (OGC)** - OGC API - Environmental Data Retrieval 1.0 Executable Test Suite
- **Aries Lai (GIS.FCU)** - Update on the WPS 2.0 Executable Test Suite
- **Gobe Hobona (OGC)** - Compliance Roadmap

Test Suites Currently Seeking Early Implementers

- OGC API - Environmental Data Retrieval v1.0
- OGC API - Processes - Part 1: Core v1.0
- OGC EO Dataset Metadata GeoJSON v1.0

Visit:
https://cite.ogc.org/te2

Data Quality DWG Closing Plenary Report

The 124th OGC Member Meeting

Author, Affiliation
6 October 2022

Meeting sponsor

The most important thing for this WG is…

Current focus of DQ DWG is in contributing to the improvement of ISO/TC211 standards for Data Quality (ISO 19157-1 and ISO 19157-3) and to the guidelines and best practice in managing quality of geodata.

What we talked about this week

- Providing information about geodata quality in an appropriate way is paramout when communicating quality to the users.
- Sourcing comprehensive quality metadata remains to be a challenge.
- Standards for geodata quality and access to standard quality measures is essential.

Where we are headed in the coming year

- Continue improving data quality standards and standard quality measures register
- Continue collecting FAIR quality information use-cases

Next Quarter WG Communications Plan

- 3rd Data Quality Workshop at Feb’23 OGC Member Meeting

Session Agenda

- Introduction – Sam Meek (Helyx)
- Geodashboard concept and implementation focussing on data quality and linked provenance information – Heiko Figgemeier (TU Dresden)
- ISO 19157-1 & ISO 19157-3 update – Ivana Ivánová (Curtin University)
- Discussion – all

Closing Plenary Report
DGGS DWG

The 124th OGC Member Meeting

Dr. Matthew B.J. Purss,
Pangaea Innovations Pty. Ltd.
6 October 2022

Meeting sponsor

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The most important thing for this WG is…

One thing that is most important for this WG is to raise wider awareness of DGGS and OGC APIs for DGGS throughout the wider geospatial community.

What we talked about this week

- The increased and varied application of DGGS technologies was discussed, including:
  - The further development of the use of DGGS to support the management and use of National Statistical Information for Mexico;
  - The extension of DGGS infrastructures through OGC API DGGS to support distributed Machine Learning workflow patterns to derive Coastal Erosion Susceptibility; and,
  - The extension of Surface (2D) DGGS to Volumetric (3D) DGGS to support improved index based spatial data integration for Digital Twins.

Where we are headed in the coming year

- The DGGS DWG will continue to provide a venue for discussing DGGS technologies, their application and issues related to the standardisation of DGGS infrastructures.

- This week contributed to this effort through the presentation of statistical applications of DGGS technologies, an application of DGGS and OGC API DGGS to real-world issues, and the fundamental considerations and applications associated with the extension of DGGS from 2D to 3D infrastructures.

Next Quarter WG Communications Plan

- The DGGS DWG will meet during the next OGC Members Meeting in Dubai and continue its role as a forum for the DGGS community to present and discuss DGGS technologies and their application.

- There is potential for publication of a position paper on the application of DGGS technologies to the challenge of building scalable Digital

- A Special Edition of “Big Earth Data” has been publish since the June OGC Members Meeting. This Special Edition highlights a number of DGGS related Research and Development activities that are actively being pursued.
    - Robert G. Gibb, Matthew B.J. Purss, Zoheir Sabeur, Peter Strobl & Tengteng Qu (2022) Global Reference Grids for Big Earth Data, Big Earth Data, 6:3, 251-255, DOI: 10.1080/20964471.2022.2113037

Session Agenda

- **Intro & Logistics** (Chair) - 5 min
- **Presentation: Geographical Grids, Use cases**
- (Luis Gerardo Esparza Ríos - in-person) - 20 min

- **Presentation: Implementing a Coastal Erosion susceptibility assessment workflow with OGC API - DGGS and OGC API - Processes - Part 3: Workflow**
- (Jerome St-Louis - in-person) - 20 min

- **Presentation: Extending Surface (2D) DGGS to Volumetric (3D) DGGS**
- (Matthew Purss - virtual) - 20 min

- **Discussion: Linkages between Topic 21, OGC API DGGS and the OGC DGGS Registry**

- (led by Matthew Purss - virtual) - 20 min

- **Other Business** (Chair) - 5 min

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Earth Observation Exploitation Platform Closing Plenary Report

The 124th OGC Member Meeting

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Ryan Ahola (Natural Resources Canada)
Claudio Iacopino (European Space Agency)
Pedro Gonçalves (Terradue)
6 October 2022

The most important thing for this WG is…

Persistent Demonstrators, Disaster Pilot, Datacube API standards working group, and exploitation platform applications!

