FIG STANDARDS NETWORK REPORT TO THE GENERAL ASSEMBLY

David Martin 10 March 2024

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:

Below is a summary of my ISO TC 211 activities from February 2023 through March 2024.

Advisory Group 12, Control body for the ISO geodetic registry (ISOGR):

- Attended all but one of the monthly meetings, plus one special meeting on 15 July 2024 to address WGS 84 transformation issues. Meetings include participation in discussions and review of new submittals and corrections to existing ISOGR entries.
- Identified truncation of WGS 84 ellipsoid inverse flattening (24 February 2023). Will be fixed as part of migration of ISOGR to Paneron software platform in early- to mid-2024.

- Final review of submitted transformations from ITRF2014 and ITRF2020 to the three U.S. NAD 83 realizations NAD 83(2011) for North America, NAD 83(PA11) for the Pacific, and NAD 83(MA11) for Guam and the Northern Mariana Islands.
- Identified errors and inconsistencies in several WGS 84 to ITRF transformations (27 August 2023). These were corrected in Feb 2024, after receiving confirmation from the U.S. National Geospatial-intelligence Agency (NGA).
- Identified multiple errors, inconsistencies, and partially complete U.S. entries in the ISOGR (30 September 2023). In process of correcting these as part of the next item.
- At the U.S. National Geodetic Survey (NGS), completed internal standardization of all datum/reference frame and transformation definitions used by the U.S. (Jan 2024). These are being used to correct and augment entries to the ISOGR as part of migrating to the Paneron platform (in progress).
- Agreed to serve as Chair of the International Association of Geodesy (IAG) Working Group 3 on Reference Frame Transformations in North America (19 February 2024).
- Contacted (NGA) directly via email to request information in new WGS 84 (G2296) realization (27 February 2024). No response as of the date of this report.

Working Group 9, Information management:

- Attended five of eight scheduled meetings in 2023; no meetings have yet been scheduled in 2024.
- Continue contributing to the 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.

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.

Publication of the first part of LADM Edition II

The Land Administration Domain Model (LADM) is an internationally recognised ISO standard (ISO 19152) that provides and supports responsible innovation and partnerships, for effective land administration. The LADM aligns the data model with a standardised global vocabulary for land administration. As an international standard it can stimulate the development of software applications and may accelerate the implementation of land administration systems that support sustainability objectives.

The Land Administration Domain Model is developed at the initiative of FIG, as part of the FIG Standards Network and Commission 3 & 7. The first edition was published in 2012 with a focus on land registration. The International Standardization Organization (ISO) regularly checks whether their standards need to be revised in order to meet user requirements.

The LADM revision has been a careful process and started already in 2017 during a joint working meeting of the FIG and UNGGIM, during which it was indicated that the scope of LADM should be expanded to include conceptual models for cadastral acquisition techniques, marine boundaries, valuation information, spatial plan information, and more 3D support (BIM/IFC input). In addition, there should also be more support for the implementation itself. It was subsequently decided within ISO/TC211 that organising the standard into multiple parts was the best approach.

The first part focuses on the conceptual model and this has now been published as ISO 19152-1:2024 Geographic information, Land Administration Domain Model (LADM), Part 1: Generic conceptual model. Part 1 forms the basis and also provides a global overview of the conceptual models in parts 2 to 5. These will be published during 2024 and 2025. The development of part 6, Implementation aspects, is planned in collaboration between ISO/TC 211 and the Open Geospatial Consortium. The first meeting of the OGC LADM part 6 standards working group is expected at the next OGC TC on 25 March 2024.

During the World Bank Land Conference 2024 there will be a session, supported by FIG, dedicated to the LADM: “How Standards empower People, Environment, Economic Progress, and its underlying data”.

The 12th International FIG Workshop on the Land Administration Domain Model & 3D Land Administration will take place in Kuching, Malaysia, 24-26 September 2024. It will be a joint event including the Geoinformation Week 2024 (including Exhibition from vendors), the FIG Commission 7 Annual Meeting, and a UN Habitat's STDM Meeting. More information is here.

