INSPIRE

Infrastructure for Spatial Information in Europe

News from Standardisation Bodies

Type	Document for information and discussion
Creator	EC and EEA INSPIRE Team
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Identifier	**MIG/10/2019/DOC11**
Description	This documents summarises new developments and activities relevant to INSPIRE maintenance and implementation from the following standardisation bodies:
	• ISO/TC 211 • Open Geospatial Consortium (OGC) • World Wide Web Consortium (W3C)
actions:	MIG to: • Take note of the document • Discuss possible coordinated actions related to the presented standardisation activities

ISO Technical Committee (TC) 211 on Geographic Information

Point of contact: Agneta Gren Engberg, ISO/TC 211 chair, agneta.gren.engberg@lm.se
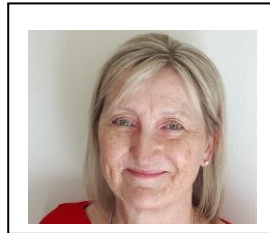
Contribution: Morten Borrebæk, Norway

ISO/TC 211 has a new chair:

Agneta Engberg

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A business view on the standardization of Geographic Information should ideally be a description of the evolving use of geodata in still new environments. As we know the evolving technology will set new standards (level of applications) for the need of integration and hence the interoperability of geodata with themselves and with other types or domains of data.

The consequences in any circumstances will be the need for more standards with geodata in one corner, or even the centre, of the application.
This corner could be embedded geodata or new type of derived geodata, maybe target towards some specific applications. Either way, the standardization results that already are achieved will only create new needs for interoperability and new kinds of geodata.

ISO/TC 211 business plan

The scope of ISO/TC 211 is very wide, but the work currently concentrates on a few segments;
- modelling and documentation of geographic information, traditionally important for major actors like the public sector,
- spatial data infrastructures (SDIs) with emphasis on sharing and dissemination of geographic information through services,
- embedding of geographic information in everyday life – ubiquitous geographic information,
- some specific domains where geographic information is an important component and where multiple disciplines are involved.
- The primary focus of ISO/TC 211 is geographic information and geomatics as an enabling technology within Information and communications technology (ICT).

The vertical integration of geomatics standard with ICT in general implies a specific focus on eGovernment and semantic web. During the last meeting in Slovenia in June 2019 ISO/TC 211 decided to establish a category C liaison between W3C (the World Wide Web Consortium) and WG4 of ISO/TC 211. A closer relationship with W3C may ease the take up of spatial data in the eGovernment infrastructure, and influence the further work on location enablement and location intelligence.

Another issue is the horizontal integration. A joint working group with ISO/TC 59 SC 13 for the interoperability between GIS (Geospatial) and BIM (Building Information models) has been working

for a year now, a technical report on interoperability barriers and possible measures is planned to be submitted in October 2019, as a fundament for further actions in the Joint working group or in the respective committees,

A joint working group with ISO/TC 204, ensuring interoperability between GIS and the ITS domain has just been established, under the responsibility of ISO/TC 211.

The business plan and the working group structure according to the program of work will be under evaluation, to ensure that we have the appropriate organization for providing the necessary standards for the future. A close cooperation with OGC is essential to ISO/TC 211.

The geodetic registry is now up and running, see https://registry.isotc211.org. The ISO Geodetic Registry is a structured database of coordinate reference systems and transformations that is accessible through this on-line registry system, maintained by a control body of geodetic experts. The Register includes only systems and transformations of international application. It does not include all possible coordinate reference systems and transformations.

Several of the ISO/TC 211 standards are now revised and available as the second generation of standards. The table below shows standards referenced in the INSPIRE implementing rules, the next table shows the revision history of these standards.

	19101	19103	19106	19107	19108	19111	19118	19115	19119	19123	19125-1	19127	19128	19135	19139
INSPIRE Metadata Regulation v03.12.2008	x							x	x						
Draft COMMISSION REGULATION implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services 14.12.2009		x		x	x	x	x	x			x	x	x	x	x
Draft COMMISSION REGULATION amending Regulation (EC) No 976/2009 as regards download services and transformation services 14.12.2009															
Draft Implementing Rules for Download Services (Version 3.0) 25/09/2009	x							x	x						
Draft Implementing Rules for INSPIRE Transformation Services (Version 3.0) 07/09/2009	x		x				x	x	x						

	19101	19103	19106	19107	19108	19111	19118	19115	19119	19123	19125-1	19127	19128	19135	19139
INSPIRE Draft Download Services Implementing Rule (Version 2.0) 14/02/2009	x								x	x					
INSPIRE Draft Transformation Implementing Rule (Version 2.0) 10/02/2009	x		x				x		x						

The table below shows the revisions of standards applied in INSPIRE IR's.

