



Capacity Development Challenges and Datum Modernisation

Rob Sarib - Chair

**FIG Asia Pacific Capacity Development
Network**



Geospatial and GNSS CORS Infrastructure and Systems Forum

- Status of Regional Geospatial and GNSS CORS Infrastructure and Systems;
- Why Geospatial / Geodetic Infrastructure;
- Link to SGDs;
- Reference Frames and GNSS CORS Theory;
- Modernisation of Geospatial / Geodetic Infrastructure;
- Role of Organisations and Sectors
- ***FIG Asia Pacific Capacity Development Network***

The International Federation of Surveyors (FIG)

Established in Paris 1878;

Federation of national associations;

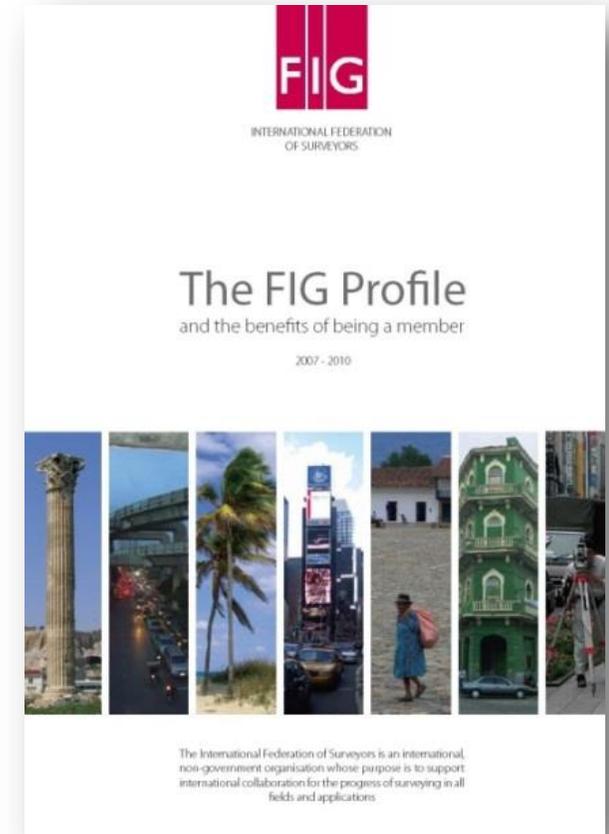
Represents all surveying disciplines;