If you would like to know more about the status of the other parts you will find an overview here and further information here:

- Link https://www.iso.org/standard/81263.html
- Link https://portal.ogc.org/meet/
- Link https://www.worldbank.org/en/events/2023/10/05/land-conference-2024
- Link https://gdmc.nl/3DCadastres//workshop2024/workshop.html
- Link https://www.sciencedirect.com/science/article/pii/S0264837723004696
- Link https://www.fig.net/organisation/networks/standards_network/ladm.asp

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 sunder 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 9: Terrestrial laser scanners
- 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:

The main standards activity this year from a Commission 4 perspective has been in relation to Bathymetric Attributed Grid (BAG). We provided feedback on the re-implementation of digital signatures as well as optional layer specifications, and we'll be represented by Denis Hains at the next Open Navigation Surface Working Group meeting where the ONSWG is putting forward their final considerations for the proposed adoption of BAG as an OGC standard. Adoption of BAG by the OGC will be a great outcome, as it will formalise BAG as an open standard for collection and retention of hydrographic datasets, where there are currently no suitable open standards.

Blockchain, ILMS, IPMS, ICMS and FIG Commission 9

James Kavanaugh (Commission 9) reports on a number of standards issues:

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

International Land Measurement Standard (ILMS) – ILMS global standard is available online. International Land Measurement Standard – International standards for a global land industry (ilmsc.org) (available in English, French, German, Spanish, Arabic, Russian, Turkish and Irish Gaelic) and has been gaining adoption and momentum as serious global issues over land (especially acquisition/expropriation) re-emerge post covid. An ILMS executive board meeting was held in London Feb 2024. ILMS has also been engaged with the LADM initiative.

International Property Measurement Standards (IPMS) – the final version of IPMS (All Buildings) provides the foundation for incorporation into and adoption of building measurement conventions in global jurisdictions. It facilitates the interface between the major differences in the historic conventions of those many global jurisdictions. This new edition supersedes all previous versions of IPMS. The Standard | International Property Measurement Standards (IPMS) (ipmsc.org)

International Construction Measurement Standards (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) – much of ICMS 3rd ed has now been operationalised within the new Whole life carbon assessment (WLCA) for the built environment (rics.org) Indeed, there are several 'carbon' orientated standards in production (carbon credits, International Land Performance Standard ILPS etc).

Two of our core UK Geospatial Standards (GNSS 3rd ed and Imagery 6th ed) have been formally accepted onto the UK geospatial standards register, after presentation and years of lobbying, a meeting of the UK ISO committee Best practice guidance and tools for managing geospatial data - GOV.UK (www.gov.uk) Sept 2023 This key 'adoption' puts RICS Geospatial standards on a par with ISO for the 1st time and makes them 'standard' for all UK government agencies such as Ordnance Survey and HM Land Registry.

The UK is hosting the annual ISO TC211 *geographic information conference in June, the event will be held at BSI Chiswick, London.

Use of Global Navigation Satellite Systems (GNSS) in land surveying and mapping, 3rd edition (rics.org)

This third edition of the *Use of GNSS in surveying and mapping* has been prepared by RICS in partnership with Newcastle University, and with the help of an extensive expert peer review process. The standard forms part of a series of standards and best practice intended to assist all those connected with the requesting, purchase and production of surveys and mapping data at all scales, by spreading good practice and seeking to avoid duplication of effort.

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 with webinars, workshops and outreach in the global south. A special session is being organised for FIG Accra, with involvement from UN GLTN, FIG Comm 9 and the LADM initiative.

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.

The proposed document 'A guide to Drones/UAVs: operation and good practice' would be a short publication sitting nicely within the FIG publications series. The content would focus on operationalisation and not seek to establish an ISO style (gold) standard. Drawing from case study/ practice, it would enable a clear understanding of the importance of land survey and ground positioning expertise to drone operations rather than focus on the software and manufacturing aspects. Further recognising that this technology is moving at very fast pace, it would not be a long-term document and so would be subject to review on an 18 to 24 months basis after produced. Further noted is the importance and inclusion of professionals in the global south, as well as other land, survey and imagery professionals (e.g. ISPRS).

Since Orlando, a new standard, ISO 17123-10 UAV Photo measurement systems is under development and a first draft version has been edited. It specifies field procedures to be adopted when determining and evaluating the accuracy (closeness to true values) and additionally in the full test procedure also the precision (repeatability) of UAV photo measurement systems (Unmanned Aerial Vehicles with cameras – or also known as drone systems), when used in 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.

We will follow this standard closely because it may address many of the questions raised in the Orlando sessions. Alternatively, or possibly with the ISO 17123-10 standard, FIG may work on short document addressing drone operation and good practice described in the previous paragraph.

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.