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**REPORT**  
**International Federation of Surveyors:**  
**Spatial Enablement towards Managing All Information Spatially**

***Executive Summary***

The *International Federation of Surveyors* is an international, non-government organization whose current vision (2011 – 2014) is for a Profession, armed with knowledge and best practices, extending the usefulness of surveying for the benefit of society, environment and economy, with the Profession increasingly positioned in significance and relevance. FIG supports international collaboration for the extension and progress of surveying in all its discipline, fields and applications.

Founded in 1878, FIG is an UN-recognized non-government organization (NGO), with a membership from 119 countries spread across the world with an aim to ensure that the disciplines of surveying and all who practise them meet the needs of the communities and markets that they serve.

This report will inform UNRCC-AP on the ongoing role of FIG, the situation within FIG, in particular it's membership base and its technical work through the then Commissions and Task Forces. The various international collaboration, bringing together the collective will and desire to ensure that the discipline of surveying contributes towards addressing the many challenges faced by humanity today.

The report will also inform on the output of the FIG Task Force on Spatially Enabled Society, namely FIG Publication Number 58 on Spatially Enabled Society that was realised with the collaboration of GSDI and PCGIAP-WG 3. It will also inform on the collaborative Expert Group Meeting on Spatially Enabled Government and Society as well as the PCGIAP International Symposium on Spatially Enabled Government and Society with the theme “towards spatial maturity” and the realization of the important Kuala Lumpur Declaration on Spatially Enabled Government and Society.

This report considers spatial enablement and its role in managing all information spatially and will conclude with a discussion on the current realities and coming horizon.

## REPORT



# International Federation of Surveyors: Spatial Enablement towards Managing All Information Spatially

## Preamble

The **International Federation of Surveyors** is an international, non-government organization whose current vision (2011 – 2014) is for a Profession, armed with knowledge and best practices, extending the usefulness of surveying for the benefit of society, environment and economy, with the Profession increasingly positioned in significance and relevance. FIG supports international collaboration for the extension and progress of surveying in all its discipline, fields and applications.

FIG was founded in 1878 in Paris and is also known as the Fédération Internationale des Géomètres. This has become anglicized to the International Federation of Surveyors in recent times. FIG is an UN-recognized non-government organization (NGO), with a membership from 119 countries throughout the world, and its aim is to ensure that the disciplines of surveying and all who practise them meet the needs of the markets and communities that they serve.

## The Role of FIG

FIG represents the interests of surveyors worldwide. It is a federation of the national member associations together with affiliates, academic and corporate members as well as correspondents, covers the whole range of professional discipline and fields dealing with the natural and built environment, with land (and the seas, its natural resources and structures thereon), construction and property. FIG provides for this global surveying community the international forum for discussion and professional development aiming to promote the Profession's sciences and technologies, knowledge, standards and practices and extend its usefulness.

FIG's activities are governed by a work plan, which is approved by the General Assembly and reviewed by Council as its tenure progresses. The current work plan for the period 2011 - 2014, guides Council, Commissions, Networks and Task Forces activities, focuses the surveyors' contributions to the challenges faced by humanity at these times. The theme is “**Engaging the Challenges, Enhancing the Relevance**”. Within FIG, recognizing that humanity currently faces many challenges, the Profession is committed to extend the usefulness of the Profession's sciences and technologies, knowledge and practices to address these challenges, towards the betterment of society, environment and economy. This will enhance the Profession's role and relevance in an era where the Profession itself also faces many challenges, both internal and external.

FIG recognizes that surveying sciences and technologies, surveying knowledge and practices pursue common good. The present work plan continues to build on past efforts and accomplishment, on extending the progress, achievements and global standing towards the betterment of society, environment and economy and thus enhancing the significance, role and relevance of the profession.

## The Members of FIG

FIG draws its membership from practitioners working in communities with both the public and private sectors, from the scientific, research and academic community, as well as from the spatial technologies and services community. FIG functions with the goodwill, resources and contribution of its membership and their corps of volunteers from around the world.

