Report to the 48th General Assembly
FIG Working Week 2025, Brisbane, Australia

Commission 5 – Positioning and Measurement

Report of Activities 2024-2025

1. General

FIG Commission 5 focusses on meeting the highest level of 'fit-for-purpose' performance for Positioning and Measurement. It provides the tools, techniques and procedures to inform, educate and train surveying professionals everywhere. The appropriate methodologies for data collection, processing and analysis are necessary to be successful in this era of global, integrated geospatial data.

2. Members of the Commission

The members of Commission 5 are listed as follows:

- Ryan Keenan (Chair), Australia
- Kevin Ahlgren (Deputy Chair), United States
- David Martin (Chair - Working Group 1), France
- Nic Donnelly (Co-chair - Working Group 2), New Zealand
- Chris Pearson (Co-chair - Working Group 2), New Zealand
- David Alvarez (Chair - Working Group 3), Mexico
- Eldar Rubinov (Co-chair - Working Group 4), Australia
- Safoora Zarminpardaz (Co-chair - Working Group 4), Australia
- Amir Khodabandeh (Chair - Working Group 5), Australia
- Li Zhang (Co-chair - Working Group 6), Germany
- David Mulindwa (Co-chair - Working Group 6), Uganda
- Allison Kealy (Co-chair - Working Group 7), Australia
- Jelena Gabela (Co-chair - Working Group 7), Austria

The Commission and its members meet regularly in person at different events, and online for Commission and other events.

3. Work Plan and Activities

In its Mission and Work Plan, Commission 5 endeavours to:

- Focus on modern technologies, and technical developments and assist individual surveyors, engineers and GIS/LIS professionals through guidelines and recommendations, to choose and utilise those methods, technologies and instruments that are most appropriate to different applications;
- Follow technical developments through collaboration with other FIG Commissions, Networks and Task Forces; participation in appropriate meetings and the preparation or appropriate publications;
- Support research and development and stimulate new ideas in the fields of expertise represented within the commission;
- Collaborate with manufacturers on the improvement of instrumentation and associated software;
- Present and promote the work of the Commission and its working groups on an on-going basis at FIG Congresses, FIG Working Weeks, FIG Regional Conferences and other relevant technical meetings and in appropriate FIG and other media.

Significant accomplishments during the period were the contributions to the 2024 FIG Working Week in Accra, a publication update for the Reference Frames in Practice (RFIP) Manual, and internal discussions around upcoming activities for expanding the commission's member base.

There is an ongoing collaboration with United Nations Agencies to address global problems such as sustainable development and humanitarian needs. The disciplines covered by Commission 5 help to deliver solutions for the spatial aspects of these important global problems. Specific activities aimed at developing countries include examination of Low-Cost Surveying Technologies, assistance with implementation of modern Geodetic and Vertical Reference Frames and associated infrastructure and contribution to appropriate Continuing Professional Development programs.

Engagement with UN-GGIM's UN-SCoG continued, particularly with the WG on Capacity Development around geodetic reference frames, and the ongoing needs for knowledge transfer into developing regions. Collaborating with the FIG Capacity Development Networks and Commission 2, particular focus was made on assessing these geospatial needs globally.

Additionally, Commission 5 continued to work closely with the International Association of Geodesy (IAG) and the United Nations Global Geospatial Information Management (UN GGIM) on the development of new models, standards and tools for implementing a Global Geodetic Reference Frame (GGRF) that includes aspects of the International Terrestrial Reference Frame (ITRF) and the International Height Reference Frame (IHRF). The GGRF will serve as a global standard for all Nations to implement their respective national datums. As such, this directly impacts FIG Members who must implement these new datums and the requirements to access them. Likewise, FIG has engaged with ISO TC211 to ensure that internationally recognized GIS standards are consistent with those for national reference frames utilized by FIG Member organizations.

In terms of the African region, Commission 5 is significantly involved with its partners IGS, UN-GGIM Africa and UN-GGCE, in engaging the African member states to gain insights on their current geodetic infrastructure capabilities and future needs, and thus help identify opportunities for education, training and in-region collaboration. Having the 2024 Working Week and 2026 Congress events in Africa is greatly supporting this initiative and updates can be expected in the coming months.

The next in-person RFIP seminars remain planned for the FIG Working Week in Australia 2025 and the FIG Congress 2026 in Cape Town.

