

Welcome to the Commission 5 Open Meeting



FIG WORKING WEEK 2017
Surveying the world of tomorrow –
From digitalisation to augmented reality
May 29 - June 2 **Helsinki Finland**



Outline

- Welcome
- FIG
- UN resolution on *Global Geodetic Reference Frame*
- FIG Commission 5 2015-18
- Technical programme in Helsinki
- Coming events
- Open discussion



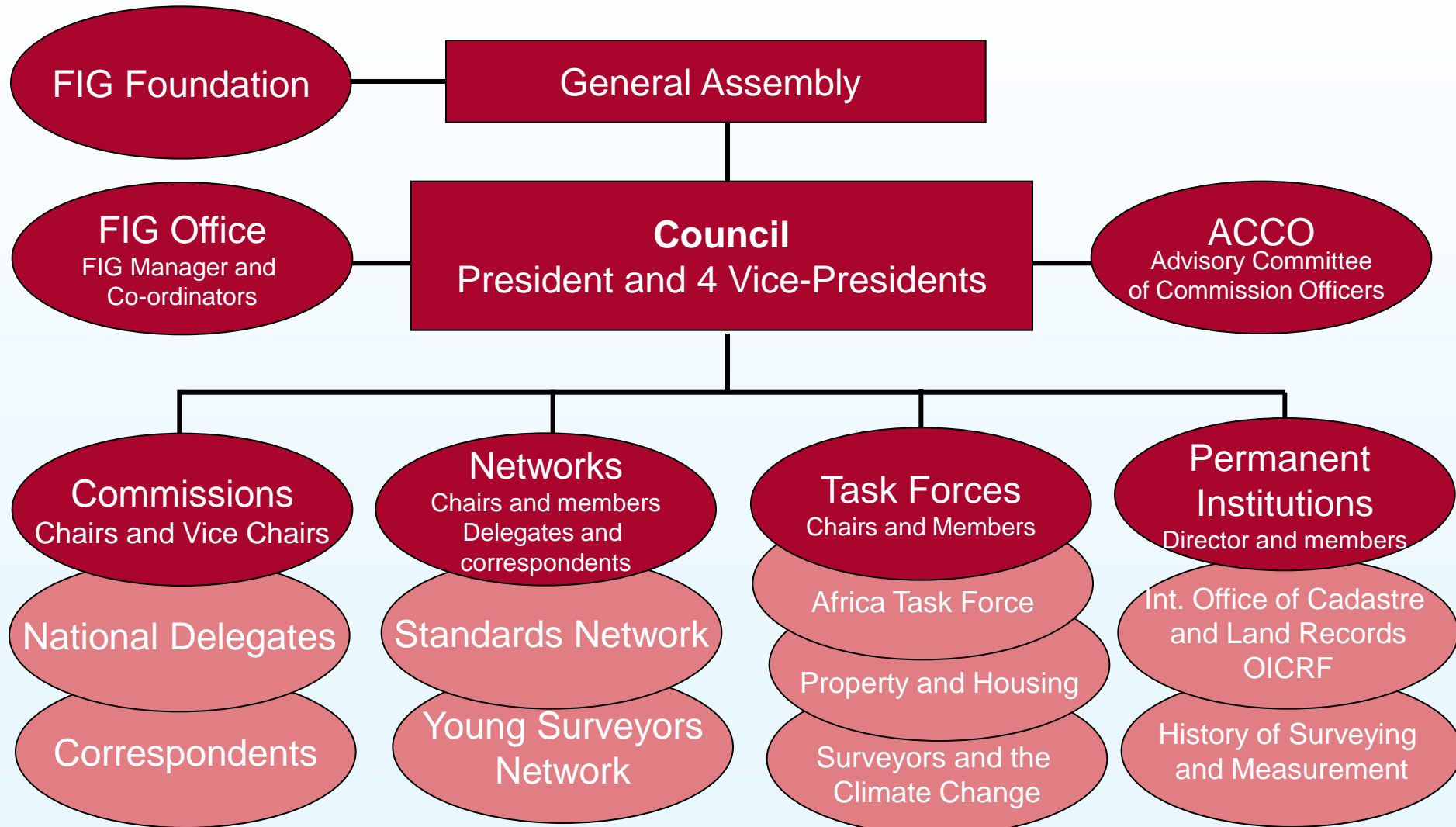
International Federation of Surveyors
Fédération Internationale des Géomètres
International Vereinigung der Vermessungsingenieure

What is FIG?

