

FIG STANDARDS NETWORK REPORT TO THE GENERAL ASSEMBLY

David Martin January 2025

Standards Network Terms of Reference:

The Standards Network was formed in 2002. It works within Commission 1 and consists of representatives from each of FIG's Commissions. The terms of reference of the Network set out in the FIG Guide on Standardisation are:

- Building and maintaining relations with the secretariats of standardisation bodies,
- Proposing priorities on FIG's standardisation activities, including advising the Council on priorities for spending,
- Setting up necessary liaison relationships with standardisation bodies,
- Ensuring that lead contacts to Technical Committees etc. are in place,
- Maintaining an information flow on standardisation to FIG members, including through the FIG website, and more directly to relevant Commission Officers,
- Maintaining the Standards Guide, and related material on the FIG website,
- Working with other NGOs, within the framework of the MOUs signed by the Council,
- Advising FIG's officers and members on standardisation activities as necessary.

Key Activities

The Standards Network covers several key activities. At different periods, the commissions are more or less active or impacted by Standards. Some activities such as ISO 19152 on the Land Administration Domain Model (LADM) or the International Measurement Standard of Property (IPMS) are clearly linked to a specific commission – Commission 7 for the LADM and Commission 9 for IPMS. While other Standards issues relate to, or implicate, or could potentially implicate several commissions. The ISO/TC 211 concerning Geographic Information/Geomatics is an example.

Below is a summary of current Standards activities in FIG.

ISO/TC 211 Geographic Information/Geomatics

ISO/TC211 – Geographic information/Geomatics is the ISO technical committee dealing with geospatial matters. Larry Hothem is the representative from ISO/TC211 to FIG and Michael Denis and Nic Donnelly are the representatives from FIG to ISO/TC211.

Michael Dennis reports:

Activities on ISO/TC 211/Advisory Group 12, Control body for the ISO geodetic registry (ISOGR):

- Attended nearly all monthly meetings since last report.
- Participated in reviews of many additions to the registry.
- Previously submitted Helmert parameters for transformation from ITRF2014 and ITRF2020 to the three NAD 83 frames used by NGS were approved and added to the registry in April 2023.
- Initiated review of most recent WGS 84 (G2296) realization, including contacting NGA. Approved by NGA and added to registry in Nov 2024.

- Participated in transition to new Paneron system. Included comparison of U.S. entries between the old and new systems, which led to identification of some minor issues.
- Reviewed and identified issues that will be corrected in the new Paneron system (some were identified prior to the previous report, but it was decided to not make corrections until the Paneron system was up and running).
- Began efforts to assemble entries for the 125 zones of the U.S. State Plane Coordinate System in multiple linear units (meters, international feet, and U.S. survey feet).

Activities on ISO/TC 211/Working Group 9, Information management:

- Attended most meetings since last report.
- Contributed to review and update of the ISO 19127 (Geographic information — Geodetic register standard) to conform to ISO 19111 (Geographic information — Referencing by coordinates) and a revised version of ISO 19135 (Geographic information — Procedures for item registration — Part 1: Fundamentals) currently under development.

New activity since last report: ISO 19111 Revision Project:

- First meeting 5 Nov 2024
- Presently attending bi-weekly meetings
- Goal is to review and address several outstanding issues with current ISO 19111 standard, including:
 - Time-dependent reference frames (including so-called “semi-dynamic” datums)
 - Reversibility of single and concatenated operations
 - Conversions vs. transformations
 - Representation of axes and datums

Nic Donnelly reports:

ISO/TC211 – Geographic information/Geomatics is the ISO technical committee dealing with geospatial matters. It held its 59th Planary hybrid meeting week in Sydney, Australia from 11-15 November 2024. Notably, this was the 30th Anniversary plenary meeting since the first in Oslo, Norway in 1994. It was the final plenary held under the chairmanship of Mr Peter Parslow of the United Kingdom. His three-year term coming to an end, the chair passes to Ms Sandra Brantebäck of Sweden.

Two new standards have recently been published; ISO 19152-3:2024 – Land Administration Domain Model (LADM) Part 3: Marine georegulation and ISO 19164:2024 Geographic Information – Indoor Feature Model. Both of these standards support consistency and interoperability of geospatial data in these important domains.

A revision of the ISO19103:2024 Geographic information – Conceptual schema language was also published. This is one of the suite of foundational standards that underpin the other standards produced by the committee. This was the first standard revised using ISO’s new Online Standards Development tool, which significantly improves the ease and efficiency of the process.