What we talked about this week

- Welcome and Introduction of New Co-Chair
- Ingo Simonis (OGC): Overview of OGC Persistent Demonstrators Discussions
- Vivek Sakhrani (Atlas AI): Planetary scale ML-based data generation to support Interconnected Pathways to Development in Energy, Agriculture and Transport
- Danny Vandenbroucke (KU Leuven): Overview of the eo4geo Initiative
- Joshua Lieberman (OGC): OGC Disaster Pilot Update
- Claudio Iacopino (European Space Agency): Proposal for a Datacube API SWG
- All: Discussion Period

Where we are headed in the coming year

- Having a place in the OGC web presence to practically and persistently demonstrate the value of standards for EO and beyond.
  - Session showed where we are in terms of progress (concept is coming together), and necessary next steps.
  - Good jumping off point for other sponsors to start becoming involved.
- Establishing a Datacube API Standards Working Group
  - Need to formalize an API standard to support better use of datacubes.
  - Re-evaluate and build on existing work. Coordination will be required to determine what role existing standards should play (e.g. WCS). Also a need to consider what standard(s) are needed to support community requirements.
- Continuing to advance EO exploitation concepts through Pilots, such as the Disaster Pilot
  - Learned that planning for Disaster Pilot 2023 is well underway. Will include EO components, particularly analysis ready data.
  - DWG will follow Pilot activities and identify potential work areas based on project findings.

Next Quarter WG Communications Plan

- DWG will host a dedicated session to further discuss the Datacube API SWG proposal.
  - Will create a draft SWG charter to consider as part of this session

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Energy and Utilities DWG Closing Plenary Report

The 124th OGC Member Meeting

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Jessica Webster, NRCan

6 October 2022

The most important thing for this WG is…

Testbed-18

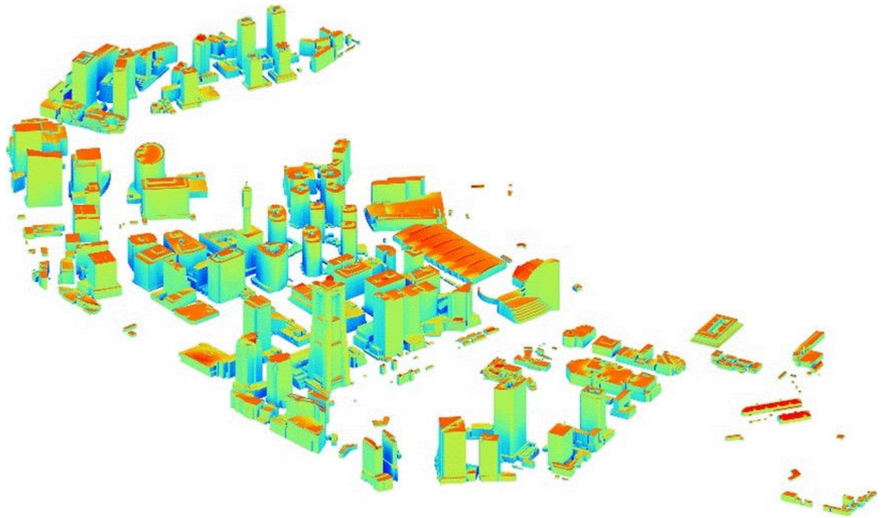
Will co-ordinate with the emerging Urban Digital Twins WG going forward