First versjon		Revised version	Comment
19101: 2002	Reference model	19101-1:2014 Reference model Part 1 Fundamentals 19101-2 :2018 Reference model – part 2: Imagery	
19103: 2005	Conceptual Schema Langua	19103:2015 Conceptual Schema language	
19106: 2004	Profiles		
19107: 2004	Spatial schema	19107: xx Spatial Schema	To be published by ISO 2019
19108: 2002	Temporal schema		
19111:2007	Spatial referening by coordinates	19111:2019 Referencing by coordinates	
19118: 2005	Encodig	ISO 19118:2011 Encoding	
19115:2003	Metadata	19115-1: 2014 Metadata part 1: Fundamentals	
19119: 2005	Services	19119:2016 Services	Service metadata moved to ISO 19115-1
19123: 2005	Schema for coverage geometry and functions	19123:2005 19123-2:2018 Coverage Implementation Schema	19123 to be revised.
19125-1:2004	Simple feature access - Part 1 common architecture		
19127:2005	Geodetic codes and parameters	19127:2019 Geodetic register	

19128:2005	WMS		
19135:2010	Procedures for item registration	19135-1: 2015 Procedures for item registration – Part1 Fundamentals	
19139:2007	Metadata XML schema implementation	19115-3: 2016 XML schema implementation for fundamental concepts	

ISO 19131 Data product specification, which is the basis for the INSPIRE data specifications, is under revision, expected to be published in 2020

Resources from ISO 191xx standards are now available at https://www.isotc211.org/. All XML schemas, html views of the UML models and ontologies are available here or in further references to GitHub. In addition, ISO/TC 211's multilingual glossary for geographic information technology is available as geoloxica. Still under development.

The ongoing work on WFS 3,0 in close cooperation with OGC is planned to be submitted as DIS (Draft international standard) in July 2019. The title in ISO will be ISO 19168-1 "Geographic Information - Geospatial API for Features - Part 1: Core".

ISO/TC 211 acknowledge that JRC will no longer maintain the harmonized model repository and necessary actions will be taken.

More information about the committee and the program of work is available at the web site https://committee.iso.org/home/tc211

Open Geospatial Consortium (OGC)

Points of contact: Athina Trakas, Director Regional Services, Europe, Central Asia & Africa

atrakas@opengeospatial.org; Bart De Lathouwer, President, bdelathouwer@opengeospatial.org

News in summary

- New leadership at OGC
- 9 Standards approved
- 30 Engineering Reports approved
- 2 Discussion or White Papers approved
- 5 new Domain Working Groups (DWG)

New OGC Leadership

- Nadine Alameh returns to OGC as our new CEO
- Bart DeLathouwer is now President
- Scott Simmons is now Chief Operations Officer (COO)
- George Percivall (CTO) and Jeff Burnett (CFO) retain their current roles
- Mark Reichardt is now the Executive Director of Strategic Opportunities

Standards approved

- OGC 18-053r1: 3D Tiles 1.0 (OGC Community standard)
- OGC 18-005r3: OGC Abstract Specification Topic 2 - Referencing by Coordinates
- OGC 18-000: OGC GeoPackage Related Tables Extension
- OGC 17-087r13: Features and Geometries - Part 1 - Feature Models
- OGC 16-071r2: Time Ontology in OWL
- OGC 16-079: Semantic Sensor Network Ontology
- OGC 17-083r1: OGC Two Dimensional Tile Matrix Set
- OGC 18-043r3: HDF5 Core 1.0
- OGC 18-010r6: Well Known Text Representation of Coordinate Reference Systems

Engineering Reports published[1]

- OGC 18-074: GeoPackage Vector Tiles Extensions
- OGC 18-028r2: OGC Testbed-14 WMS QoSE
- OGC 18-085: OGC Testbed-14: BPMN Workflow
- OGC 18-049r1: OGC Testbed-14: Application Package
- OGC 18-050r1: OGC Testbed-14: ADES & EMS Results and Best Practices
- OGC 18-036: OGC Testbed-14: WPS-T
- OGC 18-083: WMTS Vector Tiles Extension
- OGC 18-045: OGC Testbed-14: Next Generation Web APIs - WFS 3.0
- OGC 18-021: OGC Testbed-14: Next Generation APIs - Complex Feature Handling

