

Closing Plenary

Scott Simmons

117th OGC Member Meeting

Virtual | 11 December 2020

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Closing Planary Keynote: Stephen G. Bowen

NASA Astronaut Captain, United States Navy



Stephen G. Bowen (Captain, U.S. Navy) was the first submarine officer to be selected as an astronaut by NASA. Bowen is a veteran of STS-126, STS-132 and STS-133. The STS-126 mission was the 27th International Space Station (ISS) assembly mission. The crew delivered equipment and supplies as well as expanded the living quarters to house six-member crews aboard ISS. STS-132 delivered an Integrated Cargo Carrier and a Russian Mini Research Module. STS 133 delivered the Permanent Multipurpose Module and the fourth Express Logistics Carrier (ELC) to the station.

He has logged more than 40 days in space including 47 hours and 18 minutes in seven spacewalks. He is currently backup crewmember for the upcoming Expedition 63 mission.

- Thanks
- Keynote: Stephen G. Bowen, NASA Astronaut, Captain, US Navy
- CWL: Open Standards to Enable FAIR Multi-lingual Workflow Sharing – Michael Crusoe, Common Workflow Language Project
- Quorum confirmation
- TC Motions
 - Testbed 16 Engineering Reports – heads up
 - Features and Geometries JSON SWG – Clemens Portele
 - Features API SWG – Clemens Portele
 - OGC API – Environmental Data Retrieval (EDR) – Chris Little
 - I3S 1.2 Community Standard Work Item – Keith Ryden
 - Zarr Community Standard Work Item – Ryan Abernathey
 - DGIWG GeoTIFF/TIFF Profile for Imagery & GriddedData 2.3.1 – Emmanuel Devys
 - DGGs 2.0 Abstract Specification – Robert Gibb
- Upcoming TC Meetings
- Upcoming Location Powers event
- TC Chair announcements and motions
 - Final Reminder for OAB nominations
 - Cutoff date for evidence of implementation
- Working Group reports with motions: Z to 3
- Testbed 16 Engineering Reports approval motion
- “Important Things” discussion

Thanks to our intended sponsor

OGC

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CWL: Open Standards to Enable FAIR Multi-lingual Workflow Sharing

117th OGC Member Meeting, Closing Plenary
2020-12-11

Michael R. Crusoe [@biocrusoe](https://twitter.com/biocrusoe)

CWL Project Leader [#CommonWL](https://github.com/CommonWorkflowLanguage/CommonWorkflowLanguage)

 <https://orcid.org/0000-0002-2961-9670>

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Background

- Computational workflows are routinely used for large scale analyses in many fields
- Replication, validation, and extension of scientific results are crucial for scientific progress
- [Many workflows systems exist](#) but few of the systems have
 - adoption, active user community, and sustained development support
 - the ability to painlessly port or extend their workflows to another system or platform
- Needed a **multi-lingual** workflow description **standard** between systems and for cross-vendor portability



The CWL Project is a boutique SDO, part of Software Freedom Conservancy, Inc.

The CWL project supports open consensus-based standards for command line data analysis workflows and tools.

Specifically, the project supports the

- ***pre-standards process*** by providing a neutral place of convening to discuss, propose and test ideas about command-line tool based workflow standards and related topics.
- ***standardization process*** by stewarding the development and delivery of standards in accordance with the [Open Stand principles](#).
- ***post-standards life cycle*** by (1) promoting the released standards, (2) developing and maintaining related training and tools, and by (3) tracking deficits and other post-standardization feedback.



What is Common Workflow Language (CWL)?

- Open standard for describing analysis workflows and tools
 - Started as a grassroots effort by developers at [BOSC](#) codefest in 2014
 - Community based standards effort, not a specific software package
- Defined with a schema, specification and test suite
 - Reference implementation (cwltool) along with academic and commercial production implementations
- Portable and scalable across a variety of software and deployment environments
 - Supports the use of containers (e.g. Docker, Singularity)
- Designed to meet the needs of data-intensive science to improve the FAIRness of their workflows
 - CWL now used in Bioinformatics, Medical Imaging, Astronomy, High Energy Physics, Machine Learning, ... GeoSpatial?



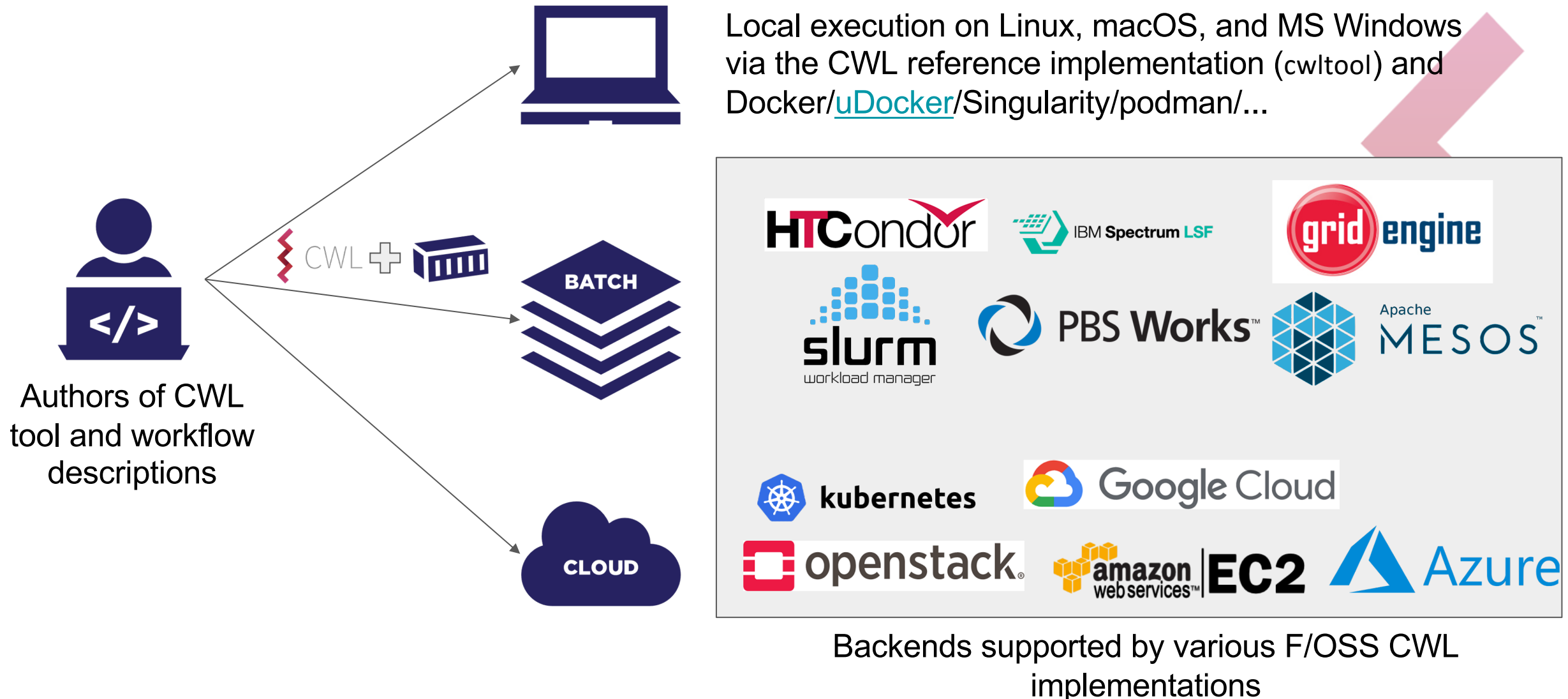
CWL: Two Standards in One

- [CWL Command Line Tool Description](#) standard: how to run a single tool; what inputs are required and allowed, what outputs are made and how to get them.
- [CWL Workflow Description](#) standard: connecting these CommandLineTools along with sub-Workflows into a workflow graph

Can use just the CommandLineTool CWL standard or the full combination of both.

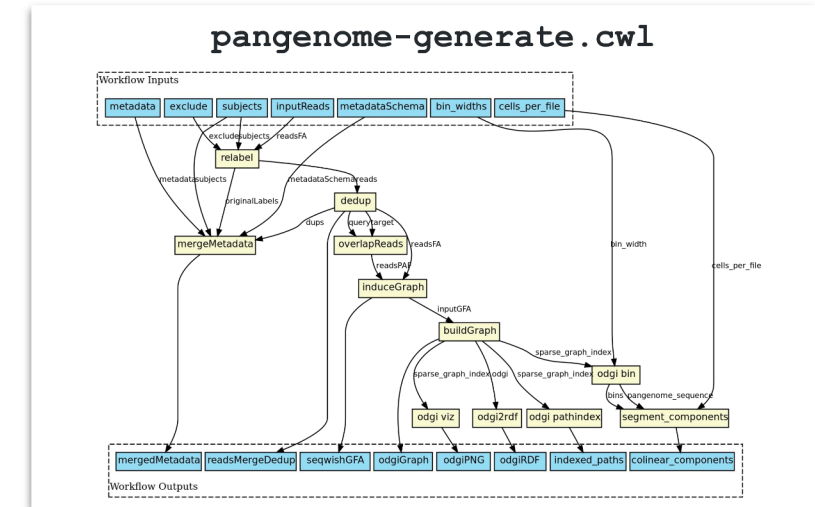


CWL Enables Execution Portability



CWL Technical Details

- CWL file contains a tool or workflow description
- Human readable
 - Written in [YAML](#) or JSON
 - Many optional fields to increase readability and reusability (i.e. “doc”, “label”, “[SoftwarePackage](#)”, “format”)
- Input/outputs are explicitly stated
- Designed to be modular and easy to reuse components
 - CWL Workflows are graphs made up of CWL tool descriptions
- Designed for high-throughput (grid and cloude) computing
 - Distribute steps over many compute nodes
 - Data movement handled by the CWL-aware workflow engine
- Encourages well-marked vendor/user extensions
 - Supporting progress without hurting portability



CWL Encourages Progressive Enhancement

```
cwlVersion: v1.0
class: CommandLineTool

inputs:
  readsFA: File

baseCommand: spoa

arguments: [ $(inputs.readsFA), -G, -g, '-6' ]

outputs:
  spoaGFA:
    type: stdout
```

Both describe the same tool.

The 2nd description is more helpful.

```
cwlVersion: v1.0
class: CommandLineTool

doc: |
  Spoa (SIMD POA) is a c++ implementation of the partial order alignment (POA) algorithm
  (as described in 10.1093/bioinformatics/18.3.452) which is used to generate consensus
  sequences (as described in 10.1093/bioinformatics/btg109). It supports three alignment
  modes: local (Smith-Waterman), global (Needleman-Wunsch) and semi-global alignment
  (overlap), and three gap modes: linear, affine and convex (piecewise affine). It also
  supports Intel SSE4.1+ and AVX2 vectorization (marginally faster due to high latency
  shifts), SIMD and dispatching.

inputs:
  readsFA:
    format: edam:format_1929
    type: File
  doc: |
    Input FASTA file containing a set of sequences to be aligned in order to generate
    a genome graph. For best results, the sequences should be sorted by length (longest
    to shortest) and quality (best to worst).

hints:
  DockerRequirement:
    dockerPull: "quay.io/biocontainers/spoa:3.4.0--hc9558a2_0"
  ResourceRequirement:
    ramMin: $(15 * 1024)
    outdirMin: $(Math.ceil(inputs.readsFA.size/(1024*1024*1024) + 20))

requirements:
  InlineJavascriptRequirement: {}

baseCommand: spoa

arguments: [ $(inputs.readsFA), -G, -g, '-6' ]

stdout: $(inputs.readsFA.nameroot).g6.gfa

outputs:
  spoaGFA:
    type: stdout
    format: edam:format_3976 # GFA
    doc: Output in Graphical Fragment Assembly (GFA) format.

$namespaces:
  edam: http://edamontology.org/
```

Community Maintained
File Format Identifier



Dynamic Resource
Requirements

CWL Data Model

The basic unit is a command line tool.



[CWL Types](#): strings, numbers, file/directories, or [record](#)s that combine these; or [array](#)s of any of these types. Union and optional types too.

[Files](#) can have a further specialization via the “format” field: a URI that identifies the file type
iana:[application/geo+json](#)
edam:[format_3016](#)

CWL does not dictate the source of these format identifiers, each community of users should define their own.



CWL Technical Details cont.

- Workflow graph can be exported as linked-data (RDF/JSON-LD)
- Supports provenance exporting [using existing standards](#) and ontologies: [W3C Prov](#), [IETF BagIt](#), [wfdesc](#), [wfprov](#)
- CWL's object model enables a variety of infrastructure-specific optimizations
 - **Cost and/or data-location aware scheduling**
 - (User overridable) caching of results
 - Streaming in-/out- of object stores; or between steps
- Hundreds of conformance tests are used to ensure portability independent of vendor
- Workflow validation catches many sneaky syntax errors before runtime



Data locality with CWL

Input and output files are modeled in CWL as rich object with identifier (URI/[IRI](#)) and other metadata.

Platforms that understand CWL can use these identifiers to **send compute to near the location of data.**

In combination with the resource matchmaking this can conversely result in data being sent to specialized compute resources as configured by the operator (or machine learning)



Proposed enhancement to CWL data model

[input value restrictions / validations · Issue #764](#)

Refinements to the existing CWL types have been proposed, but need implementation before they can be voted on.

string: Regular expressions, string sets

int/long: Integer intervals, integer sequences, integer sets

float/double: (Real) intervals, integer intervals, real sets

Goal is to catch validation errors sooner, produce more helpful (G)UIs, and prevent execution of workflows/tools that doomed to fail



How to extend CWL for your own needs?

CWL 💕 community/vendor extensions!

1. Do [let the CWL community know](#) how your needs aren't being met.
2. Experiment with alternative syntax via additional Requirements. Fork the CWL reference runner ([cwltool](#)) or another CWL implementation to implement your ideas.
3. Make sure that your extensions are [namespaced](#), so that other systems can still read your CWL documents.
4. Let the CWL community know about your progress as you go.
5. If it makes sense, make a [formal proposal](#) for possible inclusion in a future version of the CWL standards!



CWL v1.2 released 2020-08-10!

3 new features: workflow level conditionals, abstract operations, absolute paths for container inputs

20 cleanups and clarifications of corner cases in the specifications

Forward compatibility via the `cwl-upgrader` script or the reference CWL runner

Available today in the CWL reference runner (cwltool), Arvados, and toil-cwl-runner. Support in additional commercial providers is forthcoming.



CWL Mini-Conference, January 11-13th, 2021

Save the dates! Formal invites going out over the next few days.

Session 1 (**Americas-EMEA**): Monday, January 11th 14:00 - 18:00 UTC

Session 2 (**EMEA-APAC**): Tuesday, January 12th 07:00 - 11:00 UTC


Session 3 (**APAC-Americas**): Wednesday January 13th 00:00 - 04:00 UTC

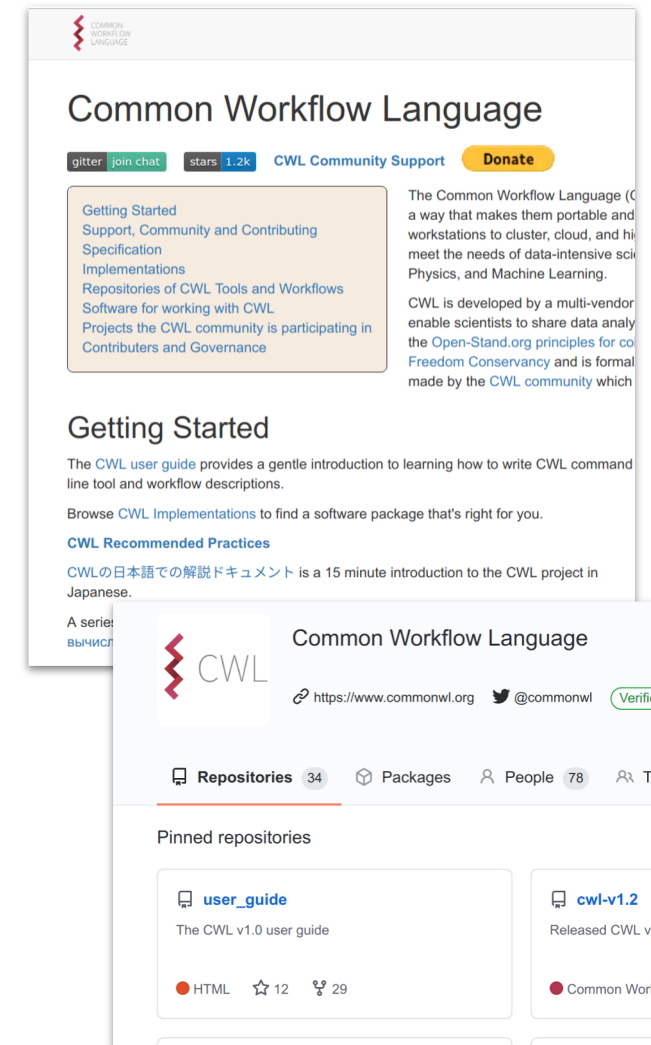
Pre-recorded talks of 5, 10, or 15 minutes from the community. Free and open for all to attend and participate.