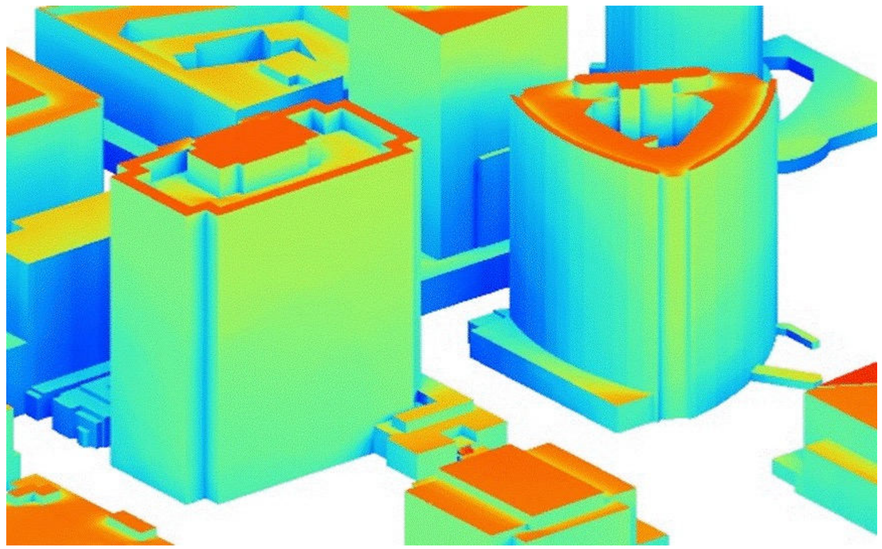
What we talked about this week

- Progress on Testbed-1
- Project PLATEAU

Project PLATEAU, Japan
Solar photovoltaic potential estimation

- Solar panels are being installed to achieve carbon neutral, but buildings in urban areas have limited space for rooftop installation of solar panels.
- In this use-case, an algorithm is developed to estimate the potential of wall solar panels using 3D city model.
- The result will be share with the municipality to verify their usefulness in realizing a decarbonized society in the region, including consideration of measures to promote the spread of solar panels and the development of energy plans in urban areas.





Solar radiation on walls and roofs

STT Consortium Web Client 2: 3D Building Model + Energy Simulation

Open Geospatial Consortium

Where we are headed in the coming year

- Consolidate and review findings from Building Energy Data interoperability theme of the Testbed
- Virtual demonstration day in January 2023
- Did this week contribute to those goals? Yes it helped those working on the Testbed consolidate work to date and discuss challenges and opportunities

Next Quarter WG Communications Plan

- Project PLATEAU would be worthy of a blog as its implementing several OGC standards and enabling the development of Urban Digital Twins nationally in application to a variety of urban planning use cases, including those relating to building energy
- The building energy data interoperability theme within Testbed-18 would be worthy of a video posted to Youtube when the Testbed is completed. This would help participants, the DWG and OGC communicate the work to a broader audience.

Session Agenda

- Welcome
- Testbed-18
  - Introduction, Josh Lieberman
  - Interactive Instruments, Clemens Portele
  - Ecere, Jerome Jacovella St. Louis
  - Steinbeis, Volker Coors
- Project PLATEAU, Chikako Kurokawa, Asia Air Survey Co.
- Questions and Discussion

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GeoAI DWG Closing Plenary Report

The 124th OGC Member Meeting

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Kyoungsook Kim, AIST
6 October 2022

The most important thing for this WG is…

New co-chair recommendation

Urban geography, Edge AI, Digital twin for Earth, Planetary scale ML-based data

Announcement GeoAI roundtable event

Internal DWG motion for co-chair election

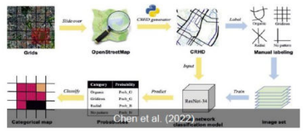
- The GeoAI DWG approves the following individuals as a co-chair of this Working Group.
  - Lokendra Chauhan (Qen Labs Inc.)
  - Motion: Don Sullivan
  - Second: Tien-Yin (Jimmy) Chou
  - There was no objection to unanimous consent.

Lokendra Chauhan is a GeoAI practitioner and technology policy enthusiast based in Minneapolis in the US. He currently works on using crowdsourced geospatial data and GeoAI algorithms to solve real-world problems in mapping and agriculture. He is a graduate of IIT Bombay (2003) and Georgia Tech, Atlanta (2007). Previously, he has worked with IIT Bombay, International Finance Corporation (IFC), Grassroots Business Fund, and the Qatar Foundation. Lokendra invests and advises startups and social enterprises commercializing research (primarily AI). He has authored documents like Qatar's national AI strategy, a global study of GeoAI applications and AI policies by the World Geospatial Industry Council (WGIC), and academic papers on GeoAI and AI policy.