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[1] http://www.opengeospatial.org/docs/er

- OGC 18-078: OGC Vector Tiles Pilot: WFS 3.0 Vector Tiles Extension
- OGC 18-047r2: OGC Testbed 14 Swath Coverage
- OGC 18-026r1: OGC Testbed-14 Security
- OGC 18-057: OGC Testbed-14 Authorization Authentication and Billing
- OGC 18-090r1: OGC Testbed-14 Federated Clouds
- OGC 18-097: OGC Environmental Linked Features Interoperability Experiment
- OGC 18-032: OGC Testbed-14: Application Schema-based Ontology Development
- OGC 18-091: OGC Testbed-14: Application Schemas and JSON Technologies
- OGC 18-022r1: OGC Testbed-14: SWIM Information Registry
- OGC 18-035: OGC Testbed-14: Semantically Enabled Aviation Data Models
- OGC 18-094r1: OGC Testbed-14: Characterization of RDF Application Profiles for Simple Linked Data Application and Complex Analytical Applications
- OGC 18-029: OGC Testbed-14: Symbology
- OGC 18-076: Tiled Vector Data Conceptual Model
- OGC 18-086r1: OGC Vector Tiles Pilot: Summary
- OGC 18-038r2: OGC Testbed-14: Machine Learning
- OGC 18-030: Secure Client Test
- OGC 18-034: OGC Testbed-14 Compliance
- OGC 18-023r1: OGC Testbed-14: MapML
- OGC 18-025: OGC Testbed-14 - CityGML and AR
- OGC 18-101: Vector Tiles Pilot Extension
- OGC 18-048r1: Point Cloud Data Handling

Discussion/White Papers published

- OGC 18-008r1: White Paper on Land Administration
- OGC 19-004: Anchor Node Extension in IndoorGML - Seamless Navigation between Indoor and Outdoor Space Discussion Paper

Recently initiated Domain Working Groups

- EO Exploitation Platform Domain Working Group (DWG)
- Statistical DWG
- Artificial Intelligence in Geoinformatics (GeoAI DWG)
- Blockchain and Distributed Ledger Technologies (BDLT DWG)
- Portrayal DWG

2019 Standards forecast

Green = approved

Red = in vote

Italic Bold = Community standard

- GeoPackage Related Tables Extension
- Features and Geometries Part 1 (AS Topic 1)
- Time Ontology in OWL (with W3C)
- Semantic Sensor Network Ontology (with W3C)
- 2D Tile Matrix Set
- HDF5 Core
- WKT CRS
- PipelineML
- OpenSearch-EO extension
- OpenSearch-EO metadata in JSON
- OpenSearch-EO response in JSON
- MetOcean Profile for WCS 2.1 (Q3)
- GroundwaterML 2 v 2.3 (Q3)
- GeoTIFF (Q3)
- WCS 2.0 REST Extension (Q3)
- SensorML 2.1 (Q3)
- OGC API – Features (formally WFS3; with ISO) (Q3)
- Symbology Core Model (Q3)
- WPS 2.0 REST/JSON Binding Extension (Q3)
- *OpenFlight (Q3)*
- *Seabed Survey Data Model (Q3)*
- *Geo-DCAT (Q4)*
- OGC API – Common (Q4)
- OGC API – Processing (Q4)
- OGC API – Maps(?) (Q4)
- IndoorGML 1.1 (Q4)
- CityGML 3.0
- QB4ST (with W3C) (Q4)

Upcoming TC Meetings

- June 2019 (24-27): Leuven, Belgium
- September 2019: Banff, Canada
- November 2019: Toulouse, France
- March 2020: Hong Kong
- June 2020: Montreal, Canada
- September 2020: Munich, Germany
- December 2020: Palo Alto, CA USA

Technology Trends watch - Highlighted topics – near term actions

Change in the technology industry is constant. The OGC Technology Trends process (http://www.opengeospatial.org/OGCTechTrends) looks at a wide variety of sources for trends information including: industry reports, international research, OGC members, alliance partners and staff.

Why does OGC track geo technology trends?

OGC's position on Innovation (2014): "develop standards to support evolving and potentially disruptive technologies, community needs and market trends." The Technology Trends Watch is a formal technology strategy, lead by the OGC CTO, to track and promote technology evolution.