Commission 5 continued its support to FIG Task Forces, the Standards Network, and regional Capacity Development Networks (the Asia Pacific (AP CDN), the Africa Regional Network (ARN) and the new Americas network). Commission 5 will also respond to the FIG Council to address new issues as they emerge. Indeed the Commission 5 Chair is now ACCO Representative to FIG Council from December 2024 until end of term December 2026.

In March 2024, Commission 5 provided the FIG Office with insights for a GIM International article covering the topic of FIG's ongoing contribution to resilient and impactful surveying, published in Spring 2024 both in press and online (https://issuu.com/geomarespublishing/docs/gim_1-2024_lr_pdf).

A summary of the Commission's working group activities in the period 2024-2025 follows. As always, we are happy to accept new members and volunteers within any of the working groups, and are grateful for insights and experiences coming from across the globe.

4. Working Groups

WG 5.1 – Standards, Quality Assurance and Calibration

Chaired by David Martin

Standards provide a framework that supports the accurate and reliable functioning of surveying instruments. Additionally, they contribute to the professionalism, consistency, and quality of surveying practices, ultimately benefiting both practitioners and the broader community that relies on surveying data.

Working Group 5.1 actively participates in technical sessions, technical seminars and presentations for FIG Working Weeks and Congresses. Working Group 5.1 is also very closely linked to the FIG Standards Network. Importantly Working Group 5.1 is the contact for FIG liaison to the ISO Technical Commission (TC) 211 (http://www.isotc211.org/) and Technical Committee ISO/TC 172/SC 6.

ISO TC 211 focuses on standardisation within the realm of digital geographic information. The committee's objective is to establish a systematic set of standards for information related to objects or phenomena directly or indirectly tied to a location on Earth. These standards delineate methods, tools, and services for

the comprehensive management of geographic information. This encompasses aspects such as definition and description, data acquisition, processing, analysis, access, presentation, and transfer in digital/electronic formats across diverse users, systems, and locations. The committee aligns its work with relevant standards in information technology and data wherever feasible, offering a framework for developing sector-specific applications utilizing geographic data.

At present, Michael Dennis of NOAA/NOS/National Geodetic Survey, and Nic Donnelly, from Land Information New Zealand, are the FIG liaisons to TC211.

Key projects in TC211 are the work on 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/TC 172/SC 6 addresses the practical aspects associated in the utilisation of classical surveying instruments. These standards specifically focus on field procedures for testing geodetic and surveying instruments, encompassing tools such as theodolites, total stations, levels, and GNSS in real-time kinematic (RTK). Current work items for ISO/TC 172/SC 6 include: ISO/WD 9849 Geodetic and surveying instruments — Vocabulary; ISO/CD 17123-6 — Part 6: Rotating lasers; and, ISO/CD 17123-11 — Part 11: GNSS instruments. Currently, Werner Lienhart is the FIG representative to ISO/TC 172/SC 6, and is also Chair of FIG Commission 6.

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.

One key aim of WG5.1 has been the investigation of appropriate standards for so-called drone surveying systems. This is a vast field. However, the ISO 17123-10 UAV Photo measurement systems currently under development addresses many of the key questions we have encountered.

From the ISO/TC 172/SC 6 web page dedicated to this project*: ISO 17123-10 UAV Photo measurement systems 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.

Finally, Working Group 5.1 has a lasting goal of endorsing the guidelines outlined in the ISO Guide to Uncertainty in Measurement (GUM) and its dedicated supplements. These guidelines aim to ensure measurement traceability, which is a process that guarantees a measurement considers all uncertainties, providing an accurate representation of the object being measured.

WG 5.2 – 3D Reference Frames
Chaired by Nic Donnelly and Chris Pearson

The main activities for Working Group 5.2 were updating the RFIP manual and organizing the RFIP Workshop as a pre-event of the Working Week 2024 in Accra. The RFIP Manual Edition 2 has been completed and will be presented at the RFIP Workshop in Brisbane. For this Workshop, another strong program is forming and we are pleased to have received confirmation of the UN ICG's and Trimble's continued sponsorship for a number of attendees from the developing world.

It was clear from the presentations that there is excellent progress on reference frame development being made in many countries. Ongoing challenges include capacity and capability development, the incorporation of deformation into reference frames, implementing vertical reference frames based on geoids and helping decision-makers understand the crucial role of the reference frame underpinning accurate positioning and data management. It is hoped that the RFIP seminars and informal discussions within the working group will go some way to address this.