Membership within FIG consists of:

- *member association* – national associations representing one or more of the disciplines of surveying;
- *affiliate member* – surveying organizations or groups of surveyors, normally governmental, undertaking professional activities but not fulfilling the criteria as member association;
- *corporate member* – organizations, institutions or agencies which provide commercial services related to the profession of surveyor;
- *academic member* – organizations, institutions or agencies, which promote education or research in one or more of the disciplines of surveying; and
- *correspondent* - an individual appointed in a country where no association or group of surveyors exist that is eligible to join FIG as a member.

There are currently 105 member associations; 41 affiliate members; 97 academic members; 23 corporate members and 14 correspondents from 119 countries.

## The Technical Work of FIG

The ten commissions lead FIG’s technical work whose general terms of reference are as follows:

### *Commission 1: Professional Practice*

Chair: Ms. Leonie Newnham (Australia)

Perception of surveying profession; professional practice, legal aspects and organizational structures; standards and certification; code of ethics and applications; under-represented groups in surveying; students and young surveyors; information technology management and professional practice; project management, quality and best practice.

### *Commission 2: Professional Education*

Chair: Prof. Steven Frank (USA)

Curriculum development; learning and teaching methods and technologies; educational management and marketing; continuing professional development; networking in education and training.

### *Commission 3: Spatial Information Management*

Chair: Prof. Yerach Doytsher (Israel)

Management of spatial information about land, property and marine data; spatial data infrastructure – data collection, analysis, visualisation, standardisation, dissemination, and support of good governance; knowledge management for SIM; business models, public-private-partnerships, professional practice and administration.

*Commission 4: Hydrography*

Chair: Dr. Michael Sutherland (Canada)

Hydrographic surveying; administration of marine spaces; hydrographic education, training and CPD; marine environment and coastal zone management; data processing and management; nautical charting and bathymetric maps - analogue and digital, including electronic navigational charts.

*Commission 5: Positioning and Measurement*

Chair: Mr. Mikael Lilje (Sweden)

Geodesy and global navigation satellite system; science of measurement including 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.

*Commission 6: Engineering Surveys*

Chair: Prof. Gethin W. Roberts (United Kingdom)

Acquisition, processing and management of topometric data; quality control and validation for civil engineering constructions and manufacturing of large objects; modern concepts for setting-out and machine guidance; deformation monitoring systems; automatic measuring systems, multi-sensor measuring systems; terrestrial laser systems.

*Commission 7: Cadastre and Land Management*

Chair: Mr. Daniel Roberge (Canada)

Cadastre, land administration and land management; development of pro poor land management and land administration; development of sustainable land administration as an infrastructure for sustainable development to underpin economic growth; applications of innovative and advanced technology in cadastre and land administration; promoting the role of surveyors in land administration matters to the public and stakeholders.

*Commission 8: Spatial Planning and Development*

Chair: Mr. Wafula Nabutola (Kenya)

Regional and local structure planning; urban and rural land use planning and implementation; planning policies and environmental management for sustainable development; re-engineering of mega cities; public-private partnerships; informal settlement issues in spatial development, planning and governance.

*Commission 9: Valuation and the Management of Real Estate*

Chair: Dr. Frances Plimmer (United Kingdom)

Valuation; investment in real estate and investment planning; real estate investment vehicles; real estate, development finance and land use feasibility planning; real estate economics and markets and market analyses; management of property and property systems; management of public sector property.

*Commission 10: Construction Economics and Management*

Chair: Mr. Robert Sinkner (Czech Republic)

Construction economics, including quantity surveying, building surveying, cost engineering and management; estimating, contract documentation and tendering; commercial management including procurement, risk management and contracts; project and programme management including planning and scheduling.