The ISO Geodetic Registry <https://geodetic.isotc211.org/> was recently transitioned to a new platform that will be much easier to manage. The Registry Control Body has been active in 2024 with over 1000 new items added to the registry.

Further details of the ISO/TC211 work programme can be found at <https://committee.iso.org/home/tc211>

ISO 19152:2012 Land Administration Domain Model (LADM)

This Standard grew out of the Commission 7 work on the Core Cadastral Domain Model. It was accepted into the ISO/TC 211 work programme in 2008. The Land Administration Domain Model (LADM) ISO 19152:2012 Edition 1 was published in 2012.

As is reported below, the LADM standard has been updated and expanded and a second version ISO 19152-1:2024 Geographic information, Land Administration Domain Model (LADM), Part 1: Generic conceptual model has very recently been published.

Below is a summary of the FIG working group on LADM and 3D LA to 2025 FIG General Assembly (Peter van Oosterom, Alias Abdul Rahman, Abdullah Kara, and Eftychia Kalogianni)

The Land Administration Domain Model (LADM) is an internationally recognized ISO standard (ISO 19152), providing a standardized framework for land administration systems that supports sustainability and innovation. It has been developed under the initiative of FIG (International Federation of Surveyors) and collaborates with the ISO/TC211 committee. In 2024, the first revision of LADM was published as ISO 19152-1:2024, focusing on a generic conceptual model, laying the foundation for future parts on land registration, valuation, spatial planning, and marine boundaries. Part 3 (Marine Georegulations) was also published in 2024, with parts 2, 4, and 5 expected in 2025.

The revision process, which began in 2017, aimed to expand the model's scope, incorporating 3D building support, cadastral acquisition techniques, and better implementation guidance. One key advancement is the development of a 3D LADM prototype to visualize rights in complex buildings, with features like sunlight/shading analysis and detailed building representations.

Further standardization efforts are being made in cooperation with the Open Geospatial Consortium (OGC), which established the Land Administration Domain Working Group (DWG) in 2018. The OGC's work includes developing methodologies for country profiles, technical model encodings (JSON, Linked Data, etc.), and workflows for land administration. The OGC SWG (Standards Working Group) for LADM was formally established in 2024, and its focus includes maintaining code lists, linking with existing OGC standards (e.g., CityGML, IndoorGML), and developing implementation aspects for LADM.

ISO/TC 172 SC6 Survey Instrument Standards

ISO/TC 172 SC6 provides a comprehensive coverage of standards related to surveying instruments and their accessories including: handheld laser distance meters, levels, theodolites, EDM measurements to reflectors, total stations, GNSS field measurement systems in real-time kinematic (RTK), terrestrial laser scanners etc...

Currently, Werner Lienhart is the FIG representative to ISO/TC 172/SC 6. He is also Chair of FIG Commission 6.

Standards and/or project under the direct responsibility of ISO/TC 172/SC 6 Secretariat (17)

ISO 12858 *Series Ancillary devices for geodetic instruments*

- ISO 12858-1:2014 Part 1: Invar levelling staffs

- ISO 12858-2:1999/Amd 1:2013 Part 2: Tripods
- ISO 12858-3:2005 Part 3: Tribrachs

ISO 16331 *Series Laboratory procedures for testing surveying and construction instruments*

- ISO 16331-1:2017 Part 1: Performance of handheld laser distance meters
- ISO 16331-2 Part 2: Terrestrial laser scanner [Under development]

ISO 17123 *Field procedures for testing geodetic and surveying instruments*

- ISO 17123-1:2014 Part 1: Theory
- ISO 17123-2:2001 Part 2: Levels
- ISO 17123-3:2001 Part 3: Theodolites
- ISO 17123-4:2012 Part 4: Electro-optical distance meters (EDM measurements to reflectors)
- ISO 17123-5:2018 Part 5: Total stations
- ISO 17123-6:2012 Part 6: Rotating lasers
- ISO 17123-7:2005 Part 7: Optical plumbing instruments
- ISO 17123-8:2015 Part 8: GNSS field measurement systems in real-time kinematic (RTK)
- ISO 17123-9:2018 Part 9: Terrestrial laser scanners
- ISO 17123-9:2018 Part 10: UAV Photo measurement systems
- ISO 17123-9:2018 Part 11: GNSS instruments

ISO 9849 *Series Geodetic and surveying instruments*

- ISO 9849:2017 Vocabulary

There are 13 participating and 10 observing members (including FIG) of ISO/TC 172 SC6.