What we talked about this week

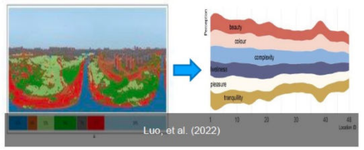
Geo-spatial Artificial Intelligence in Urban Geography

Urban forms



Urban morphology

urban analytics lab



Urban water view perception

Urban bikeability

AR+GIS+Simulation

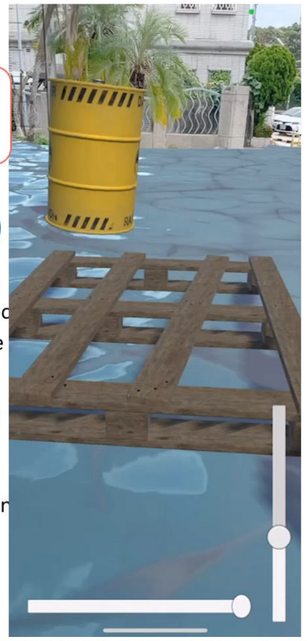
We can calculate the possible flooding range and impact level through AR simulation flooding situation.

A Real-time object collision detection

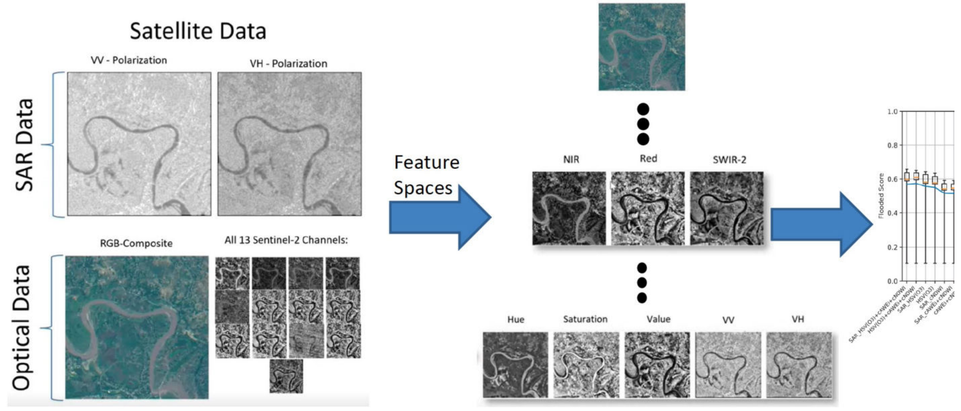
Use the ARDK toolkit to develop flooding simulations with a mixed reality experience, to achieve the feeling of flooding.

B Visual Positioning System

It can be combined with GPS and AR helmets to achieve a digital twin experience.



Flood Mapping Feature Space Analysis



PRESS RELEASES/

The Rockefeller Foundation Invests in Satellite Data & AI to Accelerate Economic Development and Climate Resilience in Africa

08.29.22

Where we are headed in the coming year

- New requirements of GeoAI for OGC standards
  - A survey was conducted to understand the priorities and challenges of the community
    - https://docs.google.com/forms/d/e/1FAIpQLScmGypOz_QCJs-42r5BEa4LcKjCROYwwvGGAsJ93kOSGkOwwQ/viewform
    - Blogpost showing these results will be posted soon on the OGC website
  - Discussion paper
    - The results of the time series flood area image recognition by FCU/GIS
    - Welcome to joining the work

Next Quarter WG Communications Plan

- GeoAI DWG is proposing to OGC to organize a **Roundtable** event in early **December or January** with the objective of:
  - Bringing together various geospatial communities interested in GeoAI to share their real-world experiences and challenges
  - Welcoming in a next generation of users and contributors who will continue to expand the impact of this new approach
  - Helping plan and prioritize new activities of the OGC GeoAI working group for 2023-2025 to serve the tech community
  - OGC will manage all the logistics of organizing the Roundtable.
  - **Other details will be announced by mailing lists**

Session Agenda

Wed, Oct 5th 10:30am (Training Room 2-2)

10:30am - 10:40am	DWG Motion for changing a co-chair
10:40am - 10:55am	GeoAI applications in urban geography, Pengyuan Liu (NUS)
10:55am - 11:10am	GeoAI for time-series of IoT data, Frank Fang (FCU/GIS)
11:10am - 11:25am	GeoAI for Earth and Space Applications, Marlon Nuske (DFKI)
11:25am - 11:40am	Announcement of GeoAI Roundtable event, Lokendra Chauhan (Qen Labs Inc.)
11:40am - 11:55am	Planetary scale ML-based data generation to support Interconnected Pathways to Development in Energy, Agriculture, Transport, Vivek Sakhrani (Atlas AI)
11:55am - 12:00pm	Closing