- Established in 1878 in Paris by 7 member associations (Belgium, France, Germany, Italy, Spain, Switzerland and UK)
- Federation of national associations
- Only international body representing all surveying disciplines
- UN-recognised non-governmental organisation (NGO)



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FIG Council



**From left: Vice President Prof. Dr. Rudolf Staiger, Germany,
Vice President Mikael Lilje, Sweden,
President Dr. Chryssy Potsiou, Greece,
Vice President Orhan Ercan, Turkey and
Vice President Diane Dumashie, United Kingdom**



International Federation of Surveyors
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FIG Office and administration



Complex housing the FIG Office, Copenhagen



Louise Friis-Hansen
Director



Claudia Stormoen Pedersen
FIG Event and support
Manager



Maria Bargholz
Finance and
Administration



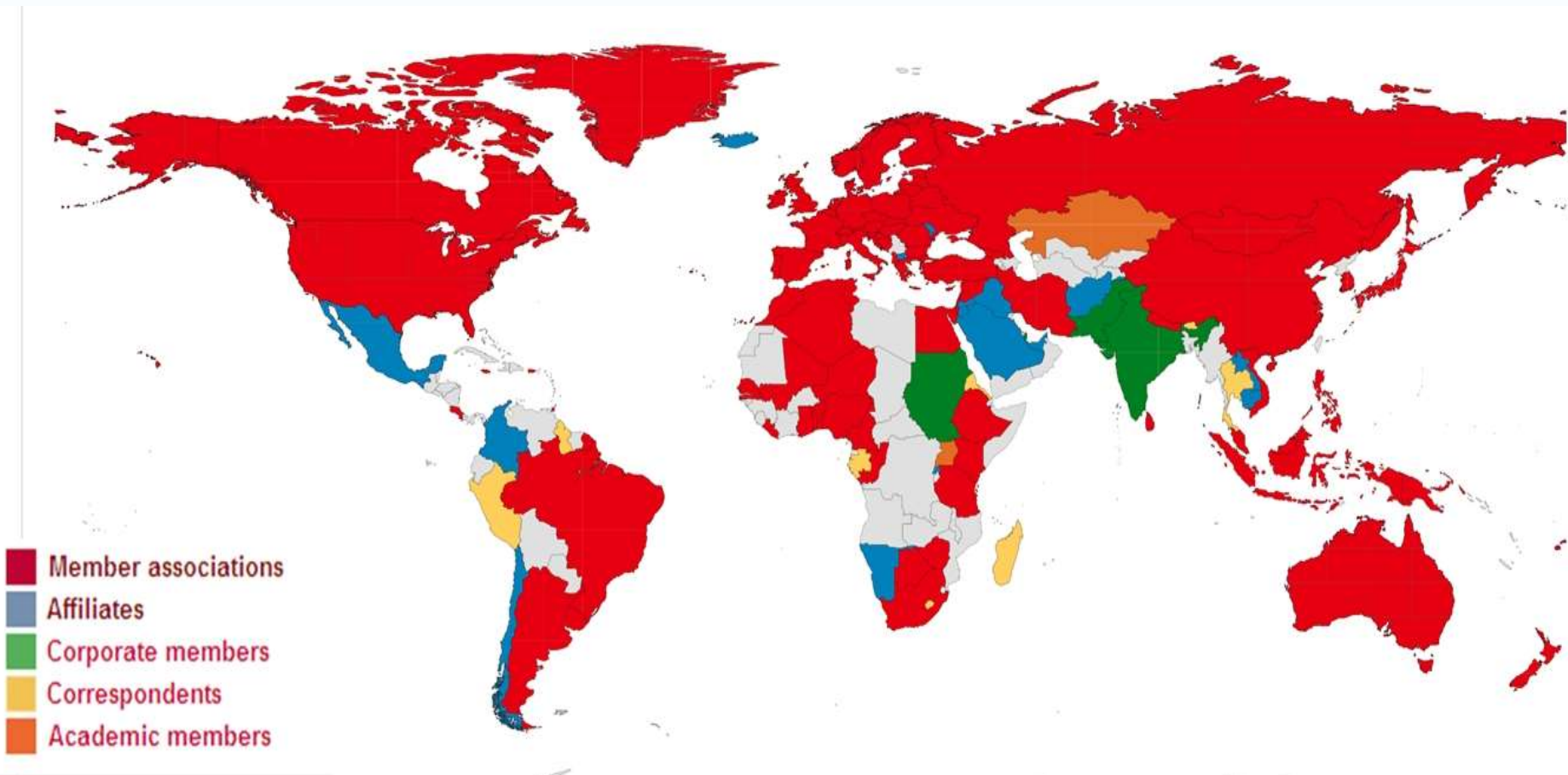
Wu Qiong
FIG Support



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Members

- **121 countries represented in 2015 – more than 300,000 individuals**





International Federation of Surveyors
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Members