Working group members continue to be active in a number of relevant international groups. These include the OGC project teams working on the standardisation of a deformation model functional model and format. Here we took a very active role in developing the standard and, once it was adopted last year we are actively encouraging its use by national geodetic agencies and software companies. We are currently contributing on the OGC Coordinate Reference Systems Working Group (CRS SWG/DWG) on CRS JSON, which aims to support an encoding of the self-contained and compact description of Coordinate Reference Systems and Coordinate Operations through a simple JSON schema.

Longer term we intend to be proactive in supporting more capacity building events in historically underserved regions like the South Pacific, South America and Africa.

WG 5.3 – Vertical Reference Frames
Chaired by David Avalos-Naranjo

WG5.3 collaborates in the organization of the Reference Frames in Practice workshop (RFIP) for its version at the FIG Working Week 2024, providing up to date material regarding the International Height Reference

Frame (IHRF) and sharing experiences on the transition from the classical approach. In collaboration with the International Association of Geodesy, WG5.3 continues to promote the creation of a special publication with recommendations and descriptions of best practice in the use of modern vertical reference frames.

The focus of this working group remains on creating opportunities to learn about the importance of maintaining or advancing the vertical control in positioning for official purposes. The new generation of vertical reference frames allows access to higher precision, stability and connection with neighbouring or even non-neighbouring countries. Such capability is considered essential for projects aiming to contribute in the achievement of local and global sustainable development goals.

WG 5.4 – GNSS
Co-chaired by Eldar Rubinov and Safoora Zarmindarpaz

The GNSS Working Group continues to support multi-constellation GNSS activities through the UN International Committee on GNSS (UN ICG) with collaboration from the International GNSS Services (IGS), International Association of Geodesy (IAG) and Multi-GNSS Asia (MGA).

In 2024-2025, FIG WG 5.4 is contributing and participating in the ION GNSS+, IGNSS, Victorian Geospatial Council of Australia conference, as well as presenting a keynote at the Joint Annual Commission 5/7 meeting. Commission 5 also participated in various online webinar series on GNSS.

The WG is continuously monitoring the new state-of-the-art technologies that enhance the resilience of GNSS, as well as provide new methods of augmenting GNSS, such as the Low Earth Orbit Positioning Navigation and Timing (LEO PNT) constellations as well as new telecommunications standards such as the 5G 3rd Generation Partnership Project (3GPP) that have the potential to bring high-precision positioning to mass market devices, including mobile phones. In 2025, Commission 5 released the State of the Market report on LEO PNT.

In summary, FIG WG 5.4 is actively involved with those groups responsible for helping to define the future of GNSS positioning into the next decade, and beyond. WG 5.4 chairs welcome ideas and contributions from members of the FIG on ways to better engage and support our community on all aspects of satellite positioning.

WG 5.5 – Multi-Sensor-Systems
Chaired by Amir Khodabandeh [Email: akhodabandeh@unimelb.edu.au]

The objective of this Working Group is to develop theory and algorithms that can extend our understanding of the tools and technologies with which one can combine sensory data from multiple devices and/or measuring systems, providing high-precision and trustworthy Positioning, Navigation and Timing (PNT) services. This includes measurable carrier phase signals transmitted by Low-Earth-Orbiting (LEO) communication satellites. It has a major focus on:

- Performance characterization of positioning sensors and technologies that can play a role in augmenting core GNSS capabilities.
- Theoretical and practical evaluation of current algorithms for measurement integration within multi-sensor systems.
- The development of new measurement integration algorithms based around innovative modeling techniques in other research domains such as machine learning and genetic algorithms, spatial cognition.
- Establishing links between the outcomes of this WG and other FIG WGs and the International Association of Geodesy (IAG).
- Generating formal parameters that describe the performance of current and emerging positioning technologies that can inform FIG and IAG members.

Activities in the past 12 months [2024-2025]

Publications in geodetic and GNSS journals: In line with the objectives of this WG, members have developed innovative positioning algorithms that integrate GNSS observations with Light Detection and Ranging (LIDAR) measurements, and with Low-Earth-Orbiting (LEO) satellite signals. The algorithms have been validated using multiple real-world and simulated datasets collected from diverse global locations. The results have been published in the following recent works.