Open Geospatial Consortium

Health DWG

The 124th OGC Member Meeting

Meeting sponsor

Ajay K Gupta, CISSP, MBA
Chair
CEO, HSR.*health*
4 October 2022

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Agenda

1. Welcome and Introductions

2. Presentation of Industry Survey on upcoming Global Health Summit, 22 February 2023, Dubai UAE.

3. Testbed-18 Summary Engineering Report on the Reproducible Science Stream. Work product from this stream will be demonstrated as well.

4. TerriaMap, leveraging geohealth applications, Rich Frazier, FGDC

5. Discussion on National SDI design considerations.

6. FME Workflows for Health Data Integration and Analytics, Dean Hintz, Safe.com

7. Future Events:

    - OGC Innovation Days, December 2022, Washington DC
    - Global Health Summit, 22 February 2023, Dubai UAE

Future Events

- OGC Innovation Days, December 2022, Washington DC
- Global Health Summit, 22 February 2023, Dubai UAE

Global Health Summit – topics of interest (not in order)

- Funding and National Support for Health-focused Spatial Data Infrastructures.
- How GeoHealth advances healthcare delivery globally.
- The Healthcare-of-Tomorrow - what will a GeoAI enabled health system look like?
- Panel on the practical, real-world uses of location data in health applications.
- Session on the Ethics and Laws related to the use of geospatial data in general, and health in particular.
- The use of Geospatial to improve Emergency Response and Disaster Management.
- Insights into the USAID-funded DEEP VZN project.

Global Health Summit – speakers (not in order)

- Epidemiologists
- Data Scientists
- GIS / GeoAI Visionaries
- Public Health Leaders

Global Health Summit – interesting notes

- An Exhibit Hall was not of interest.
- Thought Leadership was of greater interest.

Health DWG Session – No Motion

- The Health DWG held no motion at the October 2022 MM during MM 124.

Key Topic(s) for Discussion

- What improvements will GeoAI bring to the future of healthcare delivery?
- The role of Health SDI in the interoperability and sharing of health data.

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Closing Plenary Report Interoperable Simulation & Gaming DWG

The 124th OGC Member Meeting

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David Graham, CAE Inc.
4 October 2022

The most important thing for this WG is…

Same as the CDB SWG: separating the signal from the noise with all the recent attention to Digital Twins, the Metaverse, and other terms that relate at various scales to what the simulation industry has called a Dynamic Synthetic Environment

What we talked about this week; Agenda

- Update on the progress of CDB 2/X
- NVIDIA Omniverse

Open Geospatial Consortium

Marine DWG

The 124rd OGC Member Meeting

Dr Gez Wong, Co-Chair
6th October 2022

The most important thing for this WG is…

The FMSDI initiative – maximizing community benefits from completed Phases and supporting upcoming or in-progress Phases.

Session Agenda

- Keynote from Dr. Parry Oei
- OGC and the Marine Domain – the Story so Far
- Towards a Marine and Terrestrial Integrated Geospatial Information Framework (IGIF), Draft Maturity Roadmap Document
- Looking Back - the OGC Singapore Marine Summit 2019 – Where are we now?
- Digital Twin of the Ocean: ILIAD update
- The IHO-OGC Federated Marine Spatial Data Infrastructure (FMSDI) Progress to Date
- FMSDI – the Next Phase(s) – Digital Arctic
- OGC Testbed 18 and Marine-based Use Cases
- The OGC Marine Domain Working Group, Future Work Plans

Activity Summary

- Discussion Topics
  - Wide-ranging and occasionally tangential.

- Upcoming deliverables
  - FMSDI Phase 3 outputs

- Coordination (ongoing and planned)
  - Consideration of interoperability challenges are non-Marine specific and socializing them to the wider OGC community.

- Future meetings
  - Regular FMSDI meetings
  - 125th Member Meeting, 2023-Q2

Key activities

- The FMSDI initiative – Phase 3 in progress, Phase 4 and 5 in planning or pre-execution stages.