Subscribe to the [CWL mailing list](#) for the full announcement!



Participating in the CWL Community

- <https://www.commonwl.org/>
- Getting Started
 - User guide: https://www.commonwl.org/user_guide/
- Support, Community and Contributing
 - Forum: <https://cwl.discourse.group/>
 - Chat: <https://gitter.im/common-workflow-language/home>
 - GitHub: <https://github.com/common-workflow-language/>
 - Social Media: [@commonwl](#) & [#CommonWL](#)
- [Weekly video chat](#) 
- EU/EEA funding opportunity:
<https://tinyurl.com/2020-CWL-EUEEA>



Common Workflow Language



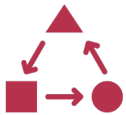
Is a vendor neutral open standard



Is a community-first project



Designed with an open and transparent governance



Improves interoperability and portability



Increases reusability and reproducibility



Enables parallelization and scale



Is supported by an [ecosystem](#) of tools, libraries, and editor plugins



Thank you!

Questions?

<https://www.commonwl.org>





Backup slides..

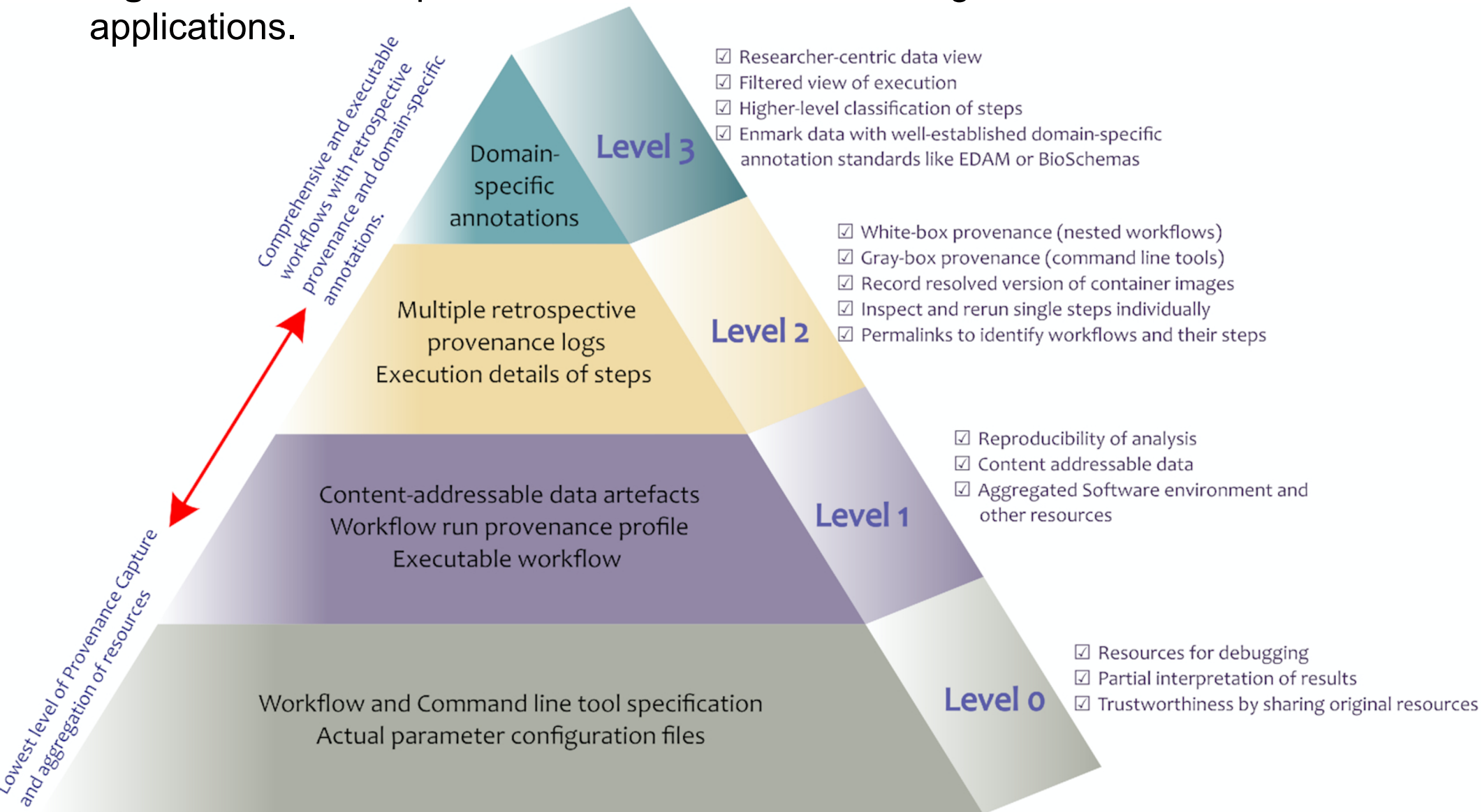
Linked Data & CWL

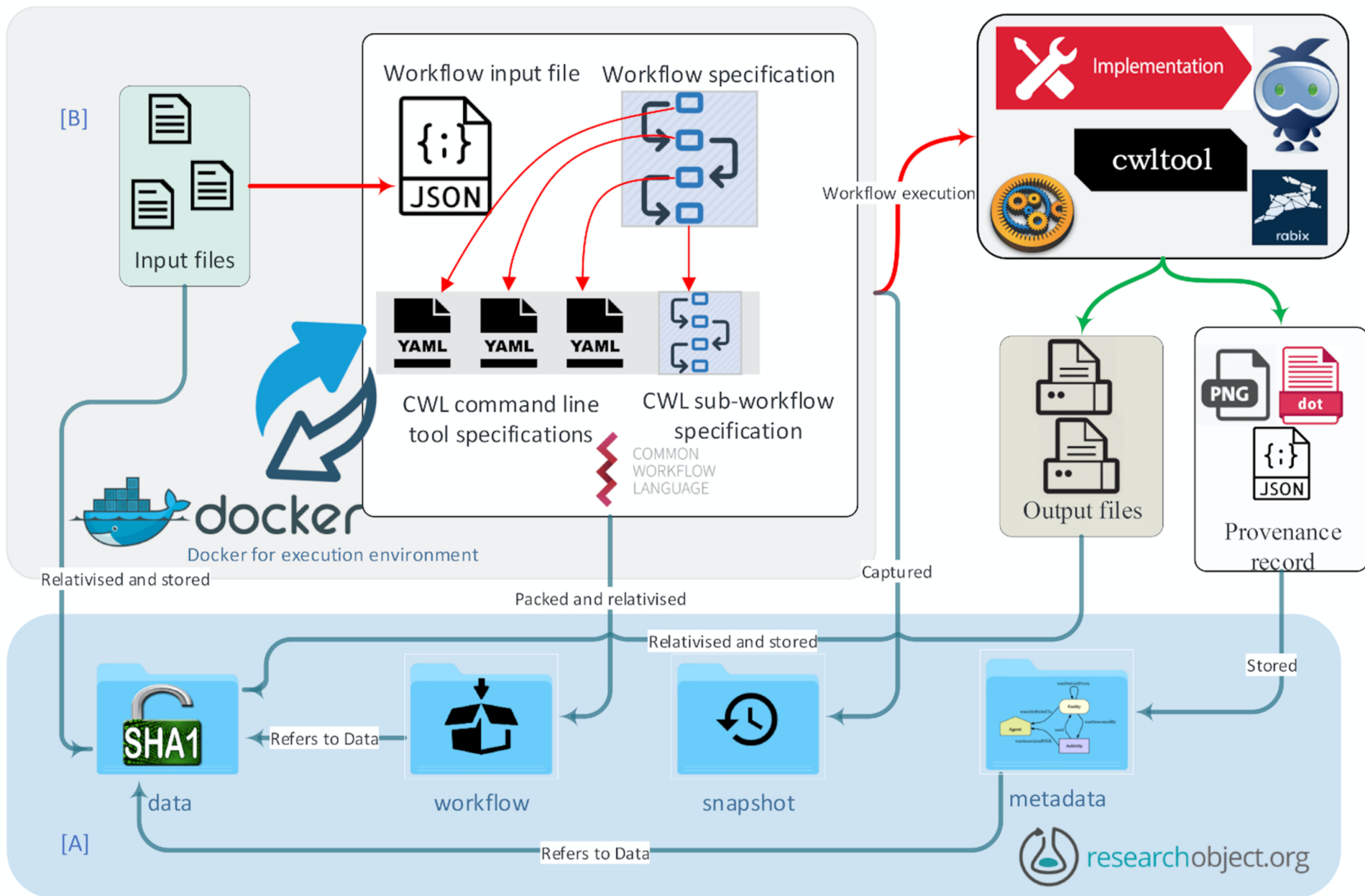
- Hyperlinks are common currency
- Bring your own RDF ontologies for metadata
- Supports SPARQL to query

Example: can use the [EDAM ontology](#) to specify file formats and reason about them:
“FASTQ Sanger” encoding is a type of FASTQ file



Figure 2: Levels of provenance and resource sharing and their applications.





Timeline

2014 Bioinformatics Open Source Conference CodeFest:
4 software engineers & a whiteboard

2015: CWL “draft-2” version, commercial vendor (SBG) releases product in December.

2016: CWL v1.0 released

2017: CWL v1.0.1 and v1.0.2 released.
Now 4 public implementations

2018: **IBM** released their CWL implementation for LSF.

2019: CWL v1.1 released

2020: CWL v1.2 released with workflow conditionals, work on CWL v1.2.1 and beyond commences



TC Motions

Testbed 16 Engineering Reports

- The TC Chair will make a motion at the end of the Working Group presentations to approval all Testbed 16 Engineering Reports (ERs)
- A list of those reports follows this slide
- Because ALL members can vote on approval of ERs, quorum is assumed at the time of vote

Testbed 16 Engineering Reports to be considered

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Engineering Report	Recommending WG	Discussion	Approved
OGC 20-019 Testbed-16: GeoPackage ER	GeoPackage SWG		
OGC 20-027 Testbed-16 Federated Security ER	Security DWG		
OGC 20-036 Testbed-16 FMV to Moving Features ER	Moving Features SWG		
OGC 20-016 Testbed-16: Data Access and Processing ER	EOXP DWG		
OGC 20-025 Testbed-16: Data Access and Processing API ER	EOXP DWG		
OGC 20-035 Testbed 16 - Earth Observation Application Packages with Jupyter Notebooks ER	EOXP DWG		
OGC 20-041 Testbed-16 Analysis Ready Data ER	EOXP DWG		
OGC 20-020 OGC Testbed-16: Aviation ER	Geosemantics DWG		
OGC 20-018 Testbed-16: Machine Learning Training Data ER	EDM DWG		
OGC 20-033 Testbed-16 OpenAPI ER	Architecture DWG		
OGC 20-039r2 TestBed-16 DGGS and DGGS API ER	Architecture DWG, DGGS DWG		



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Features and Geometries JSON SWG

Clemens Portele, Panagiotis A. Vretanos

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- Developers today prefer JSON over XML
- GeoJSON popular and widely supported
- OGC API Features implementations typically support GeoJSON
- But (intentional) limitations exist in GeoJSON that are an issue for some use cases:
 - Restricted to WGS 84 as Coordinate Reference System
 - Ellipsoidal metrics not supported
 - No support for solids
 - No guidance for the encoding of feature properties

- Develop OGC Features and Geometries JSON addressing the identified limitations
 - Additional capabilities could be added in the future, if there is broad support for the initial OGC Features and Geometries JSON in implementations
- Specify as a superset of GeoJSON
 - i.e., valid GeoJSON is also valid OGC Features and Geometries JSON
- It is not the idea to develop a GML-equivalent for JSON!
- Target an initial release of a candidate standard: end of 2021

- Document requirements for OGC Features and Geometries JSON
- Use core-and-extensions approach, first part will be the core
 - Structure conformance classes so that a profile is a simple list of conformance classes
- Use JSON Schema to specify the syntax
- Assess relevance of
 - JSON-LD
 - SensorThings API Feature of Interest JSON encoding
- Use Sprints and other innovation program initiatives for realistic testing of drafts
 - Implementations of draft (both creating and consuming the JSON) are essential before moving to public review
- Register one or more media types

- Charter endorsed by the Architecture DWG
 - See Closing Plenary report
- Testbed-17 will have a related activity
 - “Enhanced GeoJSON” (difficult terminology 😊)
- UGAS-2020 Pilot ER includes a proposal for a Features Core Profile JSON encoding
- The proposed Charter is on Pending Documents:
 - https://portal.ogc.org/files/?artifact_id=95319

- Initiate TC and Public comment

Features API SWG

Closing Plenary Report

Clemens Portele, Panagiotis Vretanos

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- The Features API SWG recommends that the OGC Technical Committee approve release of OGC 20-091 “OGC API – Common and OGC API – Features Sprint 2020: Summary Engineering Report” as an OGC Engineering Report.
 - Pending any final edits and review by OGC staff
 - There was no objection to unanimous consent
- An online code sprint that was held from 29 to 30 September 2020 to advance the development of the OGC API - Common - Part 2: Geospatial Data draft standard and the OGC API – Features – Part 4: Simple Transactions draft standard. The ER documents the results of the code sprint.

EDR API SWG Closing Plenary Report

Chris Little, Dave Blodgett, Peng Yue

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Overview I3S Version 1.2 Work Item Justification

Keith Ryden

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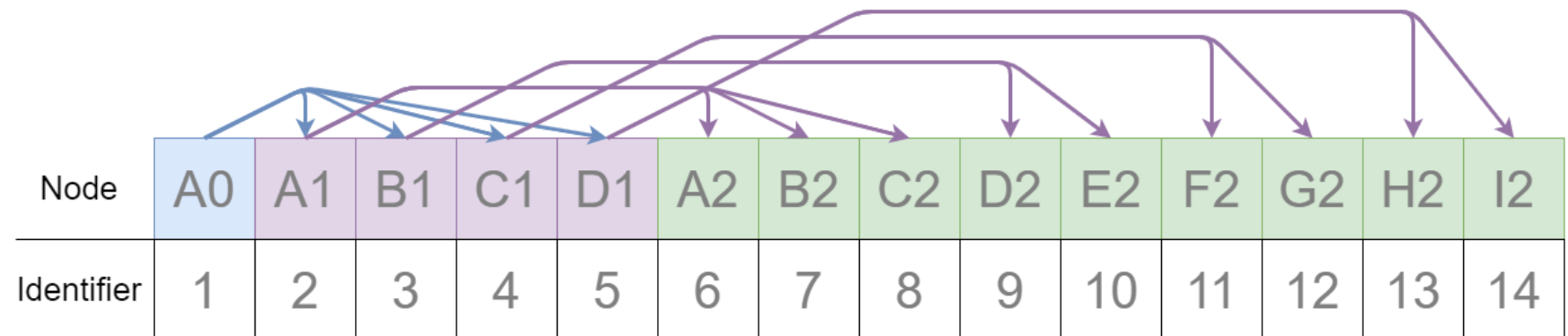


- Indexed 3D Scene Layers (I3S) – An OGC Community Standard used to stream 3D geospatial content to mobile, web and desktop clients.
- September 2016: I3S was submitted to the OGC.
- August 2017: Formally adopted as an OGC CS.
- May 2019, Approval of a work item to revise the I3S CS.
- January 2020: I3S Version 1.1 approved as official CS.
- November 2020: Work Item justification for version 1.2

- An I3S update focused on Performance and Scalability
 - Introduction of paged node access pattern – which significantly reduces the client-server traffic by bundling individual node metadata resources into compact pages of nodes.
 - Introduction of a more compact geometry layout for 3D Object and IntegratedMesh layers binary geometry payloads – using a well-known quantization encoding ([Draco](#)).
 - More optimal selection strategy – standardizes on Oriented Bounding Boxes (OBBs) based node selection criterion.
- Introduction of an advanced material definitions property such as physically based materials.
- Editorial updates/corrections.