1) Sadegh P., Khodabandeh A., Khoshelham K., Amiri-Simkooei A.R. (2024). Estimating process noise variance of PPP-RTK corrections: a means for sensing the ionospheric time-variability. *GPS Solutions*, doi: 10.1007/s10291-023-01577-4
2) Zhao Y., Khoshelham K., Khodabandeh A. (2024). Registration-based point cloud deskewing and dynamic lidar simulation. *The Photogrammetric Record*, doi: 10.1111/phor.12516
3) Yang S., Khodabandeh A., Zaminpardaz S., Teunissen P.J.G. (2025). Ambiguity-resolved short-baseline positioning performance of LEO frequency-varying carrier phase signals: a feasibility study. *Journal of Geodesy*, 'accepted for publication'
4) Psychas D., Khodabandeh A., Teunissen P.J.G. (2024). Multi-epoch PPP-RTK corrections: temporal characteristics, pitfalls and user-impact. *Journal of Geodesy*, doi: 10.1007/s00190-024-01823-8
5) Khodabandeh A., Teunissen P.J.G. (2024). Bias-constrained integer least squares estimation: distributional properties and applications in GNSS ambiguity resolution. *Journal of Geodesy*, doi: 10.1007/s00190-024-01851-4
6) Ke C., Khodabandeh A., Zhang B. (2024). Extension of the undifferenced and uncombined CDMA PPP-RTK for not-common-frequency GNSS observations. *GPS Solutions*, doi: 10.1007/s10291-024-01644-4
7) Zhang W., Wang J., Khodabandeh A. (2024). Regional ionospheric correction generation for GNSS PPP-RTK: theoretical analyses and a new interpolation method. *GPS Solutions*, doi: 10.1007/s10291-024-01682-y
8) Sadegh P., Khodabandeh A., Khoshelham K. (2024). Ionospheric process noise estimation via single-receiver GNSS data. *Journal of Spatial Science*, doi: 10.1080/14498596.2024.2396394
9) Ke C., Khodabandeh A., Zhang B. (2024). A processing strategy for handling latency of PPP-RTK corrections. *Journal of Geodesy*, doi: 10.1007/s00190-024-01920-8

Attending international conference proceedings: Amir Khodabandeh co-chaired the session of "Alternative Technologies for GNSS-Denied Environments" in ION GNSS+ 2024. Furthermore, WG members participated in the following conferences:

- IGNSS 2024, Sydney, Australia, 7 – 9 February 2024
- ION GNSS+ 2024, Baltimore, USA, 16 - 20 September 2024
- ION ITM/PTTI 2025, Long Beach, USA, 27 - 30 January 2025 (virtual)

Inviting new members from early-career scientists, engineers, and specialists: This WG welcomes new and active members. Existing members of this WG are inviting emerging leaders in the fields of geospatial and PNT to join this group.

Activities planned for the next 12 months [2025-2026]

Organizing workshops addressing the objective of the group: This WG plans to organize in-person and online workshops across the members. Before each workshop, the topic of discussion as well as the corresponding research questions will be shared with members. The expected outcomes of these workshops are to showcase state-of-the-art algorithms, tools, and technologies of multi-sensor PNT and to address existing challenges ahead of multi-sensor integration, thereby providing a broad outlook on such topics.

Inviting new members from early-career scientists, engineers, and specialists: Existing members of this WG will continue to attract new members mainly from enthusiastic early-career scientists, engineers, and specialists in the fields of geospatial and PNT to join this group.

Continuing publishing journal papers and attending international conference proceedings: Existing members of the WG will continue to develop and assess new algorithms and methods concerning multi-sensor systems, presenting outcomes in relevant journals and conferences.

WG 5.6 – Cost Effective Positioning
Co-chaired by Li Zhang and David Mulindwa

Throughout the year, WG 5.6 remained committed to its mission of promoting education and collaboration in the field of surveying. Our efforts focused on providing valuable guidance to associations and individual surveyors regarding the optimal use of surveying instruments and software, with a keen eye on economic considerations. By offering insights into the most cost-effective solutions, we aimed to empower decision makers in establishing positioning strategies that are both effective and budget friendly.

Furthermore, our team dedicated considerable efforts to designing fit-for-purpose surveying systems that prioritize cost-effectiveness without compromising on quality. We firmly believe that tailored solutions can significantly enhance project outcomes while minimizing expenses.

In addition to our educational endeavours, WG members actively participated in several conferences:

- FIG Working Week 2024, 19 – 24 May 2024 in Accra, Ghana
- Intergeo Conference 24 – 26 September 2024 in Stuttgart, Germany
- Chintergeo Conference 27-29 November 2023 in Guangzhou, China

These events provided valuable opportunities for knowledge exchange and networking, further enriching our collective expertise.