Next Quarter DWG Communications Plan

- Update on IGIF-MSDI Maturity Roadmap progress as part of the FMSDI initiative
- Update on Phase 3 onwards of the FMSDI initiative and planning of future Phases

Met Ocean DWG Closing Plenary Report

The 124th OGC Member Meeting

Meeting sponsor

Author, Affiliation
6 October 2022

Most important thing for the Met Ocean DWG is…

Integrating OGC APIs to create global operational workflows

What Met Ocean DWG talked about this week

- Standards evolution: API-EDR V1.1, CoverageJSON V1.0, API-Records V1.
- 3D tiles, Cesium, 3D-GeoVolumes, CoverageJSON overlaps & gaps
- Establishing formal profiles of API parameters used in various APIs (e.g. Features and EDR)

Where MetOcean DWG are headed in the coming year

- World Domination? Implementation of OGC standards into global production systems
- Did this week contribute to those goals? Yes
- Are any documents or other deliverables in work? Yes

Next Quarter Met Ocean DWG Communications Plan

- WIS2in a box – pilot demo of OGC for WMO global production system

Demos and presentations

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Point Cloud DWG Closing Plenary Report

The 124th OGC Member Meeting

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Stan Tillman, Hexagon

6 October 2022

The most important thing for this WG is…

Can we reuse the work to define the 3D GeoVolumes proposal as a point cloud exchange service standard?

What we talked about this week

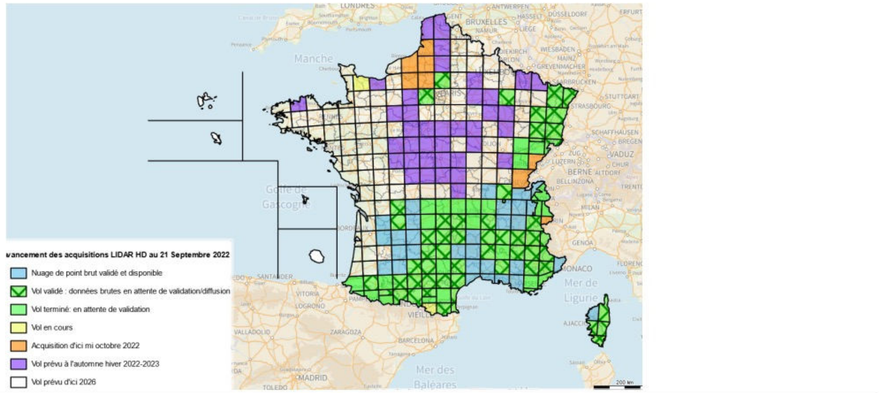
- The French High Density Lidar Program

RÉPUBLIQUE FRANÇAISE IGN CHANGER D'ÉCHELLE

Current acquisitions

Online map:

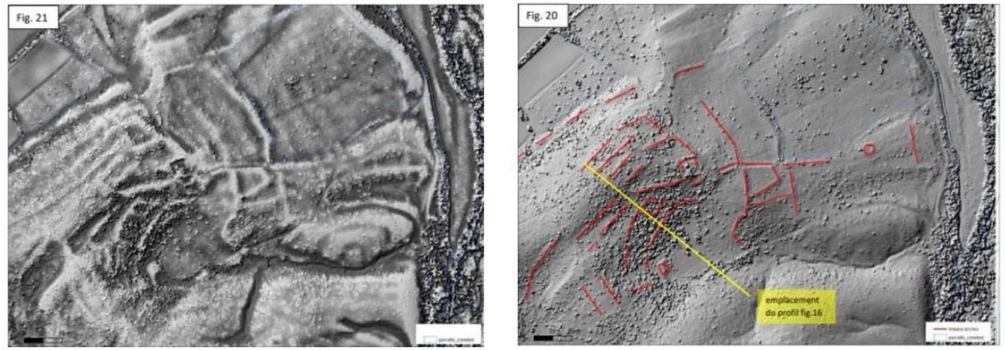
- https://macarte.ign.fr/carte/322ea69dab4c7e5afabc6ec7043b5994/acquisitionslidarhd



RÉPUBLIQUE FRANÇAISE IGN CHANGER D'ÉCHELLE

HD LiDAR Program purposes

Example of use by archeology



Archaeological structures under forest cover revealed by a digital model of minimum height derived from HD LiDAR data acquired in summer 2021 (*Catherine Fruchart*)

- Deep Learning and Semantics-driven LiDAR Information Mining

Where we are headed in the coming year

- Looking at the feasibility of using 3D GeoVolumes as a mechanism for exchanging both file and stream-based point clouds in a standardized manner.