Membership categories:

- 101 member associations from 88 countries
- 45 affiliate members from 43 countries
- 92 academic members from 58 countries
- 25 corporate members

- 1 correspondents
- 6 honorary presidents
- 32 honorary members



International Federation of Surveyors
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FIG Foundation

Building a Sustainable Future



Provides grants and scholarships, promoting high standards of surveying education, encouraging research activities and promoting the exchange of young surveying personnel.

FIG Commissions

- Com 1: Professional Standards and Practice
- Com 2: Professional Education
- Com 3: Spatial Information Management
- Com 4: Hydrography
- **Com 5: Positioning and Measurement**
- Com 6: Engineering Surveys
- Com 7: Cadastre and Land Management
- Com 8: Spatial Planning and Development
- Com 9: Valuation and the Management of Real Estate
- Com 10: Construction Economics and Management

FIG International Cooperation

With **United Nations agencies**

e.g. UN Office for Outer Space Affairs (UN OOSA);

*in particular the ICG – International Committee on GNSS
and UN Global Geospatial Information Management (UN GGIM)*

*in particular UN GGIM AP Working Group 1 (Geodetic
Reference Framework for Sustainable Development)*

With **international professional organisations** in surveying disciplines as:

International Association of Geodesy (IAG);

International Society for Photogrammetry and Remote
Sensing (ISPRS) and

The Institution of Navigation (ION)

FIG Commission 5 2015-18

Mission statement - The five "F";

- **F**ocus on modern technologies, technical development and assist surveyors through guidelines and recommendations
- **F**acilitate and follow technical development through collaboration with other commissions and other international organisations
- **F**oster and support research and development and stimulate new ideas.
- **F**ormulate and formalise collaboration with manufacturers on the improvement on instruments and associated software
- **F**IG Events – use these to present and promote the work of the Commission and its working groups



FIG Commission 5

- Positioning and Measurement

2015-2018



Chair: **Volker Schwieger**, Germany

Vice-Chair of Administration: **Li Zhang**, Germany

WG 5.1: Standards, Quality Assurance and Calibration
(David Martin, France)

WG 5.2: 3D Reference Frames (Nic Donnelly, New Zealand)

WG 5.3: Vertical Reference Frames (Kevin Kelly, USA / Dan Roman, USA)

WG 5.4: GNSS (Neil D Weston, USA / Suelynn Choy, Australia)

WG 5.5: Multi-Sensor-Systems (Allison Kealy, Australia /
Guenther Retscher, Austria / Joint with IAG /Com. 6)

WG 5.6: Cost Effective Positioning (Leonid A. Lipatnikov, Russia)

Working Group 5.1 - Standards, Quality Assurance and Calibration



- Examine and review the relevant standards, quality assurance, best practice, testing and calibration aspects of surveying.
- Present and promote the use of positioning and measurement standards and guidelines to the surveying profession.
- Provide an interface to the technical committees (TCs) within the International Standards Organization (ISO)
 - ISO TC 211 – Geographic Information / Geomatics,
 - TC 172 SC6 – Geodetic and Surveying Instruments
 - Guide to Uncertainty in Measurement (GUM) and its supplements

Working Group 5.1 - Standards, Quality Assurance and Calibration



- Special Session on ISO TC211 at a FIG Working Week
- Assist other Commission Working Groups to implement Standards from TC 172/SC 6 and ISO TC211 as appropriate
- Publication regarding the implementation of the “Guide for the expression of uncertainty in measurements” (GUM) for surveying
 - Draft publications will be presented at FIG Working Weeks during the term of this plan
 - Working group final report and outcomes will be presented at dedicated session, FIG Congress, 2018.

