

## **FIG Commission 5 – Positioning and Measurement**

### **Work Plan 2007–2010**

#### **1 Title**

Positioning and Measurement.

#### **2 Terms of Reference**

- The science of measurement (instrumentation, methodology and guidelines)
- The acquisition of accurate and reliable survey data related to the position, size and shape of natural and artificial features of the earth and its environment and including variation with time.

#### **3 Mission statement**

- Focus on modern technologies and technical developments and assist individual surveyors, 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 and other international organisations; participation in appropriate meetings; and the preparation of 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 working weeks and other relevant technical meetings and in appropriate FIG and other media.

#### **4 General**

This work plan covers the development, use and integration of technologies for positioning and measurement and the associated standardisation, best practice and fundamental reference frame issues. Many of the issues are global in nature and Commission 5, working with like-minded Sister Associations, is well placed to deal with them. FIG Council has also asked the Commissions to cooperate with United Nations Agencies to address global problems such as sustainable development and humanitarian needs. The disciplines covered by Commission 5 are at the heart of delivering 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 Reference Frames and associated infrastructure and contribution to appropriate Continuing Professional Development programs.

In addition to the specific activities above, the Commission will support and contribute to FIG Task Forces and the Standards Network. The Commission will also respond to the FIG Council to address new issues as they emerge.

## 5 Working Groups

### Working Group 5.1 – Standards, Quality Assurance and Calibration

#### Policy Issues

- Influence the development of standards affecting positioning and measurement instruments and methods, in collaboration with the FIG task force on standards and through participation in the relevant Technical Committees (TCs) of the International Standards Organisation (ISO) and other appropriate bodies.
- Acceptance controls, quality assurance and certification and their impact on the surveying profession.
- Checking and calibration of measuring instruments.
- Assist other Commission Working Groups to implement Standards from ISO TC211 as appropriate.

#### Chair

- David Martin (France), e-mail: martin@esrf.fr

#### Specific project(s)

- Transform the existing recommendations on the Use and Calibration of EDM (FIG-Publication 7/1994) in a digital document and make it available on the FIG-Website
- Actualise the above mentioned EDM-Standards
- Present and promote the use of standards and guidelines to the surveying community.
- Establish guidelines and recommendations for instruments taking into account latest development in surveying technology.
- Guidelines and Recommendations for the ISO Guide to Uncertainty of Measurements.
- Review Standards coming from ISO TC211 for relevance to Positioning and Measurement.
- Contribution to the new GPS related Work Item of ISO TC 172 SC6, in cooperation with Working Group 5.4.

#### Workshop(s)

- Participation in FIG Working Weeks and other major Commission events (see events section below) with dedicated Technical Sessions and/or Workshops as appropriate.

#### Publication(s)

- Recommendations for the Use and Calibration of EDM
- FIG Working Weeks will include Technical Papers on specific issues and presented by Working Group Members and other invited experts.
- Guidelines for instruments taking into account latest development in surveying technology.

#### Timetable

- Draft publications will be presented at FIG Working Weeks during the term of this plan and according to a timetable to be developed by the Working Group Chair.

- Working group final report: dedicated session, FIG Congress, 2010.

### Beneficiaries

- FIG member associations, manufacturers and users of survey equipment, governments, standardisation organisations, decision makers, GIS developers and users, surveying businesses, individual surveyors.

## **Working Group 5.2 – Reference Frame in Practice**

### Policy issues

- Work to bring together all organisations involved in defining or using reference frames to develop common approaches and avoid duplication. Such organisations include FIG, the International Association of Geodesy (IAG), ISO, groups of national mapping agencies, other influential national agencies (such as the US Department of Defence's National Geospatial-Intelligence Agency (NGA), which is responsible for WGS84.) and alliances of commercial organisations (such as Open GIS Consortium and the European Petroleum Survey Group).
- Continue the existing co-operation with IAG on the African Reference Frame Project (AFREF) as well as facilitate similar actions on other continents such as South America and Asia.
- Provide background technical information on relevant issues written in a way that is accessible to the surveying practitioners.
- Develop an inventory of approaches to reference frame issues in different countries (including transformation methodologies) that is accessible to surveying practitioners.
- Examine the concepts of dynamic and semi-dynamic datums.
- Examine how surveying practitioners are changing how they access the reference frame, through less emphasis on networks of ground monuments and more emphasis on Global Navigation Satellite Systems (GNSS) base stations.
- Examine global positioning services such as OmniSTAR and StarFire and their use for positioning in a national reference frame
- Examine the increased use of GNSS for height determination as well as the use of geoid models for connection to local height datums.
- Examine the role that the satellite missions GRACE, GOCE and CHAMP will have on global geoid models
- Examine the increasing role of aerial and space based imagery in the realisation of reference frames.
- Liaise with Commission 4 to review and revise (where required) FIG Publication 37, Vertical Reference Surface for Hydrography.