Details of the 1.2 submission

- A major improvement is node paging.
- Previously, clients received one node per request.
- In the new version, the nodes are grouped into pages.
- Clients can determine which node pages are needed and request only the necessary pages.
- This significantly reduces server-client traffic and improves performance!

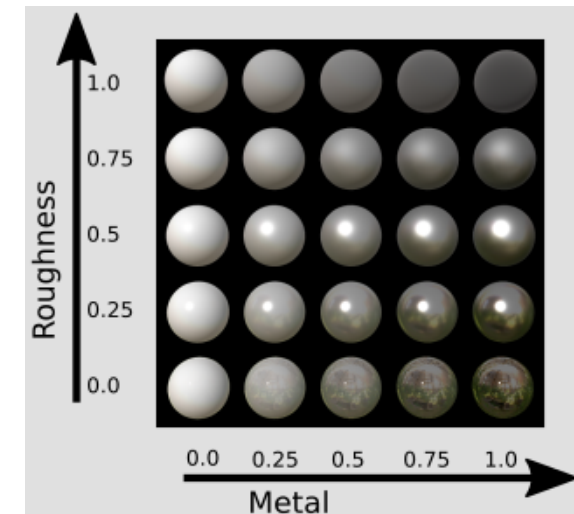


- Support for Draco geometry compression.
- Draco is an open source (Apache 2.0) library for compressing 3D geometries.
- Draco supports compressing geometry attributes creating more compact nodes, which in turn provides a smaller payload, increasing performance.
- <https://github.com/google/draco>



DRACO
3D DATA COMPRESSION

- Support for advanced materials.
- The material definition is now feature compatible with [glTF materials](#).
- glTF defines materials using a common set of parameters that are based on widely used material representations from Physically-Based Rendering (PBR).

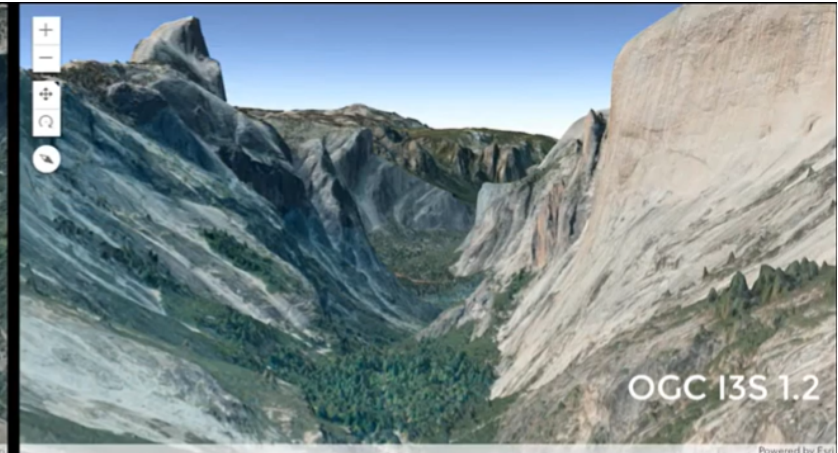
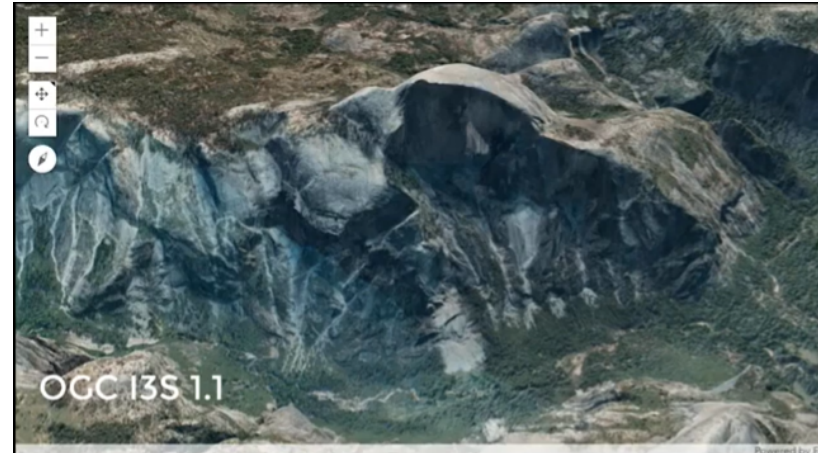


Significant performance improvements:

Geometry payload size reduced by 70-80% or more...

When combined with paged indexes, data loading is 2-3x faster

Browser Caching not enabled



Browser Caching enabled



Without compression and paged nodes

With compression and paged nodes

Process and Deliverables

This project updates the OGC I3S Community Standard document.
The following deliverables will be generated over the life of the project:

- Work Item Justification document to be approved by the OGC TC.
- An updated I3S Community Standard document for public comment.
- A presentation to the OAB seeking approval to release the document for public comment.
- A document collecting and responding to public comments.
- Final revision of the I3S Community Standard document reflecting public comment.
- A presentation to the TC reviewing the I3S Community Standard updates prior to the request for an adoption vote.
- Adoption Vote

- The I3S Work Item Justification for this update has been posted to pending as document 20-093
- The TC Chair will call for a public comment period on the Work Item Justification
- After the public comment period, a TC vote will be called to approve proceeding with the OGC I3S Community Standard Update.

- 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>

Ryan Abernathey

Zarr Community Standard Work Item

- The TC Chair recommends that the OGC Technical Committee approve an electronic vote to approve a new Community Standard Work Item as defined in [OGC 20-052] “Zarr Community Standard Work Item Justification.”
 - There was no objection to unanimous consent

GeoTIFF.SWG Closing Plenary Report

Emmanuel Devys

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DGGS SWG Closing Plenary Report

Robert Gibb, Matt Purss

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Upcoming Member Meetings

Future OGC Member Meetings

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Date	Location	Host/Sponsor
7-11 Dec 2020	Atlanta, GA USA Virtual	GTRI
March 2021	Virtual	
June 2021	Europe	
September 2021	Singapore (TBC)	
December 2021	North America	

Per a member poll, we agreed to 3 meetings for 2021; we are proposing a new pattern of 3 physical meetings per year, with a virtual meeting in March 2021 and thereafter each December



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OGC Location Powers: Urban Digital Twins January 2021



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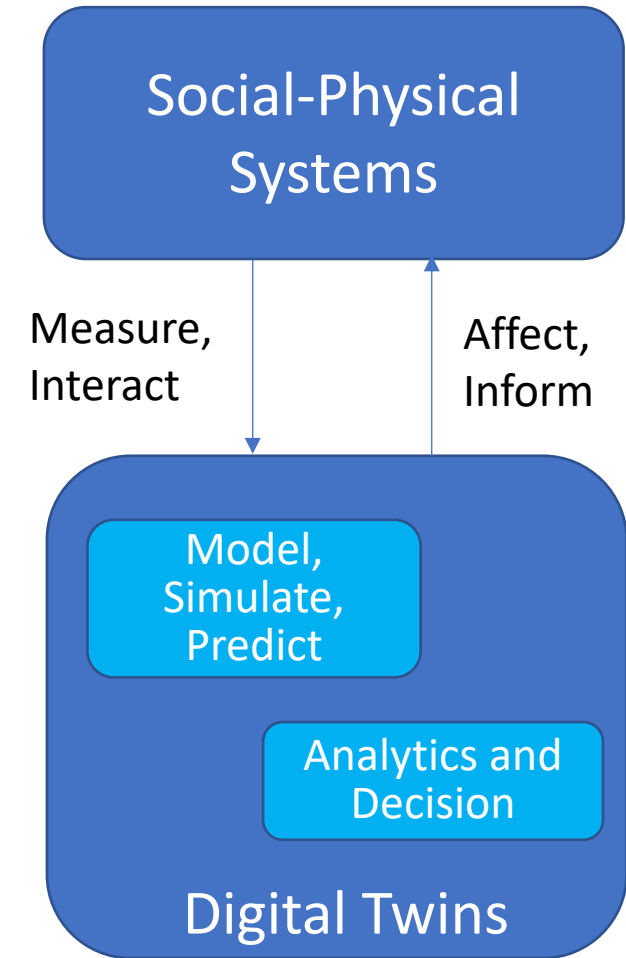
OGC Location Powers
Urban Digital Twins

January 12-14, 2020



Digital Twins at Urban Scale

- **Transform how cities are planned, built, and managed to better deliver services**
- **More livable, inclusive, safe, resilient and sustainable urban environments**
- **Geospatial information technology**
 - City Models, Data Science, AI/ML
 - Cloud, Edge, IoT; Predictive models
- **Multiple Digital Twin Systems**
 - Themes: Base, Energy, Water, Mobility, etc.
 - System-of-systems integration



Digital Twin: virtual representation of a system

International Virtual Summit

Sessions 1:

Digital Twin visions and Benefits

Sessions 2:

Tech Depth and Applications

Sessions 3:

Recommendations, Actions, Summary

West Sessions:

Europe, UK, Africa, Americas

1500 to 1800 UTC

- Each session convened twice: West and East
 - Session themes same, content different
- Keynotes, Panel Discussion, Breakout Groups



East Sessions:

NZ, Australia, Japan, Singapore, India

0200 to 0500 UTC

- Agenda and Registration (discount for members):
www.locationpowers.net/

Z to 3

WG Reports with TC Motions

Security DWG Closing Plenary Report Andreas Matheus

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The most important thing for this WG is...

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Data Centric Security in Federated Cloud Environments



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- Testbed-16 Federated Security ER
 - Craig Lee (Federation Partners) - 20 min
- Testbed 16 Data Centric Security
 - DCS Team* - 30 min
- Testbed-16 Data Centric Security ER
 - Aleks Balaban (m-click.aero) – 20 min
- OGC API and (Data Centric) Security
 - All – 20 min

*:

- Aleks Balaban – m-click.aero
- Andreas Matheus – Secure Dimensions
- George Elphick – Helyx
- Marcus Alzona – keys
- Michael Leedahl – Maxar

- Discussion topics

- Data Centric Security
- Federated Cloud Security
- Key Management Server

- Upcoming deliverables

- Testbed-16 Federated Security ER
- OGC Testbed-16 DCS ER

- Coordination (ongoing and planned)

- no

- Future meetings

- next Member Meeting

- Testbed-16 Data Centric Security
 - Theoretical concepts
 - Implementations leveraging OGC API Features

- The Security DWG recommends that the OGC Technical Committee approve release of #20-027 “**Testbed-16 Federated Security ER**” as an OGC Engineering Report.
 - There was no objection to unanimous consent
- The Testbed 16 Federated Security ER “... examines all aspects of security and trust in federated computing environments, as defined in the NIST Cloud Federation Reference Architecture. The security and trust requirements are identified, and then possible approaches for achieving security and trust are examined. These approaches range from traditional methods for securing just the basic communications among federated entities, to the use of Zero Trust Architectures.”

OGC Naming Authority Closing Plenary Report

Gobe Hobona, Erik Stubkjær

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There's a need for OGC, ISO and other alliance partners to work on harmonizing their glossaries (e.g. common tools and SKOS). Possible enablers could be:

1. Code sprints addressing the recording/registering, editing and presenting of vocabularies
2. Integrating glossary updating with standardization processes (e.g. revision of the Standards templates to make glossaries first-class objects)
3. Networking among glossary-engaged parties, aiming at shared and coordinated development

- Glossary Harmonization - Peter Strobl (JRC)
- Introduction to Glossarist – Ron Tse (Ribose)
- Representation of GeoTIFF tags in the Definitions Server – Gobe Hobona (OGC)
- Clarifying the role of the OGC-NA wrt API paths – Gobe Hobona (OGC)
- Publication of Provisional URIs – Gobe Hobona (OGC)
- Call for Volunteers for Extraction of Specification Elements

- Discussion topics

- Glossary harmonization and tools
- Representation of GeoTIFF tags in the Definitions Server
- Whether paths to API resources are within the scope of the OGC-NA
- Publishing of provisional URIs

- Upcoming deliverables

- Revision to policy on definitions
- A proposal on glossary harmonization

- Coordination (ongoing and planned)

- OGC API SWGs
- GeoTIFF SWG and O&M SWG
- ISO TC 211

- Future meetings

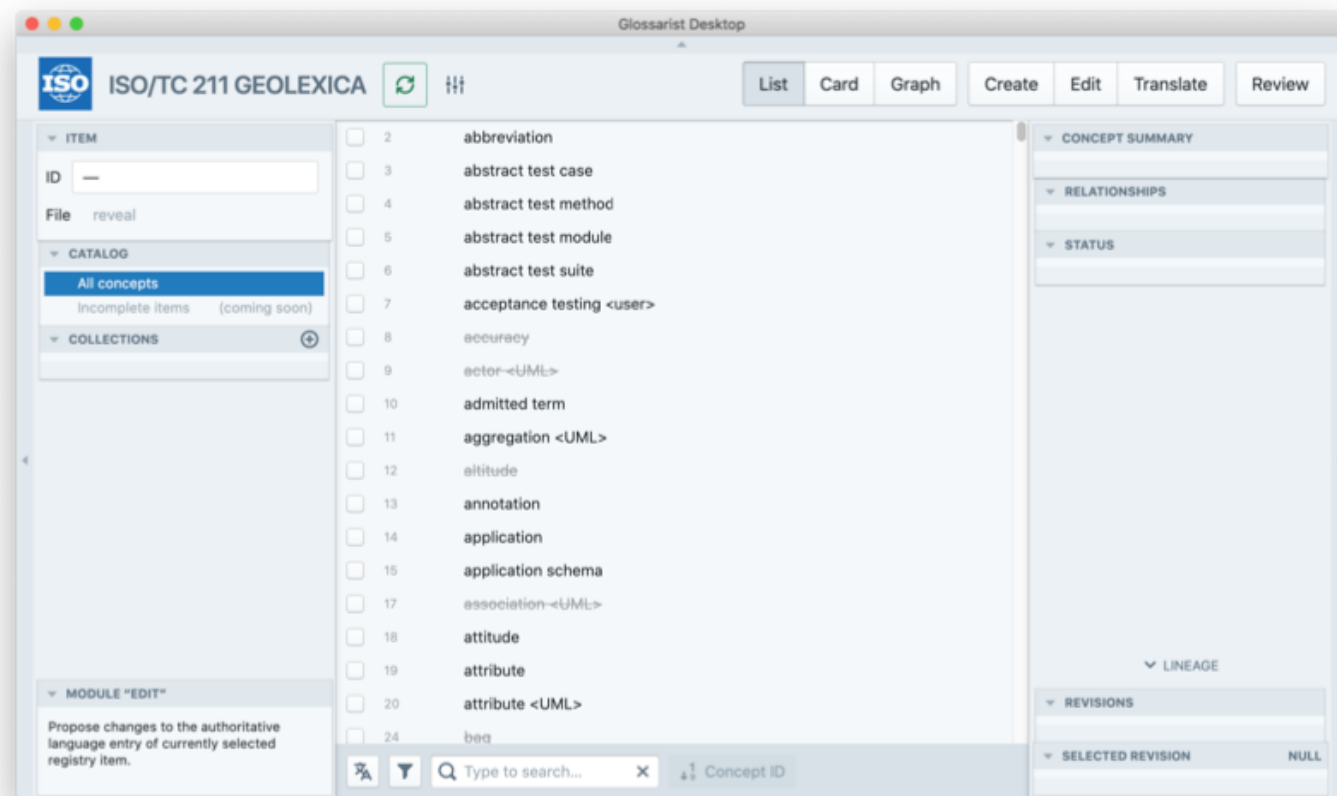
- Q1 2021 OGC Member Meeting
- Potential ISO meeting in April 2021 on glossary issues

- Registration of URIs of definitions
- Management and publication of registers
- Extraction of URIs of specification elements
- Review of candidate OGC standards to ensure compliance with OGC-NA policies

- Each term needs to be individually addressable
- Each term needs to be uniquely defined
- Each definition needs to be complete, i.e. using only everyday language or other defined terms
- All terms used in a definition which are defined themselves need to be marked and linked (parent-relations)
- All related terms where a term is (re-)used need to be listed and linked (sibling and child relations)
- Categorisations need to be unambiguous (no overlaps) and wherever possible complete (no 'grey zones')

- Fully online with fixed URL (DOI)
- Endorsed by all major stakeholders -> 'One Glossary'
- Open to 'public' contributions (registered users -> 'Wikipedia' style)
- Monitoring and moderation by multi-agency group of experts
- Mechanisms for resolving intra- and inter-disciplinary disputes
- Versioning (like in 'git')

- Contains all published and draft terminology for TC 211 for past 20 years
- Contains concept relationships
- Contains versioning, supersession information for all terminology
- Going to make the TMG Terminology Repository SMART
- Work in progress!