## **FIG/IAG/ICG Technical Seminar Reference Frame in Practice**

FIG through its Commission 5 together with the International Association of Geodesy (IAG) and the International Committee on GNSS (ICG) with the support of the United Nations Office for Outer Space Affairs (UN-OOSA) put together and conducted a technical seminar on reference frame in practice for operational geodesists or surveyors who are working with reference frame issues either in a government or commercially based environment. The seminar, on the sideline of FIG's 2012 Working Week (General Assembly and Annual Conference), was also open to academics that have either a post-graduate or Masters degree in a surveying or related discipline. The seminar discussed issues such as the role of geodesy, global geodetic observing system (GGOS) and future trends, global terrestrial reference systems and frames, regional and national reference systems, services and initiatives of the International GNSS Service (IGS), four-dimensional deformation models for terrestrial reference frames, gravity measurement and models, realization of terrestrial reference frame realizations, multi-global navigation satellite systems (GNSS) environment as well as the standards and traceability of any terrestrial reference frames.

## **FIG Task Forces**

In addition to the ten commissions, FIG's technical work is also carried out through its four task forces; their general terms of reference are as follows.

### *Task Force on Surveyors and Climate Change (2011 – 2014)*

Chair: Prof. John Hannah (New Zealand)

The Task Force seeks to identify and investigate specific areas where surveyors have the professional expertise to contribute to studies related to climate change. This may include assessing the accuracy of relevant technologies; opportunities for spatial measuring and monitoring; providing an unbiased, pragmatic approach to data interpretation; contributing to the understanding of the datum and reference frames that underpin global measurement systems; and systems for land administration, management and settlement that may accommodate land use changes driven by climate variability and help improve productivity.

### *Task Force on Property and Housing (2011 – 2014)*

Chair: Prof. Chryssy Potsiou (Greece)

This Task Force will consider policies, challenges and opportunities; identify tools and good practices that will contribute towards adequate and sustainable housing, secure housing rights and land market; urban regeneration and redevelopment, energy efficiency and green housing within an unpredictable economic and social environment.

### *Task Force for Africa (2009 – 2014)*

Chair: Dr. Diane Dumashie (United Kingdom)

Focus of this Task Force is on the African surveying profession and how it can best contribute to meet the key challenges of poverty alleviation, economic growth, and environmental sustainability. The key purpose is to enable the surveying profession in Sub Saharan Africa to deal with social responsibility in terms of its contribution in achieving the Millennium Development Goals. In this regard, the role of the surveyors as change agents, engaging with the politicians is important. This relates to the professional status of surveyors that in turn is based on the principles of social responsibility and justice.

### *Task Force on Spatially Enabled Society (2009 – 2012)*

Chair: Dr. Daniel Steudler (Switzerland)

This Task Force explored the issue of Spatially Enabled Society; identify the role of the profession in a spatially enabled society and to make recommendations. The Task Force's efforts culminated with the FIG Publication on Spatially Enabled Society.

### **FIG Publication on Spatially Enabled Society**

FIG's Publication Number 58 on “Spatially Enabled Society” is the culmination of a three-year effort by the *Task Force on Spatially Enabled Society* that was established by the General Assembly of the Federation in May 2009. The Task Force included representations from the Global Spatial Data Infrastructure Association (GSDI) and Working Group 3 of the United Nations sponsored Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP-WG3). This is a collaborative effort led by the FIG Task Force and the publication has been compiled and edited by Dr. Daniel Steudler, Chair of the FIG Task Force on Spatially Enabled Society, and Prof. Dr. Abbas Rajabifard, immediate Past President of GSDI.

The rapid development and increased demand for spatial information infrastructures in many jurisdictions these past many years have made spatial information an invaluable tool in policy formulation and evidence-based decision-making. Spatial enablement, that is, the ability to add location to almost all existing information, unlocks the wealth of existing knowledge about social, economic and environmental matters, play a vital role in understanding and addressing the many challenges that we face in an increasingly complex and interconnected world.

Spatial enablement requires information to be collected, updated, analysed, represented, and communicated, together with information on land ownership and custodianship, in a consistent manner to underpin good governance of land and its natural resources, whole-of-government efficiency, public safety and security, towards the well being of societies, the environment and economy.