### Chair

- Mikael Lilje (Sweden), e-mail: mikael.lilje@lm.se

### Specific project(s)

- Initiate, contribute and facilitate meeting(s) of all organisations involved in defining or using (regional) reference frames to develop common approaches and avoid duplication.
- Continue development of Technical Fact Sheets that briefly explain basic concepts, practical applications and issues and which summarise the activities of organisations with specific responsibilities in the field.

- Ensure terminology used in above publications conform to and give substance to the relevant Standards coming from ISO TC211.
- Ensure that the working group web page is running and updated.

#### Workshop(s)

- Participation in FIG Working Weeks and other major Commission events (see events section below) with dedicated Technical Sessions and/or Workshops as appropriate.
- Seminars and meetings involving key organisations involved in defining or using (regional) reference frames will be convened at a venue, time and date to be confirmed by the Working Group Chairs.
- Symposium on Applications of Permanent GPS/GNSS Networks. WG 5.2 and WG 5.3 event.

#### Publication(s)

- Web page.
- FIG Working Weeks will include Technical Papers on specific issues and presented by Working Group Members and other invited experts.
- Technical Fact Sheets as outlined above.
- Working group final report will be presented at FIG Congress, 2010.

#### Timetable

- Draft publications will be presented at FIG Working Weeks during the term of this plan and according to a timetable to be developed by the Working Group Chairs.
- Working group final report: dedicated session, FIG Congress, 2010.

### **Working Group 5.3 – Integrated Positioning, Navigation and Mapping Systems**

#### Policy issues

While this is a new focus, it includes the topics covered by the previous Working Groups 5.3 and 5.4 (during 2002 to 2006) and extends to cover technology generally.

- Issues associated with ongoing and rapid developments in Integrated Positioning, Navigation, and Mapping systems, including performance and applications of such systems and guidelines for their use.
- Ensuring FIG input to planning associated with programs of GPS Modernisation and GNSS Development.

#### Co-Chairs

- Andrew Hunter and Naser El-Sheimy (Canada), e-mail: ahunter@ucalgary.ca

#### Specific project(s)

- Report on the development, possibilities and limitations of new technologies.
- Prepare guidelines for practitioners on making the best use of systems to achieve the results required for particular applications.
- Develop FIG input to GPS Modernisation and GNSS Development.
- Collaborate with other Commissions and other international organisations (including IAG and ISPRS) and with equipment, software and service providers.
- Continue commitment to relevant inter-disciplinary events including the series of Symposia on Mobile Mapping (joint with IAG and ISPRS).

### Workshop(s)

- Participation in FIG Working Weeks and other major Commission events (see events section below) with dedicated Technical Sessions and/or Workshops as appropriate.

### Publication(s)

- Guidelines on making the best use of emerging systems.

### Timetable

- Draft publications will be presented at FIG Working Weeks during the term of this plan and according to a timetable to be developed by the Working Group Chair.
- Working group final report: dedicated session, FIG congress, 2010.

### Beneficiaries

FIG member associations, manufacturers and users of survey equipment, governments, standardization organizations, decision makers, GIS developers and users, surveying businesses, individual surveyors.

## **Working Group 5.4 – GNSS – Global Navigation Satellite Systems**

### Policy issues

- Cooperation with all organisation involved in the field of GNSS e.g. IAG and ISO.
- Maintaining contact with GNSS receiver and equipment manufactures to provide state-of-the-art information to the users.
- Cooperation with Commissions 3, 4, 6 and 8 regarding GNSS integration into GIS respectively GNSS for disaster risk management as well as GNSS applications in hydrography and engineering surveys..
- Providing technical GNSS background information on relevant issues for surveying practitioners via web pages, tutorials and workshops.
- Development of recommendations regarding procedures to check GNSS equipment.
- Contribute to FIG input to GPS modernisation and GNSS development
- Prepare the surveying profession for GNSS-mass-markets (e.g. Location Based Services, traffic applications,...) as well as required technologies (e.g. assisted GPS, car navigation technology).

### Chair

- Volker Schwieger (Germany), e-mail: volker.schwieger@iagb.uni-stuttgart.de

### Study Groups

#### Study Group 5.4.1 – Cost-effective GNSS

- Analysis of current “low-cost” GNSS markets (e.g. LBS, traffic) including additional necessary technologies like e.g. odometers, mobile phones
- Recommendations for surveyors to infiltrate these markets
- Development of methods to use “low-cost” GPS for precise applications
- Report on cost-effective GNSS

#### Study Group 5.4.2 – GNSS networks (together with WG 5.2)

- Analysis and review of GNSS network technologies for practitioners
- Analysis of the importance of site calibrations of permanent networks
- Analyse and compare different commercial and non-commercial GNSS networks
- Organise Workshops(s) on GNSS networks

#### Study Group 5.4.3 – Precise GNSS

- Develop and publish methods for GNSS heighting
- Develop and publish investigations regarding the GNSS/tachometer combinations
- Contact with GNSS equipment manufacturers
- Provide newest technical background information to the practitioners
- Develop input to discussions on GPS modernisation and GNSS development, e.g. through the UN mandated International Committee on GNSS (ICG).