- desktop editor + server framework
- standardization lifecycle support: proposal + approval (ISO 19135-1, ISO 19104)
- git-based storage and collaborative data entry
- uses ISO 704 concept system, ISO 10241-1 term structure
- used by ISO TCs, OSGeo, The Good Docs Project
- based on Paneron (open-source structured data editor)
- <https://www.glossarist.org>



Open-source software for maintaining multi-language concept systems.

Managing concept registries with Glossarist?

Use the desktop application

Not using Glossarist in your organization yet?

Learn how to adopt Glossarist

Operating infrastructure?

Read the docs

USED BY  Geolexica for ISO/TC 211 MLGT

Proposed Representation of GeoTIFF Tags in SKOS

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```
1 <http://www.opengis.net/def/media-type/ogc/1.0/geotiff-tag/34735>
2   a      <http://www.w3.org/2004/02/skos/core#Concept> ;
3   <http://www.w3.org/2000/01/rdf-schema#label>
4     "GeoKeyDirectoryTag" ;
5   <http://www.w3.org/2000/01/rdf-schema#seeAlso>
6     <http://docs.opengeospatial.org/is/19-008r4/19-008r4.html> ;
7   <http://purl.org/dc/terms/created>
8     "2020-12-01"^^<http://www.w3.org/2001/XMLSchema#date> ;
9   <http://purl.org/dc/terms/modified>
10    "2020-12-02"^^<http://www.w3.org/2001/XMLSchema#date> ;
11   <http://www.w3.org/2004/02/skos/core#definition>
12     "The Keys in GeoTIFF (also called "GeoKeys") are all referenced from the GeoKeyDirectoryTag
13     tag."@en ;
14   <http://www.w3.org/2004/02/skos/core#notation>
15     "34735"^^<https://www.adobe.io/open/standards/TIFF.html>
16   <http://www.w3.org/2004/02/skos/core#prefLabel>
17     "GeoKeyDirectoryTag"@en .
```

Is there a URI for TIFF or tags?

Agreement: make the notation datatype (acting as a namespace) into a resolvable URI in OGC control that references the ADOBE source -equivalent to the spec/conformance class split.

Action: OGC-NA to draft policy revision that applies this approach

- The scope of the OGC-NA focuses on the assignment, registration and management of persistent URNs and URIs within OGC domains (primarily the www.opengis.net domain)
- Restrictions on the syntax of paths to API resources would be outside the scope of the OGC-NA because API resources are published from within the domains of the application providers
- Therefore, individual SWGs should specify the restrictions and other constraints within the standards they are responsible for.

**No consensus reached on this
proposal**

- There is a way of adding a status to an uploaded resource
- policy:status <http://www.opengis.net/def/status/provisional>
- What is needed?
 - Confirmation that Authority, SWG or DWG endorsement is needed before registration – even if provisional

- OGC-NA policy allows for the registration of provisional URIs through the use of status flags.
- To minimize the potential for conflicting registrations, the OGC-NA confirms that endorsement from the Authority, SWG or DWG that is responsible for the item being registered is needed before registration – even if provisional.
- Result: There was no objection to unanimous consent

Call for Volunteers for Extraction of Specification Elements

- <https://github.com/opengeospatial/NamingAuthority/tree/master/specification-elements>

The screenshot shows the GitHub repository page for `opengeospatial / NamingAuthority`. The repository has 12 stars, 2 forks, and 5 watchers. The `specification-elements` directory is selected, showing a file tree with the following items:

Item	Description	Updated
code	Specification element URIs extracted from STA 1.0 and CDB 1.1	5 months ago
mappings	Update 16-007r4.csv	5 months ago
specifications	Specification Element URI extraction moved from private repo	5 months ago
README.md	Specification Element URI extraction moved from private repo	5 months ago

The `README.md` file is expanded, showing the following content:

Specification Elements

This repository contains scripts for extracting mappings between OGC specifications and their elements (requirements and conformance classes).

The `code` folder contains the python scripts.

The `specifications` folder contains the specification documents in text or html format.

The `mappings` folder contains the CSV files linking the URL of the specification documents to the URI of the specification elements.

OGC API Tiles (and Maps) Closing Plenary Report

Joan Masó

117th OGC Member Meeting
Virtual | 11 December 2020

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Motion to approve release of the OGC API – Maps Sprint 2020: Summary Engineering Report

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- The OGC API – Maps SWG recommends that the OGC Technical Committee approve release of OGC 20-090 “OGC API – Maps Sprint 2020: Summary Engineering Report” as an OGC Public Engineering Report.
 - There was no objection to unanimous consent
- The subject of this Engineering Report (ER) is a code sprint that was held from 28 to 29 July 2020 to advance the development of the OGC API – Maps draft standard.



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OGC API – Processes SWG Closing Plenary Report

Benjamin Pross, Jérôme St-Louis

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Moving Features SWG Closing Plenary Report Mahmoud & Kyoung-Sook & Nobu

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- The Moving Features SWG recommends that the OGC Technical Committee approve release of 20-036 “[TB-16 FMV to Moving Features ER](#)” as an OGC Engineering Report.
 - There was no objection to unanimous consent.
- TB-16 FMV : A semantic model for the interoperability of video tracking information

Interoperable Simulation and Gaming Domain Working Group Closing Plenary Report

Mike Lokuta; Carl Reed

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Continuing outreach and attempted expansion of our stakeholders to get more 'gamers' to complement the 'simmers'



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- ISG Sprint Week ER Presentation and Discussion
 - Scott Serich; OGC Staff
 - Leonard Daly; Khronos Group
- Approval Motion for ISG Sprint ER
- SOFWERX Geospatial Tech Sprint Discussion Paper presentation
 - Carl Reed

Key Activities: ISG Sprint Report

- Leonard Daly reported out the results of the ISG Sprint by giving the presentation located here:
https://portal.ogc.org/files/?artifact_id=95878
- Goals of the Sprint were achieved:
 - “Advance the use of relevant OGC and Khronos standards in the modeling and simulation community through practical exercise and testing of the OGC API - GeoVolumes draft specification.”
 - Test GeoVolumes Draft Specification through:
 - Model & Terrain updates
 - Alternate Distributions
 - Structure of underlying 3D Data
 - Integration with Rapid3D
 - Integration with Unity game engine
- The report was reviewed in the ISG DWG session for structure, content and scale.
- Issues, Concerns, and Future Work recommendations are included in the report located here:
https://portal.ogc.org/files/?artifact_id=95584&version=1
- Motion carried to recommend that the TC release the report as an OGC ER

- The ISG DWG recommends that the OGC Technical Committee approve release of OGC 20-087 “Interoperable Simulation and Gaming Sprint Engineering Report” as an OGC Engineering Report.
 - There was no objection to unanimous consent

The OGC Interoperable Simulation and Gaming Sprint advanced the use of relevant OGC and Khronos standards in the modeling and simulation community through practical exercise and testing of the GeoVolumes API draft specification produced by the [3D Data Container and Tiles API Pilot](#). Of particular interest was the handling and integration of glTF models coming from multiple sources, but the sprint also examined the specification's implementability, consistency, completeness, and maturity.

- Carl Reed reported out the results of the SOFWERX Geospatial Tech Sprint by giving the presentation located here: https://portal.ogc.org/files/?artifact_id=95798
- A report has been written that documents the results and recommendations of the rapid prototyping activities conducted during the 3D Geospatial Series Tech Sprint II
- The report demonstrates that the goals for the sprint were achieved:
 - “In support of SOF Future Concepts, the focus of this effort is accelerate evolution of the OGC CDB standard to meet the needs of planning, rehearsal, and Mission Command systems providing decision support to Special Operations Forces and enabling SOF tactical and operational advantage.”
 - Additionally, a requirement to better align aspects of the CDB standard with the One World Terrain activity was expressed during the initial week of discussions.
- In order to accomplish the target deliverables of this activity, the participants, based on their expertize, were allocated to five focus groups and performed experiments: 3D, Attribution, Coverages/Tiling, Vectors in Geopackage, and Metadata
- The ISG DWG session discussed the implications for CDB 1.3/2.0 standards development and charter revisions needed for the CDB SWG to carry Sprint recommendations the SWG feels are necessary.
- A motion to recommend to the TC that the report on this work be released as a public OGC Discussion Paper was carried in the CDB SWG (further subject to the 3 week notice rule)

GeoSemantics DWG Closing Plenary Report

Linda van den Brink, Jo Abhayaratna

116th OGC Member Meeting
Virtual | 18 September 2020

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The most important thing for this WG is...

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Figuring out next steps in geosemantics / linked data and OGC standards



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- Sergio Taleisnik (Skymantics):
Testbed 16 Aviation ER
- Frank Verschoor, Emily Daemen (Geonovum):
Note on responsible use of spatial data
- David Blodgett (USGS):
SELFIE findings related to OGC standards
- GeoSPARQL SWG members:
GeoSPARQL updates

- Discussion topics

- SELFIE takeaways: [http-14](#)
- Getting implementers involved in GeoSPARQL update

- Upcoming deliverables

- Coordination (ongoing and planned)

- Future meetings

- March OGC Meeting

- The GeoSemantics DWG recommends that the OGC Technical Committee approve release of [OGC 20-020] “OGC Testbed-16: Aviation Engineering Report (D001) ” as an OGC Engineering Report.
 - There was no objection to unanimous consent
- This Testbed-16 Aviation Engineering Report (ER) summarizes the implementations, findings and recommendations that emerged from the efforts of further advancing interoperability and usage of Linked Data within the Federal Aviation Administration (FAA) System Wide Information Management (SWIM [https://www.faa.gov/air_traffic/technology/swim/]) context.

GeoPackage SWG

Closing Plenary Report

Jeff Yutzler

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- The GeoPackage SWG recommends that the OGC Technical Committee approve release of OGC 20-019 “OGC Testbed-16: GeoPackage ER” as an OGC Engineering Report.
 - NOTUC
- The participants developed ways to:
 - Improve the performance of extremely large GeoPackages so that the format itself is no longer the limit on the size of datasets that can be distributed, and
 - Improve the interoperability of GeoPackages through better metadata
 - See next slide for details

EO Exploitation Platform Closing Plenary Report

Chris Lynnes

Cristiano Lopes

117th OGC Member Meeting
Virtual | 11 December 2020

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To continue the work on a Best Practice for EO Application Packages (and related interfaces) based on the outcomes of past IP Initiatives.



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- 1) Welcome & Introduction
Chairs – 5m
- 2) Testbed 16 - Data Access and Processing Engineering Report (20-016): Presentation and Motion
Panagiotis (Peter) Vretanos, Cubewerx - 10m
- 3) Testbed 16 - Data Access and Processing API Engineering Report (20-025): Presentation and Motion
Luis Bermudez, Geosolutions - 10m
- 4) Testbed 16 - DGGS Server (
Andrea Aime, Geosolutions - 5m
- 5) Testbed 16 - Earth Observation Application Packages with Jupyter Notebooks (20-035): Presentation and Motion
Christophe Noel, Spacebel, 10m
- 6) Testbed 16 - Analysis Ready Data Engineering Report (20-041): The concept and the usage with OGC
Joan Masó, UAB-CREAF – 15m
- 7) Highlights and learnings from the 2nd New Space workshop
Bart De Lathouwer, OGC - 10m
- 8) Execution Scenarios for Earth Observation Applications: from Notebooks to Exploitation Platforms
Fabrice Brito, Terradue, 20m
- 9) AoB (buffer) – time left

- Discussion topics

- Jupyter Notebooks are omnipresent
- T16 EOC: DAPA (like EDR) demonstrated the need for community driven “convenience APIs”
- T16 ARD/New space workshop: The need for interoperability for data analysis

- Upcoming deliverables

- 4 ERs from T16 to be approved
- Best Practice for EO Application Package

- Coordination (ongoing and planned)

- API – Processing
- Common Workflow Language (CWL)
 - see related presentation at Closing Plenary

- Future meetings

- Member Meeting March '21
- In-between - calls to be organized.

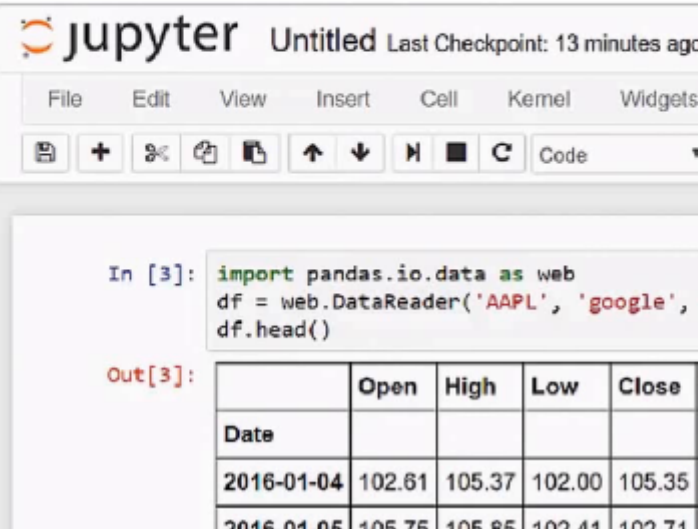
Key activities - Jupyter Notebooks are omnipresent

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Project is about Jupyter Notebook...

A **Notebook** is an web-based interactive programming interface:

- Code can be **edited**
- Execution on the fly



The screenshot shows a Jupyter Notebook titled 'Untitled' with a menu bar (File, Edit, View, Insert, Cell, Kernel, Widgets) and a toolbar. The code cell contains the following Python code:

```
In [3]: import pandas.io.data as web
df = web.DataReader('AAPL', 'google',
df.head()
```

The output cell shows the following table:

Date	Open	High	Low	Close
2016-01-04	102.61	105.37	102.00	105.35
2016-01-05	105.75	105.85	102.41	102.71

Application demonstration on Binder



- Binder builds the same python environment as the application except for the addition of the ipykernel module (enabling the notebooks with a python kernel)
- Binder hub provides users with a jupyter lab instance with a customised environment ready to run the notebooks available in the git repository

Key activities – DAPA as a “convenience API”

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Spectrum of processing in OGC

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- Processing within the OGC can be viewed as a spectrum...
- Where does DAPA fit in this spectrum?

OGC API Processes
that enabled any
process to be
deployed on the Web.

DAPA and other APIs (e.g.
EDR) built for communities of
interest where rich, integrated
functionality and ease-of-use
are important.
We sometimes call these
“convenience APIs” in OGC.

Specialized processing
deem generally
important with
dedicated APIs (e.g.
Maps, Routing)



“Peter Vetrano”

Within OGC there is a “spectrum” of
process from the most general at the left
to the most specific at the right.

At the left we have OGC API Processes that
allows any process at all to be deployed on
the web and invoked using a standard
interface.

At the right we have OGC API – Maps and
OGC API Routes which have been deemed
by the membership to be “important”
processes and for which a custom APIs
have been designed

In the middle we have a class of processes
that are important to a specific group of
people. The APIs in this range are built
taking into account functional
requirements and easy of use of the
community for which they are designed.



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Key activities – Interoperability in Data Analysis OGC

Overall

The 2 workshops create a lot of insight and enthusiasm

The New Space community really brings together a rich set of data/information, both wide and deep, from sensors high and low.

The only way that these datasets can be combined is through standardization (this includes processing)
-> OGC is the place to go

We have plans to deep-dive into New Space in 2021

<https://www.ogc.org/ogcevents/ogc-new-space-workshop-europe>



Recommendations

CEOS

• While the **CEOS** is capable of mobilizing the satellite ARD producers and the satellite industry and companies,

• **CEOS** is continuously push for an ARD that is **content ready**

OGC

• **OGC** can bring his experience of government, industry and academy in developing standard services to make data discoverable, accessible, interoperable and reusable.

• **OGC** is continuously working for standards and tools that contribute to make ARD **technically ready**

- The EO Exploitation Platform DwG recommends that the OGC Technical Committee approve release of OGC 20-016 – “OGC Testbed-16: Data Access and Processing Engineering Report” as a public OGC Engineering Report.
 - There was no objection to unanimous consent.
- This ER describes the work performed in the Data Access and Processing API (DAPA) thread, related to the development of methods and apparatus that simplify access to, processing of, and exchange of environmental and Earth Observation (EO) data from an end-user perspective. DAPA uses a simple invocation pattern that makes use of the HTTP GET method with query parameters, as a result, a DAPA request can be easily embedded in many environments including a Jupyter notebook.

- The EO Exploitation Platform DwG recommends that the OGC Technical Committee approve release of OGC 20-025 – “OGC Testbed-16: Data Access and Processing API Engineering Report” as a public OGC Engineering Report.
 - There was no objection to unanimous consent.
- This document describes the work performed in the Data Access and Processing API (DAPA) thread, where the Testbed 16 explored the development of an API, based on an end-user centric perspective, to improve data retrieval and processing. The development and use of a user centric API has significant business value. The user, by using a client, can save valuable time if the client is making function calls instead of accessing multiple generic web services or local files. This API definition can inform future standardization work in the context of end-user centric data retrieval and processing APIs.

- The EO Exploitation Platform DwG recommends that the OGC Technical Committee approve release of OGC 20-035 – “OGC Testbed 16 - Earth Observation Application Packages with Jupyter Notebooks Engineering Report ” as a public OGC Engineering Report.
 - There was no objection to unanimous consent.
- This ER describes the results and experiences from the “Earth Observation Application Packages with Jupyter Notebook” task in Testbed-16. The task extended the “Earth Observation Applications architecture” developed in other IP initiatives, with support for shared and remotely executed Jupyter Notebooks. The task worked in cooperation with the DAPA task and explored Joint-TIEs.

- The EO Exploitation Platform DwG recommends that the OGC Technical Committee approve release of OGC 20-041 – “OGC Testbed-16 Analysis Ready Data ER” as a public OGC Engineering Report.
 - There was no objection to unanimous consent.
- This document analysis and generalizes the ARD concept and studies its implications for the OGC Standards baseline. In particular, the ER analyses how modern federated data processing architectures applying data cubes and Docker packages can take advantage of the existence of ARD.

The Committee on Earth Observation Satellites (CEOS) defines Analysis Ready Data (ARD) for Land (CARD4L) as "satellite data that have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort and interoperability both through time and with other datasets".

EDM DWG Closing Plenary Report

Don Sullivan

117th OGC Member Meeting

Virtual | 11 December 2020

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The most important things for this WG are:

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Get sponsors for Disaster Pilot '21

Coordinate with GeoAI WG



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- Call for Sponsors for Disaster Pilot '21
- Josh Lieberman, OGC
 - CDS Foci:
 - EO Cloud Platform, the two ends: get data off the satellite, get it to the users (ARD/DRD), edge computing - -Support already committed by USGS/FGDC, ...
 - Health SDI: Pandemics, COVID, hunger, respiratory ...
 - Complicating factors
 - PeruSAT
- Testbed-16 ML Training Dataset ER
- Guy Schumann, RSS-Hydro
- Motion to release ER passed
- Converging Geotemporal analysis with AI to mitigate strike tree risks of forest fires and power outages
- Mike Flaxman, OmniSci – Presentation was cut short due to an error by OGC staff – our apologies ! Complete presentation is on the portal
 - Great data source: California Forest Model ?

- The EDM DWG recommends that the OGC Technical Committee approve release of OGC 20-018 “OGC Testbed-16: Machine Learning Training Data ER” as an OGC Engineering Report.
 - There was no objection to unanimous consent
- The T16 ML Training Data ER describes training data used for developing a Wildfire Response application - it discusses the challenges and makes a set of recommendations. The two scenarios for the wildfire use case outlined include fuel load estimation and water body identification. The ER includes suggestions for future work on a model for metadata of ML training datasets, which is intended to provide vital information on the data and therefore facilitate the uptake of training data by the ML community.

- We are going to have a GREAT Disaster pilot in 2021 !!!

Discrete Global Grid Systems Domain Working Group Closing Plenary Report

Dr Matthew B.J. Purss

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Virtual | 11 December 2020

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The delivery of the OGC Testbed 16 DGGS and DGGS API Engineering Report has been a significant achievement for both the DGGS Domain and Standards Working Groups. It has helped to widen the exposure of DGGS technologies and demonstrate their flexibility and ability to easily and efficiently integrate with conventional geospatial infrastructures.

The outcomes of this work have laid the foundations for the implementation and specification of OGC DGGS APIs



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1. Introduction & Logistics (Chair)
2. Discussion & Review of the OGC Testbed 16 DGGs Engineering Report (Robert Gibb)
 - a. <https://portal.ogc.org/files/95608>
 - b. We will table and consider a Motion to request the TC release this ER to the public.
3. Presentation of DGGs Client Application developed under OGC Testbed 16 (Byron Cochrane)
4. Presentation of OGC Testbed 16 Engineering Reports (Panagiotis (Peter) A. Vretanos)
 - a. **OGC Testbed-16: Data Access and Processing Engineering Report** (editor: Panagiotis Vretanos)
https://portal.ogc.org/files/?artifact_id=95582&version=1
 - b. **OGC Testbed-16: Data Access and Processing API Engineering Report** (editor: Luis Bermudez)
https://portal.ogc.org/files/?artifact_id=95593&version=1
 - c. **OGC Testbed-16: Earth Observation Application Packages with Jupyter Notebooks** (editor: Christophe Noël)
https://portal.ogc.org/files/?artifact_id=95569&version=1
5. Other Business (Chair)

- Discussion topics

- OGC Testbed 16 DGGS & DGGS API ER
- DGGS related elements included in the OGC Testbed 16 Data Access and Processing ER, Data Access and Processing API ER and Earth Observation Applications Packages with Jupyter Notebooks Reports
- A Novel DGGS-centric concept for a Covid-19 Contact Tracing App that preserves people's privacy of location data.

- Upcoming deliverables

- Nil

- Coordination (ongoing and planned)

- Engagement with all relevant OGC API SWGs to help determine key patterns and structures for DGGS APIs to assist the DGGS SWG in its task of drafting the OGC API DGGS implementation standards.
- Engagement with the OGC Innovation Program to review outcomes from planned OGC DGGS API code sprints to be conducted in 2021.

- Future meetings

- Next Virtual Meeting – OGC March Members Meeting.
- Big Earth Data – Special Issue: “Global Reference Grids for Big Earth Data”
 - Paper submission deadline 1 March 2021

- OGC Testbed 16 DGGS and DGGS APIs Stream.
 - This work has laid the foundations for the DGGS SWG to begin scoping the drafting of OGC API DGGS Implementation Standards – with further guidance to come from OGC DGGS API Code Sprints to be conducted in 2021.
- Ongoing work to develop and implement the OGC DGGS Registry will continue into 2021, in close coordination with the OGC API DGGS activities.

- The DGGS DWG recommends that the OGC Technical Committee approve release of [OGC 20-039r2] “TestBed-16 DGGS and DGGS API ER (D017)” as an OGC Engineering Report.
 - There was no objection to unanimous consent
- This OGC Testbed-16 Engineering Report (ER) documents the needs and key requirements for drafting an OGC Application Programming Interface (API) standard for Discrete Global Grid Systems (DGGS). The draft DGGS API is documented using the OpenAPI 3.0 specification. The work documented in this ER represents the beginning of a multi-initiative process to fully realize the benefits of standards compliant DGGS implementations and to help drive adoption of DGGS as a key element to advanced Spatial Data Architectures. The Testbed participants investigated a ClientServer DGGS architecture involving one (or more) DGGS Server implementations, DGGS-enabled Data Sources and a simple front-end DGGS Client. DGGS API functionality will be tested using one (or more) simple use case scenarios focusing on the two-way translation between geographic locations and DGGS Zonal Identifiers.

Big Earth Data – Special Issue: “Global Reference Grids for Big Earth Data”

- This special issue aims to focus on recent progress and developments in the design, specification and application of global reference grid systems for Big Earth data. Submissions may be in the form of review/discussion papers, research papers, data papers or technical notes. Potential topics include (but are not limited to) the following:
 - Global tessellation methods
 - Geospatial data management using global reference grids