The main issue societies have to focus on is probably less about spatial data, but much more about "managing all information spatially". This is a new paradigm that still has to be explored, deliberated and understood in the context of a spatially enabled society.

This collaboration between FIG, GSDI and PCGIAP WG3 has allowed for the participation and contribution from contributors and authors with varied expertise, from differing backgrounds and in different regions of the world.

This group of contributors and authors focused essentially on six fundamental elements, which are required to realise the vision of a spatially enabled society, namely –

- legal framework to provide the institutional structure for data sharing, discovery, and access;
- sound data integration concept to ensure multi-sourced data interoperability and integration;
- positioning infrastructure to enable and benefit from precise positioning possibilities;
- a spatial data infrastructure to facilitate data sharing, to reduce duplication and to link data producers, providers and value adders to data users based on a common goal of data sharing;

- land information, as the dominant issue in the interactions between government, businesses and citizens relating to land and water resources; and
- data and information to respect certain basic principles and to increase the availability and interoperability of free to re-use spatial data from different actors and sectors.

The Task Force identified these six elements, which are critical to the realization of a spatially enabled society. Without these six elements, the spatial enablement of a government or a society would seriously be held back in its progress.

Surveying professionals play a primary role in translating raw data into useable spatial knowledge and resource. The Professions should ensure that both the social and technical systems in which spatial enablement will operate within are well understood. Spatial enablement can only be effective when it is designed to serve specific needs within the jurisdiction in mind.

The concept of spatially enabled society is offering new opportunities for government and the wider society, but needs to move beyond the current tendency for the responsibility to achieve spatial enablement and spatial maturity to lie solely with governments. Spatially enabled society will be more readily achieved by increasing involvement from the private sector, and in the same vein, if the surveying and spatial industries start to look toward other industries for best practices in service delivery.

Future activities need to take into account emerging trends in spatial information and managing all information spatially and where new opportunities arise for the application of spatial technologies and geographic information. These trends include among others:

- location as the fourth element of decision making;
- differentiating between authoritative and volunteered information, yet recognizing the importance and value of both types of information towards spatial enablement and the enrichment of societies;
- growing awareness for openness of data;
- move towards service provision.

### **PCGIAP WG 3 – FIG – GSDI Expert Group Meeting on Spatially Enabled Government and Society**

The Expert Group Meeting (EGM) on 14<sup>th</sup> February 2012 convened by PCGIAP Working Group 3, FIG Task Force on Spatially Enabled Society and the GSDI Association on the sideline of the UNRCC-PCGIAP International Symposium on Spatially Enabled Government and Society brought together and provided the forum for professionals from government and private sectors, academia and research institutes as well as spatial technologies innovators and providers to discuss the issues, trends and technologies that impacts a spatially enabled government and society, that –

- utilized inter-sectoral approach to analyze issues, drivers and approaches towards achieving a collective understanding and a statement on Spatially Enabled Government and Society; and
- provided inputs towards a joint and definitive publication on Spatially Enabled Government and Society.

The immediate output of the EGM is the Draft Kuala Lumpur Declaration on Spatially Enabled Government and Society that was further considered and deliberated by participants at the International Symposium on Spatially Enabled Government and Society on 15<sup>th</sup> & 16<sup>th</sup> February 2012. The Declaration was presented and delivered at the concluding session of the International Symposium.

### **Kuala Lumpur Declaration on Spatially Enabled Government and Society**

The outcome of the Expert Group Meeting and presentations at the subsequent International Symposium confirmed that spatial enablement of government and societies are desirable, and that these desires are not only contemporary but have been trumpeted by surveying professionals as needed in the governance and decision making process, for decades. The need for spatial data infrastructure, higher levels of stakeholder collaboration, cooperative institutional and governance arrangements to support the infrastructures were also common points underscored. Many speakers also opined the various institutional, technological and social barriers to spatial enablement that need to be overcome in many jurisdictions. These continuing inhibitive situations to the realization of spatial enablement of government and society pose challenges and opportunities for Professionals to apply their knowledge and practices. FIG opined that the Profession must continue to forge and develop collaborative relationships with relevant governmental and professional organizations, academia and research community as well as the technological innovators and developers.