#### Study Group 5.4.4 – GNSS calibration and check (together with WG 5.1)

- Development of procedures and recommendations for checking GPS equipment
- Recommendations for the calibration of GPS antennas and permanent GPS sites
- Cooperation with standard organisations (e.g. ISO)
- Organisation of scientific workshops and tutorials for practitioners
- Discussion with GNSS equipment manufacturers about procedures

#### Workshops

- Participation in FIG Working Weeks, Regional Conferences as well as other major Commission 5 events in special technical sessions
- GNSS tutorials (fundamentals and practice relevant information, possibly including practical training) e.g. at Working Weeks and Regional Conferences in cooperation with local organizers, especially for “surveying practitioners”
- International Workshop on GNSS for Practitioners (engineering geodesy companies, state survey, cadastral administration) together with all Working Groups of Commission 5 and partners like IAG or the Institute of Navigation where appropriate.
- Specialised International Workshops on GNSS calibration (antenna, site, multipath) and on GNSS networks (together with WG 5.2).

#### Publications

- Technical Papers at Working Weeks, Regional Conferences and Commission 5 Symposia and Workshops
- Recommendations for Calibration of GPS antennas and Check of GPS Measurement Systems (together with WG 5.1 and relevant institutions like e.g. ISO).
- Report on possibilities of cost-effective GNSS techniques for developing countries.

## Timetable

Report and recommendations should be presented (and published) on next FIG Congress 2010.

## **6 Co-operation with Other Commissions**

Commission 6.

## **7 Co-operation with United Nation Organisations, Sister Associations and other Partners**

Commission 5 is the lead Commission for FIG's Memorandum of Understanding with the United Nations Office for Outer Space Affairs. GNSS will be the focus of cooperative activities from 2007 to 2010.

Commission 5 is also committed to cooperation with Sister Associations, especially those with which FIG has a Memorandum of Understanding. Commission 5 has specific liaison interest with the International Association of Geodesy (IAG) and the International Society for Photogrammetry and Remote Sensing (ISPRS). The Commission 5 Steering Committee will ensure that Working Group activities and Commission 5 events further these goals of cooperation with Sister Associations.

Commission 5 is also committed to the new Cooperation Agreement with the US based Institute of Navigation (ION) and will undertake activities as agreed with ION, especially in relation to GNSS.

## **8 Commission Officers**

Commission Chair

Prof. Dr.-Ing. Rudolf Staiger

Fachbereich Vermessung und Geoinformation, University of Applied Sciences Bochum

Lennerhofstrasse 140

D-44801 Bochum

GERMANY

Tel. + 49 234 32 10547

Fax + 49 234 32 14735

E-mail: [rudolf.staiger@fh-bochum.de](mailto:rudolf.staiger@fh-bochum.de)

Vice Chair of Administration

Rob Sarib, Manager Survey Services – Darwin

Land Information – Office of the Surveyor General, Dept. Planning and Infrastructure

GPO Box 1680

Darwin

Northern Territory 0801

AUSTRALIA

Tel. + 61 8 8999 6081

Fax + 61 8 8999 7750

E-mail: [robert.sarib@nt.gov.au](mailto:robert.sarib@nt.gov.au)

Chair of Working Group 5.1

David Martin

Alignment and Geodesy Group, ESRF

6 rue Jules Horowitz  
BP220  
38043 Grenoble Cedex  
FRANCE  
Tel. + 33 4 76 88 22 45  
Fax + 33 4 76 88 23 13  
E-mail: martin@esrf.fr

Chair of Working Group 5.2  
Mikael Lilje, Head of Reference Frame Section  
Geodetic Research Division, Lantmäteriet  
SE-801 82 Gävle  
SWEDEN  
Tel. + 46 26 633 742  
Fax + 46 70 208 95 71  
E-mail: mikael.lilje@lm.se

Co-Chairs of Working Group 5.3  
Andrew Hunter  
Department of Geomatics Engineering, The University of Calgary  
2500 University Dr. N.W. Calgary  
Alberta  
CANADA T2N 1N4  
Tel. + 1 403 220 7377  
Fax + 1 403 284 1980  
E-mail : ahunter@ucalgary.ca

Dr. Naser El-Sheimy  
Department of Geomatics Engineering, The University of Calgary  
2500 University Dr. N.W. Calgary  
Alberta  
CANADA T2N 1N4  
Tel. + 1 403 220 7587  
Fax + 1 403 284 1980  
E-mail: naser@geomatrics.ucalgary.ca

Chair of Working Group 5.4  
Dr.-Ing.habil. Volker Schwieger  
University Stuttgart, Institute for Applications of Geodesy to Engineering  
Geschwister-Scholl-Strasse 24D  
D-70174 Stuttgart  
GERMANY  
Tel. + 49 711 685 84064  
Fax + 49 711 685 84044  
E-mail: volker.schwieger@iagb.uni-stuttgart.de