Perspectives and Status
Asia Pacific
Capacity Development Network

Rob Sarib – FIG

John Dawson – UN GGIM AP WG1 Reference Frames
The International Federation of Surveyors (FIG)

Established in Paris 1878;

Federation of national associations;

Represents all surveying disciplines;

UN-recognised non-government organisation (NGO);

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;

It provides an international forum for discussion and development aiming to promote professional practice and standards

Liaise with like minded organisations

https://www.fig.net/
Through different membership categories over 115 countries are represented in FIG and more than 250,000's professional surveyors.
The International Federation of Surveyors (FIG)

FIG ORGANISATION

- FIG Foundation
- FIG Office
  - FIG Manager and Co-ordinators
- General Assembly
- Council
  - President and 4 Vice-Presidents
- ACCO
  - Advisory Committee of Commission Officers
- Commissions
  - Chairs and Vice Chairs
- Networks
  - Chairs and members
  - Delegates and correspondents
- Task Forces
  - Chairs and Members
- Permanent Institutions
  - Director and members

Commission 5 - Positioning and Measurement

Asia Pacific Capacity Development Network – “AP CDN”

UN-GGIM
GLOBAL GEOSPATIAL INFORMATION MANAGEMENT

WG 1 Reference Frames
Different organisations who represent a diverse group of members BUT we work **collaboratively and co-operatively** towards a *common* mission and vision.

Our roles, our “members”, and our objectives *are strategically aligned* to ensure our finite resources are used wisely.

*Academia?*
“Responsible governance frameworks and integrated administrative systems of tenure (rights and interests) for land and marine, are underpinned by sustainable fit for purpose geodetic / geospatial infrastructure and information management”
• Geospatial and Surveying professionals -
  • have *the capability to address the regional social, economic, environmental and technological challenges*
  • are self-reliant and have a culture and environment of learning, innovation, a blend of mature and young professionals, and a gender equity base
• Activities have progressed through *alliances and relationships* with relevant like-minded bodies and/or development partners.
• Challenges are resolved by a *regional, unified, coordinated and collaborative approach*
Role & Function of the FIG AP CDN

- An **independent advocacy** role to the Asia Pacific geospatial and surveying community
- Provision of **technical, administrative and professional support and information**
- **Organise, facilitate and actively participative** in -
  - Discussion forums
  - Meetings
  - Seminars / Workshops
  - Technical Sessions
- Encourage **co-operation and collaboration**
- **Connecting** and **engaging** professional networks
Activities of the FIG AP CDN

• Datum Unification and Kinematics Technical Seminar (FIG Comm 5) and Pacific Geospatial Surveying Council (PGSC) Meeting – FIG WW Christchurch, May 2016


• Pacific Heights Datum Workshop, Suva, Nov 2016

• Pacific GIS / RS Users Conference and PGSC Meeting – Suva, Dec 2016

• AP CDN meeting – FIG WW Helsinki, May/June 2017
Activities of the FIG AP CDN

• Fundamental geodetic reference frame theory earth dynamics and deformation - Kobe July 2017
• Sharing / exchanging geodetic data – Kumamoto Oct 2017
• Land Governance Seminar - Manilla Dec 2017
• Workshop on Legal & Policy Framework for Geospatial Information - Nuku’alofa, Mar 2018
• Reference Frame Workshops and AP CDN meeting – FIG Congress Istanbul, May 2018
• Operational Aspects of GNSS CORS – Suva, Sept 2018
Challenges and trends affecting Geospatial and Geodetic Infrastructure; and Surveyors
The global geospatial information trends identified

• Impact of rapid urbanisation, and smart cities
• Influence of disruptive technologies and digitisation – “automation, autonomous, applications - AAA”, mobile internet devices
• Importance of disaster / emergency management and building resilience – “before, during and after”
• Real time measurement earth dynamics
• Modernisation of geospatial reference systems / datums / GNSS CORS
• Permeation of ubiquitous positioning into the community – “the where is concept”
• Demographic of workforce and work preference is more diverse
The challenges being experience by geospatial / survey mapping agencies, such as