 - Discrete Global Grid Systems
 - International Standards and global reference grids
 - Global Reference Grids in practice
 - Data fusion and interoperability using global reference grids

Important Dates:

Paper Submission:	1 March, 2021
Decision to Authors:	1 May, 2021
Revised Paper Submission:	1 July, 2021
Publication:	September, 2021

[Instructions for Authors](#)

Please submit it through the [Taylor & Francis Submission Portal](#), ensuring that you select the appropriate Special Issue. Publication charges (APCs) will be waived for invited manuscripts submitted to Big Earth Data. Authors who need a waiver code should contact the Editorial Office (guanli@aircas.ac.cn) before submitting.

Data Quality DWG

Matt Beare, Ivana Ivánová, Sam Meek

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- Session 1 (10:00 - 10:40):
 - JSON encodings for ISO 19157, 19115: Examples of QualityML and MD_Lineage in the context of JavaScript map browser (Joan Masó)
 - Automated conversion of conceptual ISO schemas to JSON Schema (Johannes Echterhoff)
- *Comfort Break (10:40 – 10:50)*
- Session 2 (10:50 - 11:30):
 - Update on ISO 19157-1 revision (Ivana Ivánová)
 - Standardizing a framework for spatial and spectral error propagation (Kumar Navulur and Mark Abrams) - to include vote to recommend OGC publish discussion paper

- JSON Encodings for DQ

- Joan provided practical insight to an approach and associated considerations given to the use of JSON encodings to express Data Quality in the context of maps.ecopotential-project.eu.
- Joan made particular note of its viability, but that hand crafting the encodings was painful. Offering potential relief to this pain Johannes, illustrated techniques from the OGC UGAS-2020 Pilot for automating the creation of JSON encodings from UML models.
- Joan/Johannes to combine their understanding on the topic to hopefully offer further experience/guidance in future. We encourage others to express their interest in this topic also.

- ISO 19157 Revision

- Ivana shared knowledge of key focus areas for the revision team, developed in line with emerging ISO TC/211 good practice guide.
- The committee draft is approaching readiness for distribution for review (end Jan'21) and desire for DQ DWG to participate in feedback.
- Annex D to be replaced by separate ISO 19157-3 Data Quality Measures register, for compliance with ISO 19135-1. Creation of this new part 3 to the standard needs to be aligned with 19157-1 timescales for completion at end 2022.

- Error propagation discussion paper

- Kumar provided recap on previously presented paper on standardizing a framework for spatial and spectral error propagation, noting some of the feedback received from OGC since March.
- Motion to recommend its publication as a discussion paper was passed, formal confirmation of which is on next slide

- The Data Quality DWG recommends that the OGC Technical Committee approve the release of **OGC 20-088 “Standardizing a Framework for Spatial & Spectral Error Propagation”** as an **OGC Discussion Paper**.
 - There was no objection to unanimous consent

Compliance Interoperability & Testing Evaluation (CITE) Sub-Committee (SC)

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Motion to advance the Executable Test Suite for the Observations and Measurements (O&M) XML 2.0 standard from Beta to Production status.

- Production Status
- Beta Status
- O&M 2.0
- Discussion on CITE modernization

- Discussion topics
 - O&M 2.0 ETS
 - CITE Modernization:
 - Dependency management
 - Alternate tools
 - CITE backlog prioritization

- Upcoming deliverables
 - NSTR

- Coordination (ongoing and planned)
 - None planned

- Future meetings
 - Spring 2021 Member Meeting

- The CITE SubCommittee recommends that the Technical Committee approves the Executable Test Suite (ETS) of the Observations and Measurements (O&M) XML 2.0 standard as an official OGC Compliance Test Package. Upon passing of this motion, the ETS will be moved from the Beta instance of TEAM Engine to the Production instance.
 - This motion initiated a discussion on how ETS development is prioritized (see slide 8)
 - At the time of this motion, there is 1 early implementor that has been certified compliant.
- Result: There was no objection to unanimous consent

- Issue:

- TeamEngine was originally developed in 2005.
- Many dependencies are obsolete and no longer supported.
- Each ETS brings additional (sometimes conflicting) dependencies
- This drives development and maintenance costs.

- Conclusions:

- While this issue is well understood the options are limited:
 - Do a complete overhaul of the TeamEngine source
 - Modularize TeamEngine so that each module has its' own set of dependencies.

- Issue:
 - What other Test Harnesses are there that could support OGC compliance testing?
- Conclusions:
 - The INSPIRE test suite was mentioned, but may not be any better
 - Developers do their own in-house testing. Are any of those tools worth investigating?

- Issue:
 - Why did we develop an ETS for an old standard which could only attract one implementor?
- Conclusion:
 - We need to do a better job of prioritizing the backlog. Focus on standards which have an identified implementor community and known need for the ETS. Input from the SWGs is vital for capturing this information.

Architecture DWG Closing Plenary Report

Joan Masó, Gobe Hobona

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Whenever OGC API SWGs have a requirement to represent schemas, they should use JSON Schema.

- Motion to approve the UGAS-2020 Engineering Report
 - DWG Chair
- Testbed-16 OpenAPI Engineering Report
 - Sam Meek (Helyx)
- Sensor Things API in Citizen Science – straight forward?
 - Andreas Matheus (Secure Dimensions)
- SDI Modernization CDS
 - Joshua Lieberman (OGC)

- Testbed-16 DGGs and DGGs API Engineering Report - Robert Gibb (Landcare Research NZ)
- Draft OGC API SWG Coordination Report for November 2020
- Discussion on in-progress and to-do issues
 - Resource Path Discussion ([ogcapi-common#74](#))
 - Clarify whether OGC API-Tiles supports coverages ([ogcapi-tiles#52](#))
 - Clarify how OGC API-Tiles supports feature data ([ogcapi-tiles#50](#))
 - Clarify Filter and CQL usage ([ogcapi-maps#51](#))
 - Clarify how styles will be applied ([ogcapi-maps#52](#))
 - Clarify how OGC API-Tiles supports maps ([ogcapi-tiles#51](#))
 - Clarify how OGC API-Processes receives vector feature data from implementations of OGC API – Features ([ogcapi-processes#91](#))
 - Visualizing the payload from an implementation of OGC API - Features or the EDR API ([ogcapi-maps#53](#))

- Discussion topics

- Conversion between UML and OpenAPI definition documents
- A role of the SensorThings API in Citizen Science applications
- Potential future work for modernizing Spatial Data Infrastructure
- Coordination topics between OGC APIs for Tiles, Maps, Styles, and Features

- Coordination (ongoing and planned)

- OGC API SWGs
- Modernizing SDIs CDS

- Upcoming deliverables

- December 2020 OGC API Coordination report for OAB

- Future meetings

- Web meeting
- Next Member's Meeting

- Provision of a discussion and coordination platform for the different OGC API SWGs

- The Architecture DWG recommends that the OGC Technical Committee approves the formation of the OGC Features and Geometries JSON Standards Working Group as described in the Charter (OGC 20-086).
- Result: There was no objection to unanimous consent.

- The Architecture DWG recommends that the OGC Technical Committee approve release of OGC 20-012 “UML-to-GML Application Schema Pilot (UGAS-2020) Engineering Report” as an OGC Public Engineering Report.
 - There was no objection to unanimous consent
- This Engineering Report documents results of the UGAS-2020 Pilot. It describes the following: UML to JSON Schema Encoding Rule; Features Core Profile of Key Community Conceptual Schemas; Using SHACL for Validation of Linked Data; Generating OpenAPI definitions from an application schema in UML.

- The Architecture DWG recommends that the OGC Technical Committee approve release of OGC 20-033 “OGC Testbed-16 OpenAPI Engineering Report” as an OGC Public Engineering Report.
 - There was no objection to unanimous consent
- This OGC Testbed 16 Engineering Report (ER) documents the two major aspects of the Testbed 16 OpenAPI Thread. These are: A UML metamodel that describes OpenAPI and a profile of that model to describe OGC OpenAPI - Features - Part 1:Core; An implementation of a transformation procedure in the Shapechange open source software designed to transform the OGC API - Features Part1:Core model and transform it from a UML representation into an OpenAPI 3.0 document.

- The DGGS DWG recommends that the OGC Technical Committee approve release of [OGC 20-039r2] “TestBed-16 DGGS and DGGS API ER (D017)” as an OGC Engineering Report.
 - There was no objection to unanimous consent
- This OGC Testbed-16 Engineering Report (ER) documents the needs and key requirements for drafting an OGC Application Programming Interface (API) standard for Discrete Global Grid Systems (DGGS). The draft DGGS API is documented using the OpenAPI 3.0 specification. The work documented in this ER represents the beginning of a multi-initiative process to fully realize the benefits of standards compliant DGGS implementations and to help drive adoption of DGGS as a key element to advanced Spatial Data Architectures.

Testbed 16 Engineering Reports

Testbed 16 Engineering Reports to be considered

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Engineering Report	Recommending WG	Discussion	Approved
OGC 20-019 Testbed-16: GeoPackage ER	GeoPackage SWG		
OGC 20-027 Testbed-16 Federated Security ER	Security DWG		
OGC 20-036 Testbed-16 FMV to Moving Features ER	Moving Features SWG		
OGC 20-016 Testbed-16: Data Access and Processing ER	EOXP DWG		
OGC 20-025 Testbed-16: Data Access and Processing API ER	EOXP DWG		
OGC 20-035 Testbed 16 - Earth Observation Application Packages with Jupyter Notebooks ER	EOXP DWG		
OGC 20-041 Testbed-16 Analysis Ready Data ER	EOXP DWG		
OGC 20-020 OGC Testbed-16: Aviation ER	Geosemantics DWG		
OGC 20-018 Testbed-16: Machine Learning Training Data ER	EDM DWG		
OGC 20-033 Testbed-16 OpenAPI ER	Architecture DWG		
OGC 20-039r2 TestBed-16 DGGS and DGGS API ER	Architecture DWG, DGGS DWG		



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- The TC Chair recommends that the OGC Technical Committee approve release of all Testbed 16 Engineering Reports listed in the table presented in this Closing Plenary as OGC Public Engineering Reports.
 - There was no objection to unanimous consent
- See Working Group reports for abstracts and Working Group discussion

Closing Plenary – No Motions

Scott Simmons

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3DIM DWG Closing Plenary Report

D Graham, F Biljecki, C Rönsdorf

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Advances in 3D visualisation



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- Relevant Standards and Initial Model for a Canadian National Building Data Layer, Josh Lieberman
- CityGML Quality ADE, Volker Coors
- Experience of working with i3s and 3D Tiles, Ib Green
- OGC ISG Sprint, Scott Serich
- Location Powers: Urban Digital Twins, Scott Simmons

- Discussion topics

- Building layer, next steps
- CityGML Quality ADE
- ISG and loaders.gl tile conversion

- Upcoming deliverables

- None

- Coordination (ongoing and planned)

- <other WG>
- <other SDO>
- <other organization>

- Future meetings

- Next TC

CDB SWG

Group Closing Plenary Report

Mike Lokuta; Carl Reed

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Citizen Science DWG

Closing Plenary Report

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Break silos in Cit Sci by adopting or adapting SensorThings API



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- SensorThing APIs and Earth Challenge
 - Landon C. Van Dyke (U.S. Department of State)
- s API extension for Citizen Science
 - Andreas Matheus (Secure Dimensions)
- TB16 Data Accessing and Process API (DAPA) & Earth Observation Application Packages (EOAP) with Jupyter Notebooks
 - Panagiotis (Peter) A. Vretanos (Cubewerx)

- Discussion topics

- How to extend STA to include CitSci needs
- We need to think beyond data sharing and allow for processing and manipulation of CitSci data. New OGC API for processes (DAPA) represent an opportunity.

- Upcoming deliverables

- STA4CS Best practice