Standards in Hydrography – FIG Commission 4

The International Board (IHO, FIG and ICA) publishes guidelines for establishing individual recognition for hydrographic surveyors, at both professional and technical levels, considering education and experience.

Geoff Lawes reports:

WG 4.1 has as one of its current goals, encouragement of adoption of open standards for hydrographic data interchange and posterity, and attempting to steer those standards to best attend to the needs of the surveyor. This has been focused on BAG as the primary "surveyor led" OGC community standard for Hydrographic surface and uncertainty data interchange, as opposed to standards for end-user data interchange like S100 (ISO9100 based) which tend to be driven by GIS and cartographic user community goals, rather than the needs of surveyors.

At the recent Open Navigation Surface working group, FIG advocated for greater controls around standard compliant implementation of optional layers in BAG (essentially with a view to making them options for the end-user, not the software implementing the standard). We achieved some traction on this but encouraging our key industry software vendors to expend resources on this task is difficult. With this in mind, rather than risk loss of BAG support entirely in the commercial software community, ONSWG will take a slow and considered approach to how the OGC community standard compliance architecture will deal with this issue.

We also advocated for re-adoption of cryptography and signing for BAG, with a very positive outcome being agreement within the ONSWG to pursue this issue in the development of the next BAG version, and to adopt the S-102 cryptography implementation for greater alignment with

ISO9100 (but with the ability to use different trust chains for verification of BAG provenance, rather than just the IMO keys).

Blockchain, ILMS, IPMS, ICMS and FIG Commission 9

James Kavanagh RICS, Comm 9, FIG Standards network report – Jan 2025 – FIG Brisbane April 2025

Blockchain – an emerging opportunity for surveyors [blockchain_insight-paper.pdf \(rics.org\)](#) No update on Blockchain. Attention, in many ways, has turned towards AI/ML.

International Land Measurement Standard (ILMS) – ILMS global standard is now available online. [International Land Measurement Standard – International standards for a global land industry \(ilmsc.org\)](#) Coalition members are adopting and integrating the ILMS into their national and regional land measurement standards, and ILMS continues to engage with the ISO LADM initiative. RICS has started this process by using the ILMS methodology as a basis for the development of International Land Performance Framework (ILPF). With a changing social, economic and environmental landscape, and a growing awareness of the environmental, social and governance (ESG) agenda, it is essential for those with responsibility for land to adopt a multidimensional approach to assessing its performance. ILPF is a tool/framework for measuring the performance of a land asset from a range of assessments. ILPF will provide a holistic performance measures for a land asset, its management and its outcomes. Its components are derived from International Land Measurement Framework (ILMS) and recognises that land use can be multi-functional and links land use to outcomes also recognising that there may be multiple outcomes. Measurement of biodiversity will form part of the Key Performance Indicators (KPIs).

Maurice Barbieri adds they planning to hold a closing session with the FAO on the implementation of the standard soon

IPMS – Published by a Coalition of 88 property organisations representing hundreds of thousands of property professionals globally and drafted by an independent group of 18 experts from 11 countries, the International Property Measurement Standard is a global open-source standard aimed at creating a uniform approach to measuring buildings. The IPMS coalition has now published its final standard *IPMS All Buildings* [International Property Measurement Standards \(IPMS\) | Driving consistency; improving confidence in global real estate](#) which provides the foundation for incorporation into and adoption of building measurement conventions in global jurisdictions. Coalition members are now adopting and integrating the IPMS All Buildings standard into their national and regional building measurement, RICS has started this process with a full review and update of the Code of Measurement Practice [Code of Measuring Practice, 6th edition](#)

Maurice Barbieri adds they have updated the list of members and sent them a short questionnaire to find out how involved they are in implementing IPMS in its entity. For those interested, the questionnaire is available on request.