Working Group 5.2 - Reference Frames



Introduction

- FIG liaison to ISO/TC211
- Focus on geometric reference frames
- Practical focus on implementation and use of reference frames, particularly as it applies for surveyors
- Close links with IAG Commission 1 – Reference Frames

Working Group 5.2 - Reference Frames



Work Focus

- Reference Frames in Practice Workshops
 - Singapore, July 2015, focus on vertical reference frames
 - Christchurch, 2016, focus on kinematic reference frames and deformation
- Publication on Reference Frame Case Studies
 - Cover, by way of example, how different types of reference frame are used
 - Focus on usage by professionals – how can they maximise value?
 - Global (eg ITRF, WGS84)
 - Regional (eg EUREF, APREF)
 - Local/National (NAD83, GDA94)
- Geodesy “education” via Wikipedia, Navipedia etc

Working Group 5.2 - Reference Frames



Technical Seminar on Reference Frames in Practice Reference Frames, Datum Unification and Kinematics 1-2 May 2016 at Rydges Latimer, Christchurch, New Zealand

Technical Content

Key topics covered were:

- Introduction to 3D Reference Frames
- Introduction to Vertical Reference Frames
- Kinematic Frames and Deformation Modelling
- International Geodesy Initiatives
 - APREF and UN-GGIM
 - Geodetic Initiatives at ISO
- Geodetic Infrastructure
 - Template for Developing a National Reference Frame
 - International GNSS Service
 - Multi-GNSS
- Geodetic Software
 - SINEX Manipulation
 - RTKLIB
 - SNAP
- Case Studies
 - Australia
 - Fiji
 - Japan
 - Nepal
 - New Zealand
 - Philippines
 - Poland
 - USA



Working Group 5.2 - Reference Frames



Technical Seminar on Reference Frames in Practice
Reference Frames, Datum Unification and Kinematics
1-2 May 2016 at Rydges Latimer, Christchurch, New Zealand





Working Group 5.3 - Vertical Reference Frames



- **Education on global vertical reference frames and height systems**
 - practical aspects
 - implementation of new geopotential datums
 - access using geoid height models and a geometric datum
 - redefining heights on existing bench marks to serve as secondary control
 - ties between height systems and local and global mean sea level
 - Liaise with IAG, UN-GGIM, ISO TC 211 and others



Working Group 5.3 - Vertical Reference Frames



- **Work Plan**

- VRF workshops and paper sessions
 - VRF Workshop at SEASC 2015 in Singapore
 - RFIP/VRF workshop at FIG WW 2016 in Christchurch
 - VRF Workshop at IAG-IASPEI Scientific Assembly 2017 in Kobe
- Review paper on VRF and height systems
- VRF in Practice pre-recorded webinar series
 - Practical implementation of VRF



Working Group 5.4 - GNSS



Goals

- Review of web-based automated positioning services
- Review of positioning techniques using GNSS
- Explore research and applications using real time networks
- GNSS products and services
- Collaborate with the International Committee on Global Navigation Satellite Systems (ICG) and IAG WG4.5.2 Precise Point Positioning and Network-RTK

Workshops

- Develop and present seminars on reference frames, GNSS and positioning
- Develop special sessions at FIG Working Weeks and Conferences

FIG Publications

- Precise Point Positioning
- GNSS Advancements



Working Group 5.4 - GNSS



Cost Effective GNSS Positioning Techniques



FIG Commission 5 Publication
2nd Edition

2010 and 2014

**Currently working on... Low Cost Precise Positioning,
together with WG 5.6**



Working Group 5.5 / IAG - Multi-Sensor-Systems



- **This group is a joint working group between FIG and IAG. It focuses on the development of shared resources that extend our understanding of the theory, tools and technologies applicable to the development of multi sensor systems. 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 etc.
- Establishing links between the outcomes of this WG and other IAG and FIG WGs (across the whole period)
- Generating formal parameters that describe the performance of current and emerging positioning technologies that can inform FIG and IAG members.

Working Group 5.5 / IAG - Multi-Sensor-Systems



- **Specific project(s)**
- International field experiments and workshops on a range of multi sensor systems and technologies.
- Evaluation of UAV capabilities and the increasing role of multi-sensor systems in UAV navigation.
- Investigate the role of vision based measurements in improving the navigation performance of multi sensor systems.
- Development of shared resources to encourage rapid research and advancements internationally.
- **Workshops**
- Special Sessions at Working Weeks and Supporting Special international conferences and symposia including: Mobile Mapping Symposium, ION GNSS, IGNSS Australia, IPIN, etc.
- **Publications**
- A number of papers will be submitted to relevant conferences and technical journals. A special journal edition of papers from the Mobile Mapping Symposium in 2015 will be supported.