- Coordination (ongoing and planned)

- STA SDG
- Architecture DWG

- Future meetings

- Member Meeting
- CitSciE

CityGML SWG Closing Plenary Report

C Nagel, S Smyth, C Rönsdorf

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Coverages DWG & SWG

Closing Plenary Report

Stephan Meißl, Peter Baumann

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Get “OGC API – Coverages Part 1: Core” ready for public RFC



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- Modular OGC Workflow Demo, Jérôme St-Louis, Ecere
- O&M V3 Update - What's New?, Kathi Schleidt, DataCove.eu
- Data Access and Processing API - Testbed-16 results, Peter Vretanos, et al., Cubewerx, et al.
- Review and discussion of Issues on the SWG OAPI-Coverages GitHub repository

- Discussion topics

- How to fix published CIS 1.1 examples
<https://github.com/opengeospatial/ogcapi-coverages/issues/102>

- Upcoming deliverables

- OGC API – Coverages Part 1: Core

- Coordination (ongoing and planned)

- CoveragesJSON work item
- ZARR as potential community standard

- Future meetings

- Weekly calls on Wednesdays 9am ET / 3pm CET

CRS Joint DWG/SWG Closing Plenary Report

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Should the CRS Domain Working Group undertake a project to standardize a JSON schema encoding of the coordinate reference description? A JSON version of CRS WKT...

- Reports from CRS DWG project teams established 2020-06
 - Deformation model functional model project progress
 - Gridded geodetic data exchange format project progress
- ISO Metadata amendments – status discussion
- JSON encoding of CRS WKT

- Discussion topics

- Status of DWG subgroup work
 - Deformation grid functional model
 - Deformation grid exchange format
- Status of ISO Metadata updates affection CRS
- Overview of JSON schema encoding used in the open source PROJ implementation

- Upcoming deliverables

- Draft Deformation grid functional model
- Draft Deformation grid exchange format
- Updated ISO Metadata documents

- Coordination (ongoing and planned)

- In coordination with ISO, complete ISSO metadata updates, then move those updates into the OGC Metadata documents – approx. March 2021

- Future meetings

- Continue Deformation Grid meetings every two weeks – project teams alternate meetings – See OGC calendar for Monday meeting schedule:
 - Deformation grid functional model
 - Deformation grid exchange format

- Anticipate an update to OGC Metadata standards to stay in sync with anticipated agreement to ISO updates. Expected in February/March 2021 timeframe – OGC process will run faster than ISO
- Start an online discussion of JSON schema for CRS description to gauge interest and if high, can a project team be pulled together?

Data Preservation DWG Closing Plenary Report

Joan Maso

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EU eArchiving specifications for Geodata
as an OGC Community standard



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- EU eArchiving specifications for Geodata as an OGC Community standard
 - Gregor Završnik (GEOARH)
- ISO 19165 promotion website
 - Joan Masó (UAB-CREAF)
- Discussion
 - All

- Discussion topics

- What is the right version to bring into the OGC process
- Who in the OGC will propose the Work Item? (we need three of them at least)
- How to collaborate in the call for participation in the original source

- Upcoming deliverables

- Document to move

- Coordination (ongoing and planned)

- OWS Context SWG
- ISO 19165

- Future meetings

- Next members meeting
- Telecons to make progress



Specification for the E-ARK Content Information Type Specification for digital geospatial data records archiving (CITS Geospatial)

The GeoCITS v 2.0.4 is an updated version of the specification, defining the approach to preserve digital geospatial records. It describes what elements need to be preserved in order to ensure future reuse of geospatial records and enable creation of information products that are based on those records. Key changes in this version include a revised structure of geodata elements and its placement within the eArchiving Information Package, additional examples of possible formats and technical standards to define representation information and documentation.

PDF: [13. Draft CITS Geospatial v2.0.4.pdf](#)

The questions we want you to answer in your feedback are the following:

- This document is a first draft version of version 2.1, is there anything missing that should be included?
- Does the document need more detail for you to understand the specification and the standards it is built upon, and what specifically?
- Can you aid us with examples of the formats and standards you use when transferring geospatial records?
- Do you have any further comments regarding CITS Geospatial data? Make these as comments in the pdf and upload these to us when replying to the survey

Your feedback can be entered here: https://ec.europa.eu/eusurvey/runner/Geospatial_data

**Chance to contribute
before January 17th**

D&I DWG

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- The D&I DWG recommends that the GeoPackage SWG update its charter to include work on a 3D Model Extension to the GeoPackage encoding standard.
 - There was no objection to unanimous consent

- D&I DWG to agree to take responsibility to coordinate validation and growth of the Sensor Integration Framework (SIF) in conjunction with the SWE DWG and GeoSemantics DWG.
 - There was no objection to unanimous consent

OGC Energy & Utilities DWG

Eddie Oldfield, Jessica Webster

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Finalizing BEMA-CDS and recommending to TC early in New Year

Informing Interoperability Pilots/Demonstrations
and concept development of Energy SDI

Engaging with more utilities

- Intro, welcome
- Recap of BEMA CDS and key findings
- Review of Validation Webinar findings
- Gaps, Challenges, Opportunities Identified
- Discussion – next steps
- Close

BEMA CDS: Building Energy Mapping and Analytics Concept Development Study

- Discussion topics

- BEMA CDS findings
- Next Steps toward developing energy SDI / CEE Map

- Upcoming deliverables

- BEMA CDS

- Coordination (ongoing and planned)

- Planning E&U DWG sessions for 2021, coordination with other DWG/SWG chairs as needed

- Future meetings

- We anticipate holding next meeting in the first Quarter of 2021.

GeoPose SWG

Closing Plenary Report

Christine Perey, Jeremy Morley, and Jan-Erik Vinje

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GeoXACML SWG

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Andreas Matheus

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IndoorGML SWG

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Ki-Joune Li, Pusan National University

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IoT in Agriculture

Karel Charvát

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Part 1 – 20 00 – 21 30 CET (Room B)

- Karel Charvát (Plan4all) – Introduction to the section, the role of IoT in Agriculture
- Hylke van der Schaaf (Fraunhofer IOSB) – OGC SensorThings API v1.1 Update
- Kathi Schleidt (DataCove e.U.) – API4INSPIRE
- Michal Kepka (BOSC) – SensLog – an interoperable solution for sensor data
- Ondrej Vesely (Flowerchecker) – Plant identification AI technology in agriculture
- Dr. Corentin Dupont (WAZIUP) – Affordable IoT Solution for African Agriculture
- Vojtech Lukas (Mendel University) – Introduction to on-the-go crop sensors for variable-rate fertilization

Part 2 – 22 00 – 23 30 CET (Room C)

- Gottfried Pessl (Pessl Instruments GmbH)- Introduction to Pessl Instruments
- Nikolaos Kalatzis (NEUROPUBLIC) – The gaiasense smart farming solution; evaluating data interoperability approaches
- Antonín Kubíček, Marek Šplíchal (Lesprojekt) – Introduction to Agronode
- Åke Sivertun (RISE Research Institutes of Sweden) – Use of UAV and IoT for Agriculture in the Cellular and UAV Innovation zone Sweden
- Raul Palma (Poznan Supercomputing and Networking Center) – Generating RDF views over IoT data sources

IoT data IoT data (Internet of Things) relates to the information collected by connected devices — sensors, wearables, and other devices.

Characteristics:

- Generated from a variety of data sources
- Potentially massive volumes of intermittent data streams
- Predominantly time-series (series of data points in time order)
- Produced as streams (real-time) or batches
- Diverse underlying structure and schema

IoT in Agriculture – Large potential of IoT in following domains



- Horticulture, viticulture
- Arable Farming
- Animals
- Forestry
- Fishery
- Food industry
- Wood Industry
- Logistic

- Return of Investment
- FAIR principles - discovery
- Easy to use
- Trust and security
- Standardization
- Key role for future Digital Twins for Agriculture



A standard for exchanging sensor data and metadata















- Historic data & current data
- Proven data model
 - ▣ Sensor Web Enablement: started at NASA ~1990, in OGC since 2001
 - ▣ Observations and Measurements model (OGC 10-004r3, ISO/DIS 19156)
- RESTful + JSON Encoded
 - ▣ Powerful querying mechanism (based on OASIS Odata)
- Supporting ISO MQTT messaging
- Easy to use & understandable
- Discoverable with just a web browser

How does it work?

- Part 1: Data model
 - Which entities exist
 - How are they linked
- Part 2: URL patterns for queries
 - How do I get & search data
 - How do I add data
 - How do I modify data
 - How do I delete data

Implementations

- Several Open & closed source implementations

52 North GmbH Top ▲		
52N Sensor Web REST API 2.x 🔗	 Jirka, Simon	Registered: 2016-08-10
Fraunhofer-Gesellschaft Top ▲		
FROST-Server 1.10 🔗	 Hylke van der Schaaf	Registered: 2016-08-10
FROST-Server 1.12.x 🔗	 Hylke van der Schaaf	Registered: 2016-08-10
 OGC SensorThings API Part 1: Sensing 1.0 (Certified: 2020-11-01)		
Geodan Holding BV Top ▲		
GOST 0.3 🔗	 Bert Temme	Registered: 2016-11-28
GOST 0.6 🔗	 Bert Temme	Registered: 2018-01-10
GOST 0.6.1 🔗	 Bert Temme	Registered: 2020-01-28
 OGC SensorThings API Part 1: Sensing 1.0 (Certified: 2020-01-30)		
Institute of Communication and Computer Systems Top ▲		
SensorThings 1.0 🔗	 MariaKrommyda	Registered: 2019-05-30
 OGC SensorThings API Part 1: Sensing 1.0 (Certified: 2019-06-06)		
PilotGaea Technologies Co., Ltd Top ▲		
PilotGaea GIS 11.0 🔗	 Li, Yashu	Registered: 2020-01-07
 OGC SensorThings API Part 1: Sensing 1.0 (Certified: 2020-02-11)		
SensorUp Inc. Top ▲		
SensorUp SensorThings API v1.0 🔗	 Steve Liang	Registered: 2016-02-29
SensorUp SensorThings API v1.0 🔗	 Steve Liang	Registered: 2016-02-29

<https://www.ogc.org/resource/products/byspec/?specid=772>



- Implemented under the ISA² ELISE Action
 - European Location Interoperability Solutions for e-Government
- Based on demand
 - Requested by MS at the ISA² working group on geospatial solutions
- Novel approach
 - Providers on board
 - Learning from hands-on experiences
- Tasks
 - Evaluation Methodology
 - Benefits & Efforts
 - Deployment Strategies for
 - OGC API - Features
 - OGC SensorThings API
 - Deployment of API endpoints



- Senslog
- Gaiasense
- Plant.id
- Waziup IoT Cloud Platform
- AfarCloud Platform

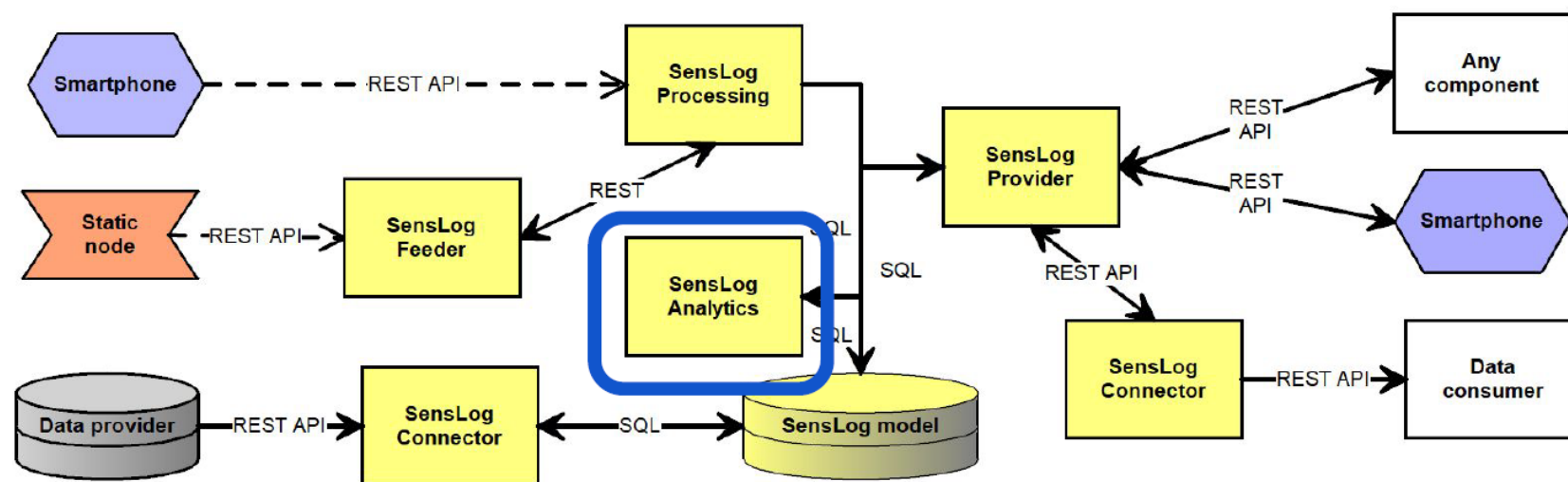


Senslog - an interoperable solution for sensor data

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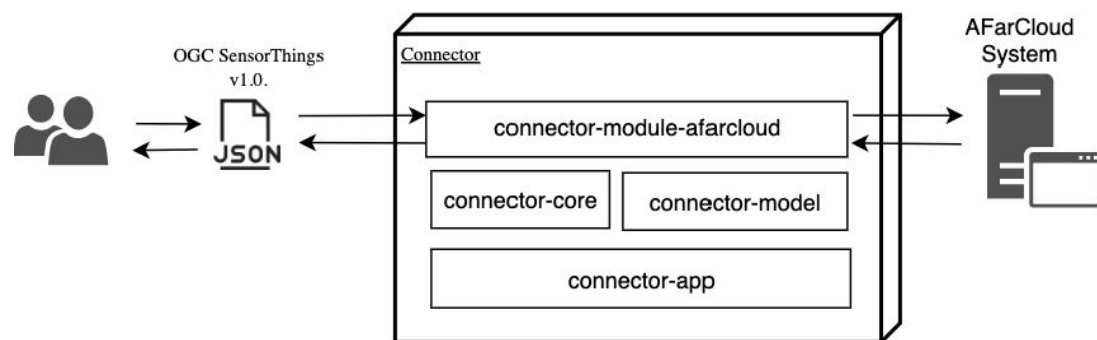


- Web-based & cloud-based data management application for:
 - storing, managing, processing and publishing sensor data
- Static in-situ sensors, deployed on mobile carrier, collected by smart devices
- Provides REST API for both sides of chain – data producers and data consumers
- Data Storage in a RDBMS with spatial extension – can provide variety of analytical services
- Utilization of standardized interfaces is an important step for data integration. Interfaces based on OGC SOS 1.0.0 and OGC SensorThingsAPI are being developed for SensLog Connectors



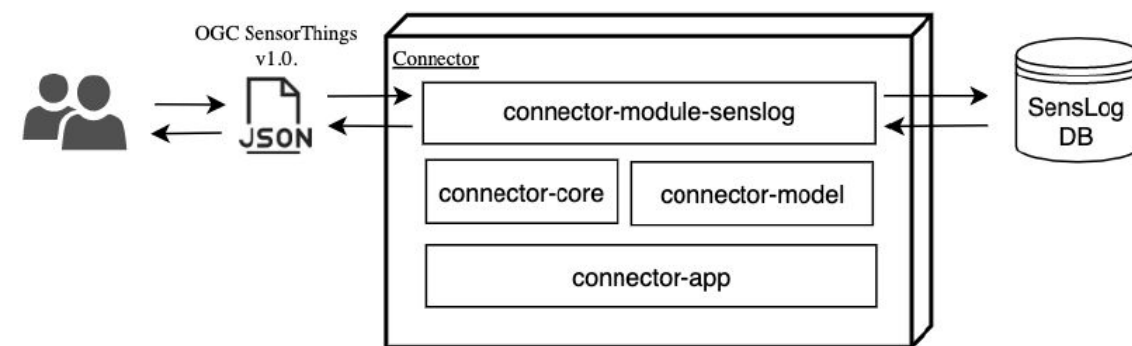
USE CASE 1: OGC SensorThingsAPI ↔ AFarCloud REST API

- Proxy version of the Connector - no storage between data exchange
- Services invoke services



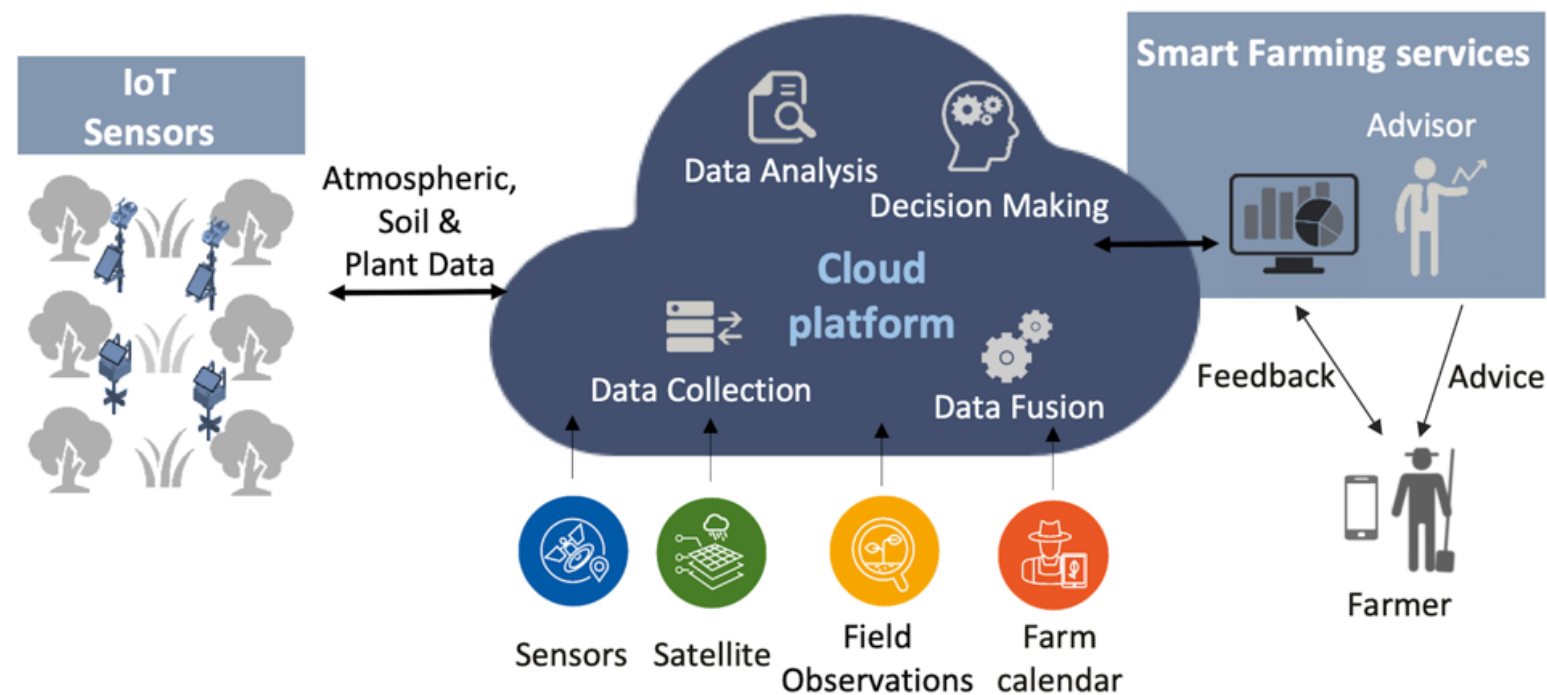
USE CASE 2: OGC SensorThingsAPI ↔ SensLog model

- Push and pull mode
- Services connected to the database



The “gaiasense” smart farming solution

- A technological solution offering a range of innovative **smart farming services** that provides **advice** to farmers based on **data collected** from the field.