Next Quarter WG Communications Plan

- < Are there any upcoming events (e.g., conference papers) related to your WG that you would like OGC to promote? >
  - None

- <Is there a new project or outcome that you think is worthy of an article or blog post? Please add a short description.>
  - None

- <Have there been any articles published online/in magazines that reference the work your WG is doing?>
  - None

Session Agenda

- The French High Density Lidar Program
  - Gilles Cébélieu, IGN
- Deep Learning and Semantics-driven LiDAR Information Mining Framework
  - Rajat Shinde, Indian Institute of Technology Bombay
- If time remaining:
- Potential Point Cloud Standard
  - Stan Tillman, Hexagon

Open Geospatial Consortium

Portrayal DWG Closing Plenary Report

The 124th OGC Member Meeting

Meeting sponsor

MPA SINGAPORE

SLA SINGAPORE LAND AUTHORITY

GeoWorks SINGAPORE

6 October 2022

The most important thing for this WG is…

Improve the quality and usability of Cartographic products being generated through standards based OGC APIs.

What we talked about this week

- International Cartographic Associate (ICA) and OGC partnership
- Areas of common interest
- Outline of proposed technical white paper on improving Cartographic Portrayal in standards-based mapping
- Possible immersive Cartography workshop in Dubai and Huntsville

Next Quarter WG Communications Plan

- Need to finalize plans for immersive cartographic visualization workshop concept discussed with OGC TC chair and in Portrayal DWG;
  - Schedule
  - Participants/Agenda
  - Communication
  - Logistics for required visualization devices

Session Agenda

- **Introductions and Business**
- **Standardization in mapping and portrayal - ICA**

Closing Plenary Report Security DWG

The 124th OGC Member Meeting

Meeting sponsor

Andreas Matheus, Secure Dimensions
6 October 2022

The most important thing for this WG is…

Is Security in the OGC just a separate(d) layer

that only a few enthusiasts understand, or

could it be considered common good?

What we talked about this week

- Testbed 18 Data Centric Security
  - Engineering Report for Secure and Asynchronous Catalogue
  - OGC API Records
  - Subscription Service
  - Key Management Service
- OGC API security for asynchronous
  - Continue communication after service ends 202
    - Email, Web Hook, Web Push

Where we are headed in the coming year

- We don’t know yet

Session Agenda

Security DWG

Tue, Oct 4th 5:00pm (Training Room 9-1)
Security DWG
Testbed 18 Data Centric Security
Project: Security DWG (read more...)
Reserved By: Andreas Matheus
Facilitator: Greg Buehler

Session Agenda Items

1. **Speaker:**
   Yves Cone, Christophe Noel (Spacebel)

   Presentation:
   Testbed 18 Secure & Asynchronous Catalogue ER (10 min)

2. **Speaker:**
   Andreas Matheus (Secure Dimensions)

   Presentation:
   Testbed 18 Secure & Asynchronous OGC API Records (10 min)

3. **Speaker:**
   Andreas Matheus (Secure Dimensions)

   Presentation:
   Testbed 18 Key Management API ER (10 min)

4. **Speaker:**
   Philip Hawkins (Helyx)

   Presentation:
   Testbed 18 Catalogue Client including DCS (10 min)

5. **Speaker:**
   all (n/a)

   Presentation:
   discussion (20 min)

Temporal DWG Closing Plenary Report

The 124th OGC Member Meeting

Meeting sponsor

Author, Affiliation
6 October 2022

Most important thing for the Temporal DWG is…

Document a high level abstract conceptual model for time to underpin future dynamic features.