ICMS - ICMS provides a high-level structure and format for classifying, defining, measuring, recording, analysing and presenting life cycle costs and carbon emissions associated with construction projects and constructed assets. ICMS 3rd ed focused on carbon emissions and was released in 2021 [International Cost Management Standard | International standards and data for a global construction industry \(icms-coalition.org\)](#). ICMS coalition members are now busy adopted and

integrating ICMS 3rd ed into their national and regional standards and best practice guidance. RICS has continued with this process by integrating ICMS criteria into the [Whole life carbon assessment \(WLCA\) for the built environment \(rics.org\)](#)

Two of our core UK Geospatial Standards (GNSS 3rd ed and Imagery 6th ed) have been formally accepted onto the UK geospatial standards register [Best practice guidance and tools for managing geospatial data - GOV.UK \(www.gov.uk\)](#) Sept 2023

The UK hosted the annual ISO TC211 *geographic information conference in June 2024, the event was held at BSI Chiswick, London. [58th Plenary meeting Chiswick](#)

Standards issues related to FIG Commission 9

Unregistered Land Valuation – operational manual - The unregistered land manual [Valuation of Unregistered Land–A Practice Manual – Global Land Tool Network \(gltn.net\)](#) (UN GLTN/IVSC/FIG/RICS) was released in mid-2020 and continues to gather momentum. The GLTN VUL expert group was pleased to announce that the latest International Valuation Standards (IVS) now recognize land value in non-formal land tenure contexts. This significant development, inspired by GLTN’s Valuation of Unregistered Land, acknowledges the social, cultural, and environmental value of land. It ensures effective land valuation, particularly in Africa’s key development areas such as agriculture, carbon trading, and extractive industries. This milestone reflects GLTN’s strong partnership with the Royal Institution of Chartered Surveyors (RICS), the International Federation of Surveyors (FIG), and the International Valuation Standards Council (IVSC).

Additionally, the VUL manual and IVS have been referenced and included in the current update of the ISO LADM II 19152 Part 4, which was recently approved in ISO’s Draft International Standard (DIS) stage. ISO’s approval is a significant step toward sectorial adoption of the principles of Social Market Value in the valuation process. An informative annex has been added to part 4, extending the existing STDM conceptual model with an STDM Social Market Value class. This class can potentially be applied in various use cases, including expropriation, slum upgrading, fair resettlement and compensation, cultural heritage, and biodiversity conservation projects.

Initiative for a guide to Drones/UAVs: operation and good practice

In Orlando, two highly successful sessions were devoted to exploring the establishment of a standard for drone-based surveying. The participants in these sessions demonstrated extensive knowledge and posed highly specific and relevant questions. The outcome of these sessions indicated widespread support for this initiative in FIG, notably from Commissions 4, 5, 6, and 7.

After Orlando, given the interest in the FIG community it was decided to look into creating a guide for Surveying with Drones/UAVs.

Initially a document ‘A guide to Drones/UAVs: operation and good practice’ within the FIG publications series was proposed. However, since Orlando, a new standard, ISO 17123-10 UAV Photo measurement systems is under development (stage 20.20). It *“specifies test procedures for the preliminary assessment of the validity of an entire workflow involving photography with UAV photo measurement systems (Unmanned Aerial Vehicles with cameras – or also known as drone systems) used for specific surveying tasks, such as determining land surfaces, monitoring earthworks, monitoring and measuring all kind of structural designs and civil construction sites, calculating*

volumes and many other similar surveying applications. Primarily, these tests are intended to be field verifications of the suitability of a particular UAV system, including camera and processing software, and the survey results resulting from the synthesis of pre-planned shooting conditions to meet the accuracy requirements for a particular survey task. The focus for the test procedures is set to simplicity - they shall allow a quick judgement, if the system can obtain the desired accuracy given by the job. They are not intended for the calibration of UAV photo measurement systems. Both the full and the simplified test procedure require a minimal set of markers on the ground with known coordinates, to be used as ground control points and check points.”¹

We will follow this standard closely because it appears to address many of the questions raised in the Orlando sessions.

Summary

Standards are important in the surveying profession. Standards work in FIG ranges from the very specific ISO/TC 172 SC6 Survey Instrument Standards; to liaison with the much broader ISO/TC 211 Geographic Information/Geomatics, which impacts on virtually every aspect of the surveying profession. One very important standard is the ISO 19152 LADM. FIG is involved in the IPMSC coalition, ILMS and IPMS with the aim to develop and implement accessible and appropriate International Standards.

Surveying is changing. To get an idea of the magnitude of the changes that await us one can look at a document published by UN-GGIM: Future trends in geospatial information management: the five to ten year vision (<https://ggim.un.org/documents/future-trends.pdf>). The changes outlined are breath taking. Underlying all of these future trends are standards. The Standards Network is responsible for building and maintaining relations with the different standardisation bodies, proposing priorities on FIG's standardisation activities and ensuring information flow on standardisation to FIG members.

¹ <https://www.iso.org/standard/83171.html>