Table 1. Example assessment summary

Trend	Machine Learning
Meta Trend	Data Science and Analytics
Description from Wikipedia	Subfield of computer science that gives computers the ability to learn without being explicitly programmed. Deep learning - a sub type of machine learning - consists of multiple hidden layers in an artificial neural network.
What is new or emerging?	• 3rd generation of Machine Learning providing revolutionary big data capabilities • Need for robust training sets and methods to efficiently develop them
Why might it matter?	• Significantly improved ability to to identify features in geospatial datasets, e.g., patterns in linked data, objects in features.
SW TRL	Level 7 – Demo in Operational Environment
Interop Readiness	Level 5 – Incorporation of novel service into apps with minimal custom code – Associational Standards
References	• Location Powers: Big Data • OGC Big Geo Data White Paper
Tipping Point	Past: ImageNet2012. Future: (break through in efficient, robust training set dev.)
OGC SP	Big Data DWG
OGC IP	OGC Testbeds - Testbed-14: Machine Learning Engineering Report

Individual trends are grouped into the following meta-trends:

- The Power of Location
- Spatial and Temporal Models
- Data Science and Decisions
- Big Data
- Spatial Data on the Web
- New Geo Sources
- Human-System Integration
- Information Technology

World Wide Web Consortium (W3C)

Points of contact: Dave Raggett dsr@w3.org, team contact of the Dataset Exchange Working Group, Francois Daoust fd@w3.org, team contact of the Spatial Data on the Web Interest Group, Ivan Herman ivan@w3.org, team contact of the JSON-LD Working Group.

- The Dataset Exchange Working Group[2] updated the Data catalog Vocabulary version 2 on 28 May 2019, the DCAT Profiles Vocabulary on 2 April 2019, and the Content Negotiation by Profile on 30 April 2019.
- The Spatial Data on the Web Interest Group[3] is discussing maintenance and update of the vocabularies and Spatial Data on the Web Best Practices document that were published last year. In addition, the group is also identifying areas where standards should be developed *jointly* by both W3C and OGC, using the overall W3C Strategy Funnel[4], which triages topics into the following stages: Exploration, Investigation, Incubation, Evaluation and Standardization (this last step is out-of-scope for the Interest Group). It has also started to work on best practices for Statistical Data (no document published yet).
- The Linked Building Data Community Group[5] brings experts together on building information modelling (BIM) and Web of Data technologies to define existing and future use cases and requirements for linked data applications.
- W3C has chartered a Working Group on updating the popular JSON-LD specification[6].
- The Web of Things Working Group[7] is progressing work on standards for exposing physical and abstract entities (things) as objects with properties, actions and events, independently of the communication protocols. The approach uses Linked Data with URIs for naming things and linking to their descriptions, and provides the basis for semantic interoperability across open markets of services. We expect the specifications to reach W3C Recommendation status in mid-2019 following the publication of Candidate Recommendations for Web of Things Architecture and Thing Descriptions on 16 May 2019. The Second W3C Workshop on the Web of Things[8] took place in Munich on 3-5 June 2019.
- A W3C standardisation workshop[9] took place in Berlin on 4-6 March 2019 on bridging communities (RDBMS, Property Graphs, RDF/Linked Data, AI/ML) on identifying opportunities for further standardisation work, e.g. extending RDF to embrace Property

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[2] https://www.w3.org/2017/dxwg/wiki/Main_Page

[3] https://www.w3.org/2017/sdwig/

[4] https://github.com/w3c/strategy/projects/2 (overall strategy funnel), https://github.com/w3c/strategy/projects/2?card_filter_query=label%3Ageospatial (only geospatial proposals)

[5] https://www.w3.org/community/lbd/

[6] https://www.w3.org/2018/03/jsonld-wg-charter.html

[7] https://www.w3.org/WoT/WG/

[8] https://www.w3.org/WoT/ws-2019/cfp.html

[9] https://www.w3.org/Data/events/data-ws-2019/cfp.html

Graphs, alignment on graph data query languages, and context sensitive mappings between vocabularies with overlapping semantics. A follow on workshop on time-series and spatial data is now at an early stage of planning. A Graph Standardisation Business Group is in the process of being launched to coordinate technical standards work and liaisons with standards development organisations and industry alliances.

- A W3C study of Web data standardisation[10] has been produced with support from the Open Data Institute and InnovateUK, with a view to making W3C a more effective, more welcoming and sustainable venue for communities seeking to develop Web data standards and exploit them to create value added services.

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[10] https://www.w3.org/2017/12/odi-study/