- It is offered as **zero technological related investment** for farmers, making it accessible even to farmers with **small holdings**. – **Smart-Farming As a Service**
 - IoT sensors infrastructure owned and operated by the service provider.
 - Subscription based model – annual service per hectare



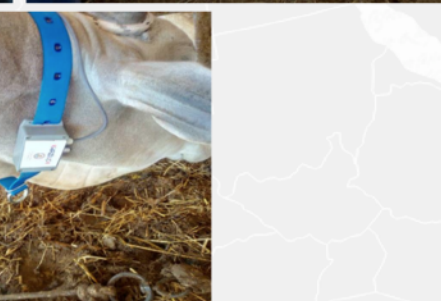
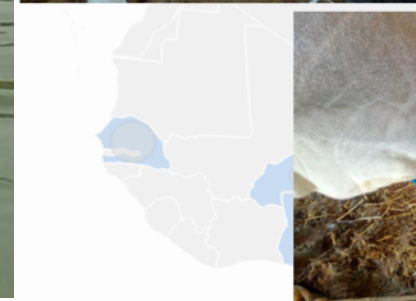
Gaiasense solution for SmartFarming

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	Aim	Based on
Smart Irrigation	<ul style="list-style-type: none"> • Definition of the critical minimum-maximum Soil Moisture limits • Definition of the most appropriate time for initiating the irrigation • Optimum irrigation dose calculation 	<ul style="list-style-type: none"> • Soil quality characteristics • Soil moisture measurements <ul style="list-style-type: none"> ▪ Real time - Different depths • Mapping of the active root system • Precise recording of precipitation and performed irrigations
Smart Fertilization	<ul style="list-style-type: none"> • Address precisely the nutritional needs of a given crop • Avoid excess or deficiency of nutrients 	<ul style="list-style-type: none"> • Soil sampling and analysis • Consideration of the specific crop's needs • Use of other data types (e.g. plant growth stage)
Smart Crop Protection	<ul style="list-style-type: none"> • Avoid unnecessary applications of pesticides • Ensure the timely application of pesticides 	<ul style="list-style-type: none"> • Precise recording of atmospheric conditions that favor the infection/infestation of a given crop, plants phenological stage, applied cultivation practices • Scientific models specialized for each pest / disease of a given crop and adapted to the microclimatic conditions of an area

WAZIUP: IoT Cloud platform

- Open API to manage devices, data and users
- Ready to use dashboard to manage the users and devices
- Develop your application using HTML/javascript with few click and host on Github
- Support simple Users interface for notifications (SMS, USSD, etc.)



Use of UAV and IoT for Agriculture: Data Collection

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Autonomous driving machines

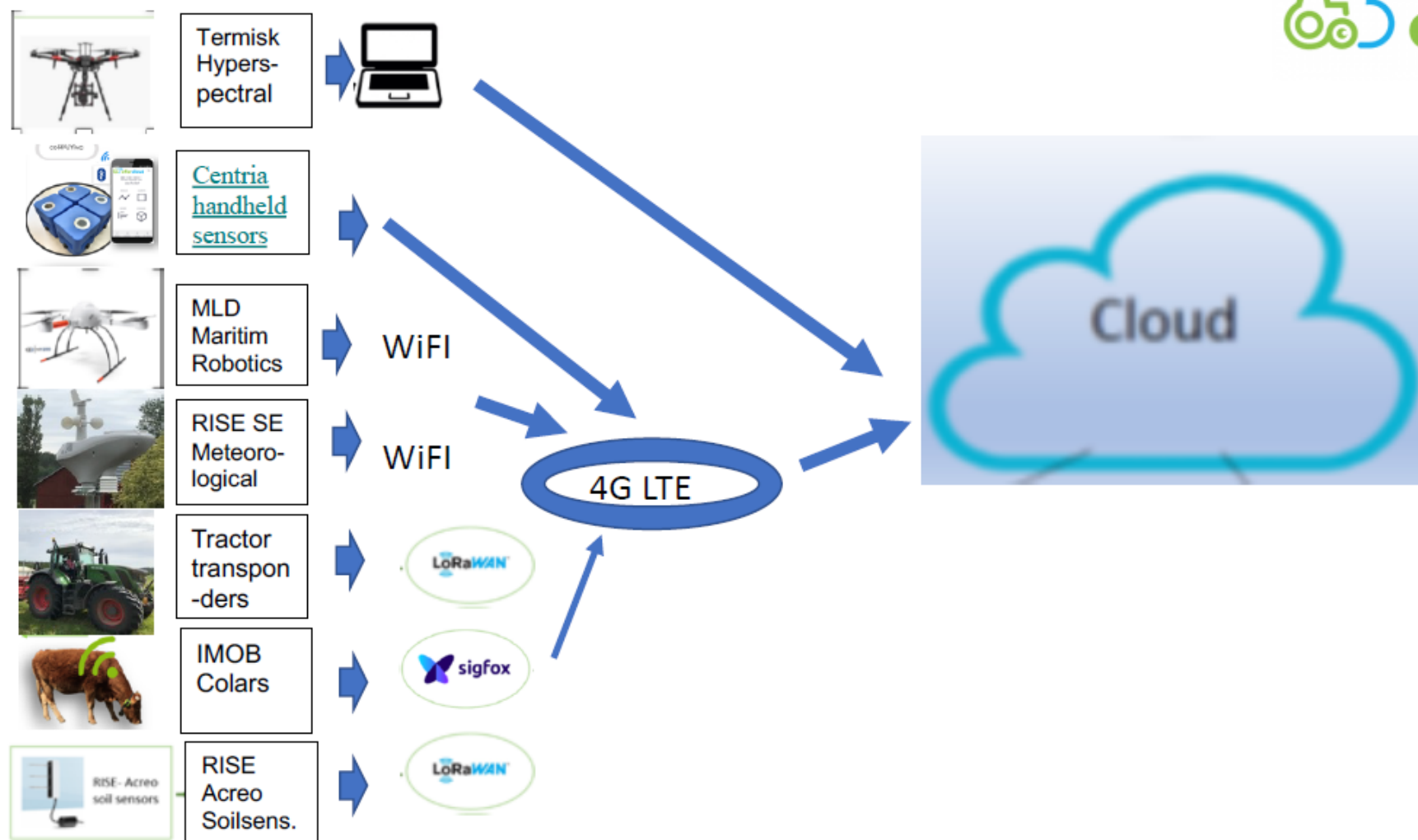


Autonomous UAVs with sensors



Soil, water, weather and UAV data as input in DSS for soil wetness and temperature in planning of agricultural activities and for sowing, additional services, irrigation and harvest

Communication from different devices to AfarCloud

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Examples of in situ sensors



Gaiasense



Waziup



Agronode

- First application - 2004
- Autonomous telemetry station with external sensors
- Data transmission through radio based on IoT technology
- Designed to collect, store and transmit wide variety of physical, chemical and other measurements from commercial sensors
- Open modular architecture
- Configurable by user



On-the-go crop sensors for variable-rate fertilization

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Yara N-sensor



Fritzmeier ISARIA



Trimble Greenseeker



Topcon CropSpec



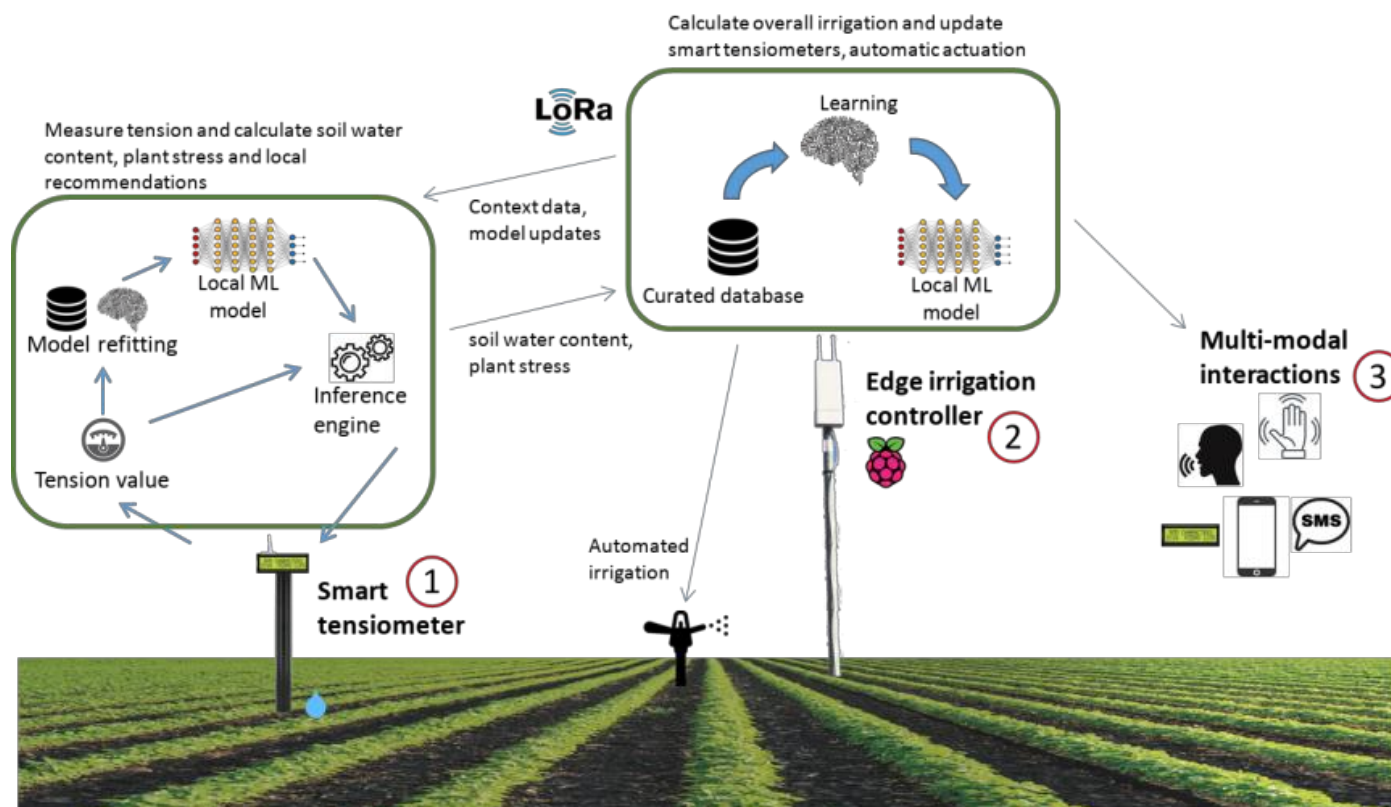
AgLeader OptRx



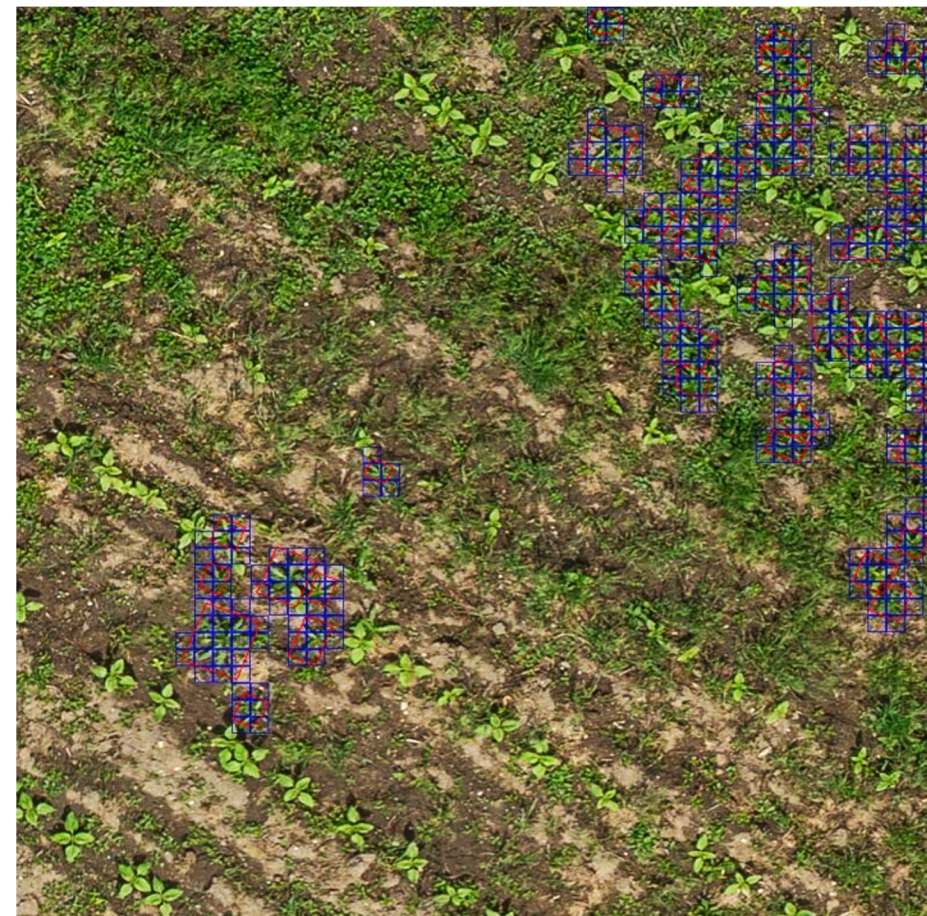
On-the-go crop sensors pros and cons

- On-the-go crop sensing is a practical solution for the diagnosis of the nutritional status of plants, necessary for the variable topdressing of nitrogen fertilizers during vegetation,
- The results of spectral measurements are comparable to remote sensing, but without restrictions on weather, light conditions and clouds occurrence,
- The limit for farmers is a higher purchase price, especially in the large farm enterprises with a higher number of applicators

AI enabled irrigation



AI for thistle detection



- Importance of IoT and sensor data in agriculture domain is growing (Meteorological stations, Soil probes, Groundwater monitoring, Indoor environment monitoring, Livestock monitoring - health status)
- Challenging integration of various data sources (Different interfaces, Different formats and encodings)
- IoT is empowered by Artificial Intelligence and Big Data
- IoT will play a **key** role for future Digital Twins for Agriculture
- On-the-go crop sensing is a practical solution for the diagnosis of the nutritional status of plants, necessary for the variable topdressing of nitrogen fertilizers during vegetation,
- The results of spectral measurements are comparable to remote sensing, but without restrictions on weather, light conditions and clouds occurrence,
- The limit for farmers is a higher purchase price, especially in the large farm enterprises with a higher number of applicators

Met Ocean DWG Closing Plenary Report

Chris Little, Steve Olson

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Virtual | 11 December 2020

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The most important thing for the Met Ocean DWG is... OGC

Getting EDR API published, socialized and more implementations



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- Intro, welcome, announcements
- Overview of OGC Standards work of interest:
 - WMS1.3 Best Practice and profiles: status, implementations, key Issues, plans. Chris Little, Met Office
 - TimeseriesML: status, implementations, key Issues, plan. Paul Hershberg, NOAA
 - WCS2.1 Met Ocean Application Profile: status, implementations, key Issues, plans. Pete Trevelyan, Met Office
 - EDR API: status, implementations, key Issues, plans. Chris Little, Met Office
- Data Formats
 - GRIB2: status, implementations, key Issues, plans. Enrico Fucile, WMO
 - NetCDF: status, implementations, key Issues, plans. Ethan Davis, Unidata
 - CoverageJSON: status, implementations, key Issues, plans. Chris Little, Met Office
 - IWXXM: status, implementations, key Issues, plans. Mark Oberfield, NOAA
- Overview of non-OGC work –
 - WMO Jeremy Tandy, Met Office
 - W3C SDW IG/WG. Linda van der Brink, Geonovum
 - INSPIRE & EU Projects. Roope Tervo, FMI
- Future work discussion
 - Weather Revolution recommendations, short discussion. Nadine Alameh
 - MetOcean DWG next steps: other DWGs , SWGs, TestBeds, hackathons, metadata, discussion. All
- Any Other Business
 - New Co-Chair needed

- Discussion topics

- Many Thanks to Frédéric Guillaud, stepping down as Co-Chair
- Documentation, examples, sandboxes for EDR API success
- Cross domain is the new normal
- Try to interest Met Ocean observation communities in APIs
- No perceived benefits of liaison with other SDOs beside W3C and ISO

- Upcoming deliverables

- API-EDR, 2020-12
- TimeseriesML, 2020-12
- CoverageJSON, 2021-12

- Coordination (ongoing and planned)

- OGC API-EDR implementers
- Outreach to WMO on APIs (e.g. WIS2.0 Discovery Pilot)
- Cross-domain Sprints (e.g. OGC/OSGeo/Apache sprint 2021Q1)

- Future meetings

- More regular web meetings
- Next Member Meeting: elect 3rd Co-Chair

- More regular, well advertised, recorded meetings
- Note API EDR uptake

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MUDDI SWG Closing Plenary Report

A Leidner, A Hughes, C Rönsdorf

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O&M SWG / JSON Kick-off

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Ilkka Rinne

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OGC API Common Closing Plenary Report

Joan Maso

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Point Cloud DWG

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Stan Tillman, Hexagon

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Are there any “geo” aspects of point clouds that should be standardized?

- Point Clouds for Situational Awareness and Digital Twins
 - Joshua Rentrop, InfoDao LLC
- Remaining time will be used to discuss what's next for the group.

- Discussion topics

- Point Clouds for Situational Awareness and Digital Twins
- What's next for the Point Cloud DWG

- Upcoming deliverables

- N/A

- Coordination (ongoing and planned)

- Interest in GeoVolume when it is formed

- Future meetings

- Next Member Meeting

- < Are there any upcoming events (e.g., conference papers) related to your WG that you would like OGC to promote? >
 - No
- <Is there a new project or outcome that you think is worthy of an article or blog post? Please add a short description.>
 - No
- <Have there been any articles published online/in magazines that reference the work your WG is doing?>
 - Point Cloud DWG article has been given to Lidar Magazine, but I am not sure when it will be published.

Portrayal DWG Closing Plenary Report

Keith Ryden

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The Styles and Symbology Encoding SWG is in need of a new Chair. Seeking interested/motivated individuals to fill the position.

- GeoPackage Testbed 16 - Portrayal prototype work and other relevant GeoPackage efforts - Jeff Yutzler
- Styles and Symbology Encoding SWG - update and chair position request – Olivier Ertz, Erwan Bocher
- Open Discussions:
 - Road Map for next year? What do we want to achieve in next 12 months?
 - Frequency of Meetings – at TC or do we want to meet outside of the TC?
 - Future presentations call

- Discussion topics

- GeoPackage Testbed work in the area of Portrayal
- Status of work in the Styles and Symbology Encoding SWG
 - Need for a new SWG Chair
- Open discussion of work plan in 2021
 - Significant discussion on how Portrayal is used across different display/rendering devices, and whether or not we are covering the needs of all use cases.

- Upcoming deliverables

- No immediate deliverables
- Working drafts of the Styles and Symbology Encoding standards are available – Olivier to upload URLs for people to access

- Coordination (ongoing and planned)

- With the GeoPackage SWG for evolution of Portrayal concepts in an GeoPackage Extension
- With the Styles and Symbology Encoding SWG to progress the work

- Future meetings

- March 2021 TC – Coordination with SWGs
- June 2021 TC – Portrayal “show and tell”

- Proposed that the Portrayal SWG undertake an effort to pull together glossaries and clarify terminology where domains use the same terms in different ways.
- Proposed that the March 2021 DWG focus on the status of work in SWGs:
 - Styles and Symbology Encoding SWG
 - GeoPackage SWG Portrayal work
- Proposed that the June 2021 DWG be a “show and tell” from software providers focusing on Portrayal and Symbology

SensorThings API SWG Closing Plenary Report

Steve Liang

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TimeseriesML SWG Closing Plenary Report

Paul Hershberg

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UxS/Aviation DWG

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Don Sullivan

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The most important thing for this WG is...

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The most important thing for this WG is the incredible dedication of it's members. For our WG presentations, we began at:

8:00 PM Tuesday, in Barcelona, Spain,

3:00 AM Wednesday, in Taichung, Taiwan,

And 9:00 PM Tuesday, in Cape Town, South Africa -

And EVERYBODY engaged whole-heartedly.



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- Testbed-16 Engineering Report about Full Motion Video to Moving Objects
- Emeric Beaufays, Hexagon
- The final results of the Aviation Task of Testbed-16
- Sergio Taleisnik, Skymantics
- Application of High Resolution Thermal Imaging with UAV
- Will Kuan and Lawrence Chao, GIS Feng Chia University
- Use of OGC standards in Marine Observation Platforms
- Enoc Martinez and Cristina Barrado, Universitat Politècnica de Catalunya (UPC)
- Using Web and Geospatial Standards to Automate Drone Data Operations
- Jane Wyngaard, University of Notre Dame/University of Cape Town
- Geo enabled Edge Computing
- George Percivall, OGC

- As usual, a packed to overflowing domain working group meeting resulted in much discussion after the excellent presentations.
- One discussion addressed SensorML in json (something more modern than xml), for low bandwidth wireless connections. EXI compression was mentioned to reduce sensorML size.
- It was noted that testbed 17 Call for Participation includes a "Web API for Aviation" work item:
- https://portal.ogc.org/files/?artifact_id=95726#Aviation

- Coordinate with ESIP and RDA Working Groups
- Expand on relationships developed during AGU, especially at the sUAS Town Hall
- Find a way to get these closing reports read, with the hope of creating greater engagement across disciplines.