*Kuala Lumpur Declaration on Spatially Enabled Government and Society* acknowledged that spatial enablement, by definition, requires information to be collected, updated, analysed, represented, and communicated, together with information on ownership and custodianship, in a consistent manner to underpin effective delivery systems, good governance, public safety and security towards the well being of societies, the environment and economy. The Declaration recognized that geospatial information includes ‘fundamental data’ that is essential and therefore must have authority, currency, resilience and sustainability, be comprehensive, freely available, accessible and usable for informed decision-making, which immediately leads to better policies and sustainable actions, and more open, accountable, responsive and efficient governments,

The Declaration supported the initiative of the United Nations to implement global mechanisms to foster geospatial information management among the Member States, international organizations, and the private sector, and to make every effort to:

- enhance national efforts including investments towards the managing of all information spatially and the realizing of spatially enabled governments and societies with a focus on citizens and users;
- confirm the importance of governance and legislative frameworks and the need for legislative interoperability;
- confirm the importance of authoritative and assured data and information, encourage the incorporation of volunteered information, develop enabling platforms by locating, connecting and delivering information from different scales, purposes and origins;
- confirm the importance of common geodetic reference frameworks, positioning and network infrastructures;
- avail resources to invest, manage and sustain the capture, collection and collation of fundamental data and information and to reduce duplication in these efforts;

- build and use common standards and frameworks to ensure interoperability;
- enhance institutional arrangements and stakeholder collaborations; and
- improve returns on investment through better coordination, use and reuse of data, information and systems and to enhance innovation and productivity.

### **Current Realities and Horizon**

A new generation of web and mobile services, such as online maps and location based applications, are stimulating a greater interest and use of location in society today. This location revolution in our personal lives is being mirrored in our professional lives.

Information, with both geographic and temporal context, is increasingly being used, for example, to ensure emergency services arrive at incidents in time, to support the formulation of policies to mitigate the impact of climate change, to ensure that services are better targeted to citizens needs and to empower citizens and communities to manage their communities and administer their spaces more effectively.

The delivery of the benefits associated with this location (spatial) revolution is dependent on the availability of spatial data that is readily accessible for re-use, has minimal restrictions, is affordable, has appropriate quality and can be easily integrated and linked into collaborative environments using common frameworks.

Whilst recognizing that many jurisdictions today requires authoritative information, yet there are many jurisdictions that need an “initial point of entry” to begin accumulating and building these crucial data and information base including spatial data, land and property information. When considering the resources and capacities that are required to build this desired and crucial information base, an “initial point of entry” may well involve methodologies that are of lesser sophistication and accuracies, information from participatory and volunteered sources, technologies that are mobile and widely available, for example. These can be distinct from prevailing approaches and practices.

The technical component within the quest for spatial enablement is where the surveying professionals has the competence and hence the Profession should contribute further to that which is already complex, to contribute in the development and implementation of more “fit-for-purpose” approaches, taking into consideration context, scale and opportunity. There is thus the challenge to develop approaches, tools and solutions that can be incremented, that are able to connect with and deliver benefits from a variety of approaches and efforts that are of different scale, purposes and origins. This would include spatially referencing other including socio-economic and environmental information to derive wider societal, environmental and economic benefits.

Thus, spatially enablement will allow information to be more effectively used in all levels of decision making and surveying professionals need to design and implement the next generation of solutions that are fit-for-purpose, more affordable, are citizen centric and can be improved incrementally when appropriate. This would be of distinct advantage as jurisdictions seek to be inclusive and progressive as well as in addressing the challenges of the times.

FIG, the Profession and its Partners have demonstrated their collective, creative and productive capacities in conceptualizing, construction, piloting and implementing alternative but appropriate and innovative approaches in the quest to extend the usefulness of surveying for the benefit of humanity. The Profession has the courage to tackle a highly technical component within this quest that is normally complex, that has socio-economic dimensions and going forward, will remain resolute in this contribution.

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