Moreover, WG 5.6 is pleased to report that we embarked on several exciting research and development projects in 2023. Notable among them are initiatives such as the development of Low-Cost GNSS and IMU for monitoring and the creation of cost-effective multi-sensor systems for fault localization on railway tracks and we will present the first results in FIG Working Week 2025. We also initiated projects aimed at providing cost-efficient scalable solutions for the agricultural and construction industries, reflecting our commitment to innovation and practical problem-solving.

Looking ahead, we are excited to announce plans for the 3rd Edition of FIG Report 74, titled "Cost-Effective Precise Positioning with GNSS". With the support of WG 5.4, we aim to deliver a comprehensive resource that addresses the evolving needs and challenges in the field of precise positioning.

New Working Group 5.7 Emerging Technologies for Positioning, Navigation and Timing (PNT)
Co-chaired by Allison Kealy and Jelena Gabela, partnering with IAG.

During this period, the working group has focused on advancing technologies and techniques to address the requirements for resilient Positioning, Navigation, and Timing (PNT) across diverse application domains. Members also contributed to a real-world, quantum sensing field trial, data processing, and simulation study that demonstrated the potential of next-generation quantum technologies for geodesy and navigation.

Key Activities and Contributions

1. **Joint FIG/IAG Webinar**
   In July 2024, the working group co-organized an international webinar titled *"Advancing Geodesy and Navigation with Quantum Sensors."* This event was jointly hosted with the IAG Project QuGe (*Novel Sensors and Quantum Technology for Geodesy*) and the IAG Joint Study Group 4.1.1 (*Evaluating the Potential of Next Generation Quantum Sensors for Positioning, Navigation and Timing*). The webinar drew 160 participants globally, reflecting strong international interest.
   - **Key Impact**: Provided a platform to share insights on quantum sensor advancements for resilient PNT.
   - **Recording**: Webinar Recording.
2. **International Conferences and Events**
   The group played a pivotal role in global scientific discussions by presenting research

papers, participating in scientific committees, chairing sessions, and reviewing scholarly work at prominent conferences, including:
    - *ION GNSS+ 2024*, Baltimore, USA (Sept 16–20)
    - *European Navigation Conference*, Netherlands (May 20–24)
    - *IGNSS 2024*, Sydney, Australia (Feb 7–9)
    - *ION PNT Pacific*, Hawaii, USA (April 15–18)
    - **Highlighted Contribution**:
      At *ION GNSS+ 2024*, a member of the working group chaired a panel discussion on *Emerging Autonomous Applications – Challenges and Prospects,* addressing the role of resilient PNT technologies in autonomous systems.
3. **Quantum PNT Initiatives**
   The working group is leading activities aimed at advancing the application of quantum sensors for geodesy and navigation. These include presentations, publications, panel participation and grant applications. These activities have already provided critical insights into the operationalisation of resilient PNT technologies and informed strategies for future adoption across industries.
4. **Data Processing for Resilient PNT**
   By engaging in rigorous data processing and analysis, the working group supported the development of techniques to enhance the robustness of PNT systems. These efforts directly contribute to mitigating vulnerabilities such as signal interference and environmental disruptions, ensuring reliability across diverse application domains.

The activities undertaken by this working group have made significant strides in promoting resilient PNT technologies and their applications, especially through contributions to quantum research, international collaboration, and global scientific engagement. These efforts continue to position the group as a leader in the advancement of PNT technologies for the benefit of the broader community.

5. Collaboration, Seminars and Workshops

The Commission is involved with myriad partners, both inside of FIG, and beyond.

5.1 Collaboration with Other FIG Groups

Other areas of collaboration include:
- Commission 4 regarding Hydrographic Surveying on the Ellipsoid
- Commission 6 and ISPRS on GNSS-based Deformation Monitoring
- Commission 6 on UAV Usage for Surveying
- Commission 7 and 3 on Cost-Effective Positioning
- Regional Capacity Development efforts in Asia-Pacific, Africa, and the Americas

- Task Force: International Trends and Future Geospatial Information Ecosystem
- Task Force: Diversity and Inclusion
- Task Force: Climate Compass
- Task Force: FIG and the Sustainable Development Goals (SDGs)

5.2 Collaboration with Sister Organisations

Commission 5 continued to maintain a successful working relationship with the International Association of Geodesy (IAG), PGSC (with AP CDN) and SIRGAS. This was achieved by convening joint Technical Seminars on Reference Frames in Practice, technical sessions and holding joint administrative meetings on significant issues.