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 - UN GGIM, IAG



<https://www.fig.net/>



UN-GGIM
UNITED NATIONS INITIATIVE ON
GLOBAL GEOSPATIAL
INFORMATION MANAGEMENT



FIG Member Associations
 2017

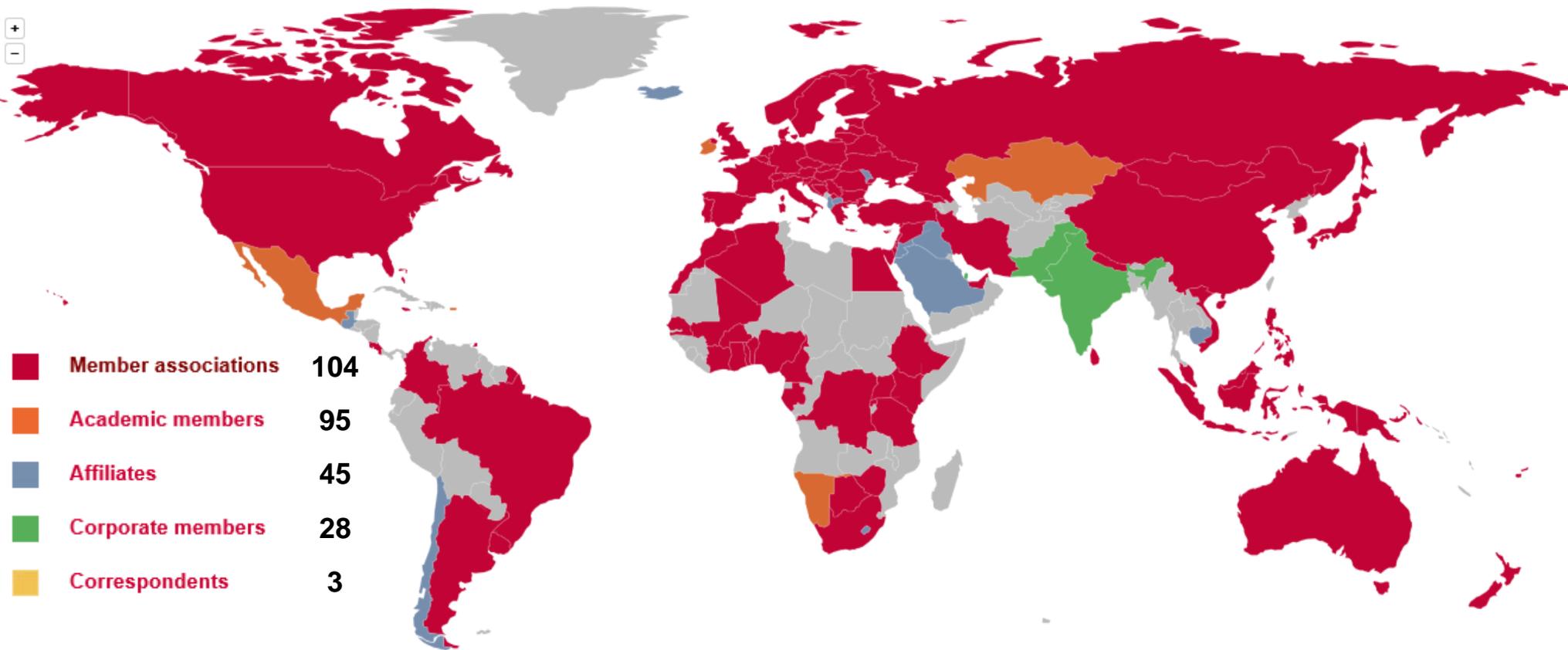


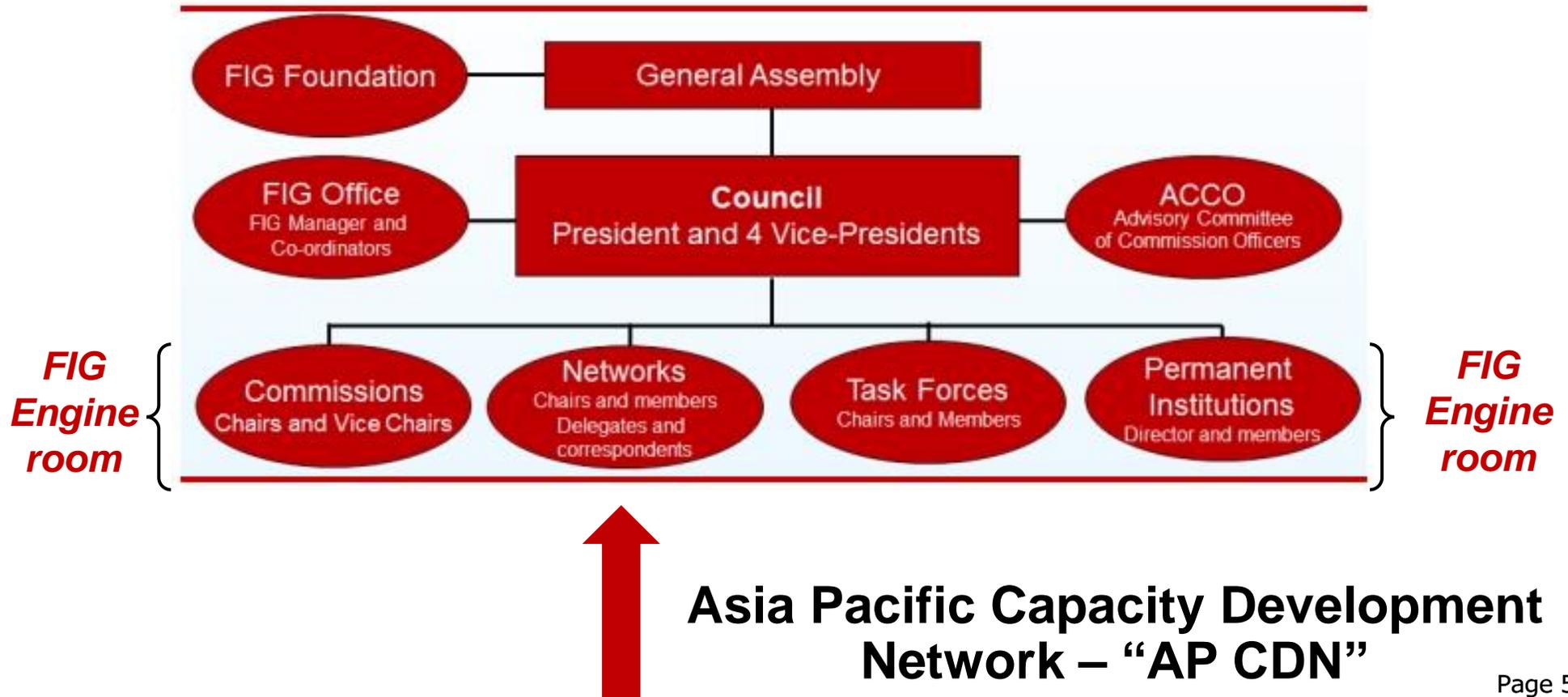
FIG Members

Through different membership categories 115 countries are represented in FIG and over 100, 000 professional surveyors

Where is it? – within the FIG Organisation



FIG ORGANISATION



Network of individuals or representatives from –

- Pacific Geospatial Surveying Council
- Pacific Community - Geoscience Division
- Australian Government agencies - Geoscience Australia, Bureau of Meteorology,
- New Zealand Government agencies - Land Information New Zealand (LINZ),
- Asean Flag
- Geospatial Information Authority of Japan



Network of individuals or representatives from –

- UN GGIM AP Working Groups, GGRF, UN ICG
- International Association of Geodesy (IAG) Working Groups, IGS
- FIG Commissions, FIG Young Surveyors Network, and FIG Corporate entities
- Professional Surveying Organisations - Surveying and Spatial Sciences Institute (SSSI), New Zealand Institute of Surveyors (NZIS), Fiji Institute of Surveyors (FIS), Japan Federation of Surveyors (JFS)



What is capacity development?

***It is about understanding the challenges /
obstacles;***

***that hinder an individual / organisation /
community from accomplishing their objectives;
and then***

***developing the necessary knowledge / skills /
abilities / competencies / frameworks to achieve
them.***

What is capacity development? It is also about

***The process of learning to adapt to change....
(or shifting the paradigms of practice)***

***Who and how and where the decisions are
made....***

***Being supported by a sustained resource and
political commitment to yield longer term
results***

Source : Allan Kaplan

Collective FIG / UN GGIM AP “Capacity Development Network” outcome -

“Responsible governance frameworks and integrated administrative systems of tenure (rights and interests) for land and marine, are underpinned by sustainable fit for purpose geospatial and survey infrastructure and information management”



Modernisation !



FIG AP CDN – Output Measure

Outputs of AP CDN -

- Professional geospatial scientists and surveyors, **have the capability to address the regional social, economic, environmental and technological challenges** associated with the UN Sustainable Development Goals (SDGs).
- Regional capability and their activities have progressed through **alliances and relationships with** FIG, UN GGIM AP, relevant **like-minded bodies other agencies and / or development partners.**