- Continually justifying role, existence, value and importance (decision makers – executive mgt / financial / political)
- Modernising legislation, developing relevant and agile policies and guidelines
- Updating and complying with industry standards and practices
- Ensuring foundation (fundamental) data has integrity - accurate, current, facilitates integration and interoperability AND in a modern information system (open source?)
- Spatial information / datasets “open”, “shared” or with limited restrictions
- Administering and visualising information in 3 dimensions + temporal component
- Leveraging the power of the internet, mobile phones, web-based data portals, crowd sourcing, web services
The challenges being experience by geospatial / survey mapping agencies, such as

- Provision of data in the “cloud”, via distributed web services, data retrieval through catalogues and visualisation via Web Map Services... in near real time...
- Modelling and monitoring of the dynamics of the earth and environment in real time
- Implementation of dynamic reference frames and datums
- Building and maintaining geospatial / geodetic infrastructure and systems
- Modernising land administration systems to ensure indefeasibility of registration of rights, restrictions and responsibilities
- Responsible governance – accountability to the community
- Securing resources
- Balancing priorities – legal, technical, organisational, data, and people
The Never Ending Challenges

- Capacity Development – training, education, specialist
- Future role/function of agency
- Integration of land/water information data and systems
- Establishment/Maintenance Geospatial infrastructure
- Monitoring and analysing the dynamics of the earth
- Connecting to ITRF/APREF
- Communication and power infrastructure
- Integrating reference surfaces
- Advocacy of the value (benefits) of geospatial information
- Alignment of Institutional objectives
- Regulation and Standards
- Data Sharing
- Automated Processing of geospatial data
- Justification of budget, resources
- Collaboration/Co-operation - “private” and “public” and “regional”
- Legal & Policy Framework
- Political diversity

Legal, Technical, Organisational, Data, People, Standards?
Balancing the PRIORITIES?
Countries Geospatial Readiness Index 2018

Characterised by –

- Intelligent geospatial data (maps etc) as a highly advanced tool for decision making.
- Data is digital, interactive and has effective visualization.
- Incorporation of geospatial information and technology in workflow management.
- Provide solutions for traditional sectors such as agriculture, construction, and disaster management, but ALSO for specialized sectors like real-estate, building engineering, architecture, banking and financial services, retail and logistics, forestry etc.
- Geospatial technology business programs are part of national programs.
- Collaboration occurs with a diverse group of industry bodies, professional member networks, commercial institution in products / applications (hardware, software, and content.)
Geospatial and Surveying Professionals MUST enhance their capabilities to tackle these trends and challenges BUT how?
WHY do we need to develop our capacity? What will be its purpose? Drivers – social, economic, political?

WHOSE capacities need to be developed? Which groups or individuals need to be empowered? Local / Regional?

WHAT KINDS of capacities need to be developed to achieve the broader development objectives? Technical & Non-technical?

Collaboration is the KEY!
Step 1: Engage Stakeholders on Capacity Development

Step 2: Assess Capacity Assets and Needs

Step 3: Formulate a Capacity Development Program

Step 4: Implement a Capacity Development Response

Step 5: Evaluate Capacity Development

Capacity Development Process

Via a collaborative / unified manner
Discover the “why” that will unify agencies and influence the decision makers (and politicians)
Understand your geospatial information (foundation datasets)

- Common asset of location information to facilitate informed decision making that affects people's safety, prosperity, and environment
- Comprising of the best available, most current, authoritative source of foundation geospatial data which is standardised and quality controlled

Role in Generic Geospatial Information Cycle?

Capture

Data Acquisition, Collectors, Gathers

Data processing, quality control, validation

Data Archival, Geospatial DB

Data Catalogue, Metadata

Data distribution, Access, Data discovery, Web Services

Applications – Open data / layers, Visualisation, Mobile Devices

Users – General Public, Decision Makers, Research, Scientists

Value Added Retailers, External

Each stage controlled by relevant Standards, Practices, Legislation / Policy

Role in managing GNSS CORS infrastructure?