Based on feedback from our members, and insights into current trends, Commission 5 has created a new Working Group - 5.7 Emerging Technologies for PNT, in partnership with the IAG.

5.3 Cooperation with UN

FIG and IAG are both supporting the UN International Committee on GNSS (UN ICG) as well as the UN Global Geospatial Information Management (UN GGIM) Committee. The UN GGIM has implemented the Global Geodetic Reference Frame (UN GGRF) that is being implemented by the UN GGIM SubCommittee on Geodesy (UN SCoG). In 2023, FIG Commission 5 was formally invited to become a Partner of the UN SCoG. The UN SCoG has several working groups including one on Capacity Development WG CD (formerly WG Education, Training and Capacity Building (ETCB)). FIG Leadership as well as Commissions 2 and 5 are working closely with WG CD to evaluate the geodetic and surveying capabilities of Nations and to catalog available training resources for surveyors around the world. Ryan Keenan is the key liaison for these connections with UN and is actively involved with the UN SCoG and a number of its WG, as well as being an individual (non-institutional) member of the inaugural International Advisory Committee (IAC) of the UN GGCE.

5.4 Cooperation with ISO

There has been ongoing interaction with ISO/TC211, the geographic information technical committee of ISO. Nic Donnelly continues as the Special Liaison from FIG to ISO/TC211. ISO TC211 has focused on maintaining and expanding the ISO Geodetic Registry to ensure all national and international reference frames and vertical datums are listed officially. This enables GIS and other programmers to accurately transform positions and measurements for FIG Members.

Commission 5 also is active in ISO/TC172/SC6 concerned with standardization of terminology, requirements and test methods for geodetic and surveying instruments, their components and accessories.

6. Events and other activities

2024

In 2024, Commission 5 supported:

- UN-GGCE – Listening Tour Webinar series with FIG/IHO/ISO, online in February 2024
- UN-GGCE – 2nd Meeting of the IAC of the United Nations Global Geodetic Centre of Excellence & 4th Plenary Meeting of SCoG in Bonn, Germany in March 2024
- FIG Africa Mentoring Program 2024
- The FIG Working Week hosted by Ghana in May 2024
    - RFIP Workshop as a pre-event
    - Five Commission specific technical sessions
    - One joint technical session with Commission 6
    - Supporting the UN-GGIM specific meetings
- UN-GGIM Plenary of Experts on Geodesy - in New York, United States in August 2024
- Geodetic Engineers of Philippines – Professional Regulation Board, Manila, Philippines in August 2024
- FIG Commission 7 with Commission 5, LADM, STDM and Geoinformation Week 2024- Kuching, Malaysia in in September 2024
- UN ICG 18th Meeting in Wellington, New Zealand in October 2024
- FIG Regional Technical Seminar hosted by Nepal in November 2024
- Active involvements in preparations for the FIG Working Week 2025 in Brisbane, through membership of the Local Organising Committee (LOC).

2025

In 2025, Commission 5 plans to support:

- UN-GGCE – 3nd Meeting of the IAC of the United Nations Global Geodetic Centre of Excellence & 4th Plenary Meeting of SCoG in Bonn, Germany in March 2025
- The FIG Working Week hosted by Australia in April 2025
    - RFIP Workshop as a pre-event
    - Six Commission specific technical sessions
    - One joint technical session with Commission 6 // IAG
    - Supporting the UN-GGIM specific meetings
- UN-GGIM Plenary of Experts on Geodesy - in New York, United States in August 2025
- UN ICG 19th Meeting in Busan, South Korea in October 2025
- Active involvements in preparations for the FIG Congress 2026 in Cape Town
- EuroCOW - European Workshop on Calibration And Orientation 16 to 18 June Warsaw Poland.

7. Communication and Publications

Commission 5 has issued numerous reports and periodic newsletters to our delegates. These information can also be found on websites:

- http://www.fig.net/organisation/comm/5/index.asp
- https://www.linkedin.com/showcase/fig-commission-5-positioning-and-measurement/?viewAsMember=true
- GIM International article on FIG's Ongoing Contribution to Resilient and Impactful Surveying Spring 2024)

Ryan Keenan

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January 2025

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