What we talked about this week

- Elected Chuck Heazel as a third Co-Chair (others: Chris Little, Ron Tse)
- Events, clocks, calendars
- Temporal precision ~ Spatial precision
- Einstein's Theory of Relativity
- Poincaré's protocol for synchronizing multiple stationary clocks to the same time
- Poincaré's proof of impossibility of synchronizing multiple moving clocks
- Therefore if moving features move a long way or fast, they need their own clock
- Then we can accommodate relativistic moving features, à la GeoPose

Where we are headed in the coming year

- Abstract Conceptual Model of time for OGC Reference Model/Abstract Topics, consistent with W3C OWL-Time Vocabulary
- Liaise with ISO TC211 AHG9 over alignment and possible update to ISO19108
- Link to existing ISO Implementation standards for Time
- Did this week contribute to those goals? Yes

Next Quarter Temporal DWG Communications Plan

- Find time for some regular online meetings

Worth an article when some porgress made

No visible activity or relevant explanatory material on ISO, BIP or IERS websites

Temporal DWG Agenda

Expanding our temporal scope to embrace time

1. Key concepts in Time - Chris Little
2. New temporal challenges for the OGC – Chuck Heazel

Temporal DWG chair election

- The Temporal DWG approves the following individuals as a third Co-Chair of this Working Group: Chuck Heazel, Heazel Tech
  - Motion: Chris Little, Met Office
  - Second: Ron Tse, Metanorma
  - Discussion: none
  - There was no objection to unanimous consent

Open Geospatial Consortium

Urban Digital Twins

The 124th OGC Member Meeting

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Carsten Rönsdorf
6 October 2022

The most important thing for this WG is…

1. The wealth of practical examples in the field of Urban Digital Twins.

2. Discussion about re-charter of Smart Cities DWG.

What we talked about this week

- The focus on Urban and the Built Environment
- That a Digital Twin doesn’t necessarily have to be 3D
- The architecture of federated, distributed Digital Twins
- The role of purpose, or a targeted use cases for a Digital Twin
- The social component of Digital Twins
- The use of Digital Twins by cities
- Standardisation gaps in Digital Twins being multi-disciplinary + link to other SDOs
- The overlap of content discussed here with other working groups
- … so much more

Where we are headed in the coming year

- Continuation of regular planning group meetings which are now becoming calls of the Smart Cities DWG
- Debate on agreement on updated charter
- Ambition to have re-charter completed by March 2023 meeting

Agenda 1/5

13:30-15:00

- **Welcome** and Madrid/June 2022 summary (Carsten Roensdorf, Ordnance Survey - 5 min) The need for Digital Twins from a city's perspective
- Comparison between **FrontierSI Digital Twin projects** (Sisi Zlatanova, Uni of NSW, and Kate Williams, FrontierSI - 10 min)
- S-Map: urban digital twins for **Seoul** (Seong Gon Kim, Sfractum - 10 min)
- The **Four Dimensions of Urban Digital Twins** (Timo Ruohomaki, Forum Virium - 10 min)
- A Composable, Customisable, and Community-oriented **System Architecture** for Urban Digital Twin (Soheil Sabri, Uni Melbourne - 10 min)
- Why **Spatial Digital Twins**? (Brian Nicholls, AAM - 10 min)
- Q&A with presenters - 15 min

Agenda 2/5

15:30-16:30

- Digital Twins in the European **DUET project** (Lieven Raes, Digital Flanders - 10 min)
- Delivering **data infrastructure** for the information economy (Mark Enzer, previous chair UK national Digital Twin Programme - 15 mins)
- Urban Digital Twin Showcase: **City of Jeonju** (SangKi Hong, Anyang University - 10 min)

- Spatial Digital Twin: Update on **challenges and opportunities** from journeys across Australia (Marie Truelove, data61 - 10 min)
- Q&A with presenters - 15 min

Agenda 3/5

17:00-18:00

- **Observations, Integration Approaches and Standards** in Digital Twins (Dean Hintz, Safe Software - 10 mins)
- **Discussion** - 25 mins (what standards are important in an urban DT context, what are other SDOs doing?)
- Develop **OGC position statement for Digital Twins in the Built Environment** - 25 min

Agenda 4/5 UDT DWG Ad-hoc

Ad-hoc, Wednesday, 5/10/2022 8:00AM

- Draft UDT DWG charter for discussion

https://portal.ogc.org/files/?artifact_id=102531

Agenda 5/5 – relevant content in other groups

3DIM DWG, Wednesday, 5/10/2022 13:00

- **Barriers to Digital Twin adoption**, Binyu Lei, NUS
- **CDB** for digital twin implementations, Carl Reed

MUDDI SWG, Wednesday, 5/10/2022 15:00

- **Digital Underground** - subsurface data in Singapore, Mun Shi Woo, SLA