Source - Matt Higgins “A model for organisational roles within a Positioning Infrastructure”
Understand land / water Administration, Management, and Governance

• Administration a *system that* provides *infrastructure for*
  ➢ *securing land / water tenure* (rights, restrictions, responsibilities),
  ➢ *determining valuation* and taxation of land / water,
  ➢ *land / water use planning* and
  ➢ *development of built environment* - utilities, construction

• Management *processes for the use and development of land / water resources*

• Governance framework of *legislation, policies, processes and institutions by which land / water, property and natural resources are managed*
Modern Land (Water) Administration System

- Defines and records the location and extent of property rights, restrictions and responsibilities - 3 dimensions plus a temporal (time) component
- Geometric representation of land and real property boundaries (digital visualisation)
- Must be easily, uniquely and accurately identified in a common reference system or geodetic datum or geospatial reference system

<table>
<thead>
<tr>
<th>Level</th>
<th>Competency Requirements</th>
<th>Training provided by</th>
<th>Countries</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Basic understanding of:</td>
<td>Educational institutions – universities and polytechnic institutes, Government mapping agency, Private companies</td>
<td>Countries that might have one CORs and maintain a traditional geodetic network of reference marks – e.g. small Pacific Island Nations?</td>
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<tr>
<td></td>
<td>• GNSS</td>
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<td></td>
<td>• Reference frames, including geoid models, vertical and horizontal datums</td>
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<tr>
<td>2</td>
<td>The above plus knowledge of:</td>
<td>Educational institutions – universities and polytechs, UN-GGIM Geodesy Capacity Group, FIG, Government mapping agency, Private companies</td>
<td>Countries with small CORs network and those who adopt global Reference frames for their nation reference frames – e.g. Fiji?</td>
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<td></td>
<td>• Constructing, building and running a small CORs network</td>
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<td></td>
<td>• GNSS processing using standard software - e.g. Trimble, Compass Solution (ComNav), LGO(Leica),…., Least squares processing and provision of datum access</td>
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<td>• Geoids models, precision, determinations and basic implementation</td>
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<td>• Implementation of a vertical datum including use of geoid models</td>
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<td>3</td>
<td>The above plus high knowledge of:</td>
<td>Specialized courses – e.g. geoid school, UN-GGIM Geodesy Capacity Group, IAG and FIG, Government mapping agency, Private companies</td>
<td>Countries with a more extensive CORS and developing their own specialized national and vertical datum – e.g. New Zealand and Sweden?</td>
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<td></td>
<td>• Implementing and running large CORS networks</td>
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<td></td>
<td>• High end GNSS processing and datum access</td>
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<td></td>
<td>• Geoid model computation and implementation into a vertical datums</td>
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<td></td>
<td>• Monitoring earth dynamics and including in datum realization</td>
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<td>• Geodetic database management</td>
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<tr>
<td>4</td>
<td>The above plus expert knowledge of:</td>
<td>IAG, Specialist training courses run by NASA/JPL – e.g. on VLBI or SLR, Private companies, Specialized software training courses – e.g. Bernese</td>
<td>Countries engaged in Global Reference frame determination and Geodesy Science - e.g. US, Australia and Germany?</td>
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<tr>
<td></td>
<td>• Reference frame determination and computation</td>
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<td>• High end GNSS analysis and processing</td>
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<td>• SLR including analysis and processing</td>
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<td>• VLBI including analysis and processing</td>
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<td></td>
<td>• Gravity collection, processing and geoid determination</td>
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<td>• Analysis centre – combining various geodetic techniques to determine reference frame parameters</td>
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<td></td>
<td>• Use of other potential geodetic techniques – e.g. DORIS and InSAR</td>
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Capabilities / Competencies for the Future

Our profession and leaders of organisations need to have skills to:

- Prepare for **continuous change** by transforming their attitude towards change, **be progressive in their thinking, be agile, be less risk adverse**

- **Collect, process, deliver, reliable, accurate, interoperable and “24/7” geospatial information** to decision makers in real time via a combination of “**disruptive technologies**, crowd sourcing techniques, and web services”

- Convey **professional advice and services** to facilitate design, risk assessment, investment analysis, asset management and resource deployment.

- **Innovate in multi-disciplinary teams** to effectively manage diminishing resources, increased data volumes; and resolve legal data matters such as privacy, custodianship, sharing, liability etc.
Capabilities / Competencies for the Future

Our profession and leaders of organisations need to have skills to -

• Actively lead, negotiate, influence, and permeate collaboration amongst a diverse team of survey and land professionals

• Understand and balance commercial influences

• Advocate and communicate relevance to influence leaders, decision makers, politicians; and attract a diverse group of new professionals

• Form and administer strategic plans with an outcome / output focus; and qualitative and quantitative monitoring / evaluation frameworks.