Working Group 5.6 - Cost-Effective Positioning



Policy issues

- ⇒ Educate FIG member associations and individual surveyors on when to use which surveying instrument or software taking into account economic reasons
- ⇒ Design fit-for-purpose cost-effective surveying systems
- ⇒ Support decision makers for establishing cost-effective positioning solutions

Chair

- ⇒ Leonid A. Lipatnikov (Russia) e-mail: l.lipatnikov@ssga.ru

Specific project(s)

- ⇒ Development of guidelines for cost-effective use and design of survey solutions including costs for labour and investment

Working Group 5.6 - Cost-Effective Positioning



Workshops

⇒ FIG workshop with Commissions 3 and 7

Publications

⇒ FIG Publication on cost-effective surveying techniques

Timetable

⇒ Working group final report and outcomes will be presented at dedicated session, FIG Congress, 2018.

Beneficiaries

⇒ FIG member associations, academic and research institutions, spatial data acquisition specialists, GIS developers and users, surveying businesses, individual surveyors mainly dedicated to developing countries.

Technical Seminar on Cost Effective Positioning and Geo Data (20 April 2017)



- The Seminar was held within the frame of the XIII International Exhibition and Scientific Congress "Interexpo GEO-Siberia 2017" in Novosibirsk, Russia.
- The total number of attendees at the Seminar was more than 60.
- 6 Presentations mostly in the area of (cost-effective) GNSS
- Organization: Leonid Lipatnikov, Chair of FIG Working Group 5.5
- Great social event



Technical Program in Helsinki

FIG 2017 Commission 5 Work Plan Overview						
Time / Day	29 May - Monday	30 May - Tuesday	31 May - Wednesday	1 June - Thursday		2 June - Friday
8:00 - 18:00	Registration	Registration	Registration	Registration		
9:00 - 10:30	FIG General Assembly Part 1	Opening Ceremony	Plenary Session 2	Plenary Session 3		
10:30 - 11:00	Tea/Coffee Break	Tea/Coffee Break Opening of exhibition	Tea/Coffee Break	Tea/Coffee Break		Tea/Coffee Break
11:00 - 12:30		Plenary Session 1	TS03C -UN Resolution on GGRF Room 103A Volker Schwieger [C] Rob Sarib [R]	TS06C -Classical and Emerging Positioning Techniques Room 103A Kevin Kelly [C] Suelynn Choy [R]	TS06J -FIG Standards Network Room 217 David Martin [C] Nic Nonnelly [R]	FIG General Assembly Part 2
12:30 - 14:00	Lunch	Lunch	Lunch	Lunch		Lunch
14:00 - 15:30	FIG General Assembly Part 1	TS01C -Tectonic Movement Room 103A Nic Donnelly [C] Kevin Kelly [R]	TS04C -Geodynamic Effects on Reference Frames Room 103A Mikael Lilje[C] Dan Roman [R]	TS07C -GNSS I Room 103A Suelynn Choy [C] Heidi Kuusniemi [R]		FIG General Assembly Part 2
15:30 - 16:00	Tea/Coffee Break	Tea/Coffee Break	Tea/Coffee Break	Tea/Coffee Break		Farewell Reception
16:00 - 17:30	Steering Committee (16:00-17:30) Room 214	TS02C -UAV and Photogrammetric Methods Room 103A David Martin [C] Daniel Roman [R]	TS05C -Reference Systems and Frames Room 103A Dan Roman [C] Rob Sarib [R]	TS08C -GNSS II Room 103A Heidi Kuusniemi [C] Suelynn Choy [R]		
17:30-18:30			Commission 5 Annual Meeting (17:30-18:30) in Room 103A	Charity Run/ Walk	Steering Committee Room 103A (17:30-18:30)	
Evening	Welcome Reception at City Hall of Helsinki, Pohjoisesplanadi 11-13 (19:00-20:00)	Finnish Evening/ FIG Foundation Dinner (from 19:00)in Hotel Crowne Plaza, Helsinki (Mannerheimintie 50)	Commision 4,5,6 Dinner TBD (from 19:00?)	Gala Dinner in Finlandia Hall (Mannerheimintie 13) (from 19:00)		

Coming events

- Technical Seminar on Reference Frame in Practice Workshop in Kobe, Japan 29-30 July 2017
- Technical Session at Intergeo 2017, 26-28 September 2017 in Berlin, Germany
- Technical Seminar on Reference Frame in Practice Workshop in Istanbul, Turkey, May 2018
- FIG Congress 2018, 06-11 May, Istanbul, Turkey

Discussion