• Develop sustainable policies to balance consumption of resources with environmental needs; and to ensure a self-reliant, self-determinate community that has gender equity
Capacity Development Strategy, Framework, Implementation
Capacity Development Strategy, Framework, Implementation

Plans that are aspirational but realistic, achievable, focused on national/regional challenges and flexible to accommodate a rapidly changing industry

*Plans are fundamental to resourcing proposals and capturing the political will!*
To develop capability organisations and agencies need to consider –

• Formulating a capacity building strategy, framework and implementation plans for a *country / sub regions* that are linked to the *needs / priorities / objectives* of the nation or broader community

• Intelligent *real time geospatial information and systems* for decision making across many sectors

• Identifying *core competencies* for geospatial / geodetic surveying

• Investigating who can provide the required *professional or capacity development*

• Examining *mutual recognition of professional qualifications OR accreditation*

• *Sustainable solutions* that enhance *self-reliance and development*

• Formalising *collaboration* with FIG AP CDN, UN GGIM AP, UN ETCB etc
**Future of Collaboration?**

**Good Will and Volunteerism is NOT Sustainable!**

**New “modus operandi?”**

**MoUs to formalise Collaboration -**
- Shared objectives and expectations
- Defined roles and responsibilities
- Measurable benefits and value
- Shared commitment

**Foundations of SUCCESS**
Moving forward the FIG AP CDN recommend more capacity building for geospatial and surveying professionals and decision makers wrt –

- Understanding the **value and importance** of geospatial and geodetic information
- Forming **capacity development plan(s)** for geospatial professionals / geodesists / surveyors – national / regional?
- Developing **strategic and operational plans** for the organisation aligned with national / regional objectives
- **Modernising** legislation, policy, standards & practices and guidelines
- Preparing proposals and **business cases** for national geospatial or geodetic or capacity development initiatives and resourcing (or specific projects)
- **Technical matters** - geospatial and geodetic infrastructure, systems and operations
- Building a framework to **share our knowledges and experiences** – “a body of knowledge”
Collaborative Workshops for 2019?

Locate

8-10 April 2019, Melbourne Convention Centre, Melbourne

FIG WORKING WEEK 2019

Hanoi, Vietnam 22 - 26 April 2019
Geospatial information for a smarter life and environmental resilience

15th South East Asia Survey Congress

15–18 August 2019 • Darwin Convention Centre

Collaboration • Communication • Capacity-Building
The quest for capacity development – making it work

“Don’t start what you can’t sustain”

Provisions for ongoing updating and possible upgrading are crucial and must be established up front.

Capacity development relates to societal awareness, institutional and organisational reform, and education and training of human resources.

The way forward includes understanding and cooperation between UN-agencies, professional organisations, and national governments

To drive and manage the change process there must be effective knowledge-sharing to ensure that lessons learned and good practice are widely implemented.

“Good co-ordination begins with good co-ordinates”

Dave Doyle FIG Regional Conference Costa Rica 2007

“As for training its people... ASEAN should take advantage of the digital revolution to ensure interoperability of digital systems within the region – that is the digital systems developed in one country can be used in others too”

PM Lee Hsien Loong, Singapore – 33rd ASEAN Summit 2018
Looking Forward: Future activities (coming year?)

- **Report on the questionnaire;**
  - Regional based reporting and discussion. What are the barriers in each region?

- **Building a knowledge database**
  - Find recourse to compile existing material available online
  - Update FIG publication on “Reference Frame in Practise”

- **Potential new questionnaire**
  - In-deep questions regarding the barriers, why capacity building is needed, who requires capacity building, what capacities are required, and how these should be delivered and by whom

- **Resourcing**
  - Explore opportunities for long-term resourcing and the application of the Integrated Geospatial Information Framework
DISCUSSION

For discussion;

• Regarding Education, Training and Capacity Building and our proposed action for coming year(s), do you agree?

• The importance of the regions, how can we engage them and have them taking more ownership of training and capacity building?

• The questionnaire notice impediments regarding funding, resources as well as political will. How can we as Subcommittee on Geodesy together work on these issues?

• What is the role of industry sector in training?