Outputs of AP CDN -

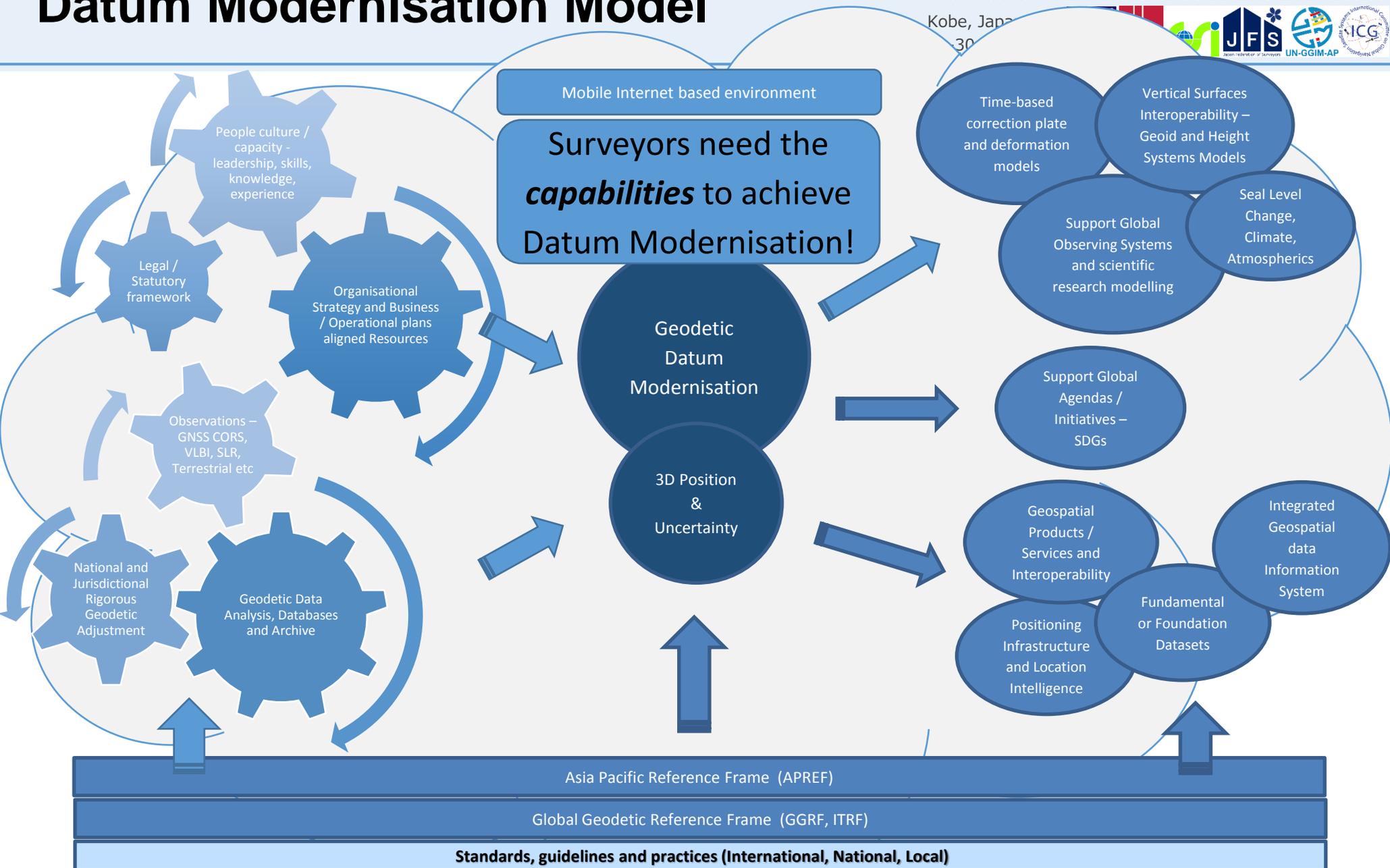
- Regional geospatial and survey community are ***self-reliant*** and have a ***culture and environment of learning, innovation, a blend of mature and young professionals, and a gender equity base.***
- Regional geospatial and surveying challenges are ***resolved by a regional, unified, coordinated and collaborative*** approach.



Role of the FIG AP CDN of professionals –

- 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

Datum Modernisation Model



Capabilities for the Future

Surveyors (and spatial leaders of organisations) ALSO need to have skills to -

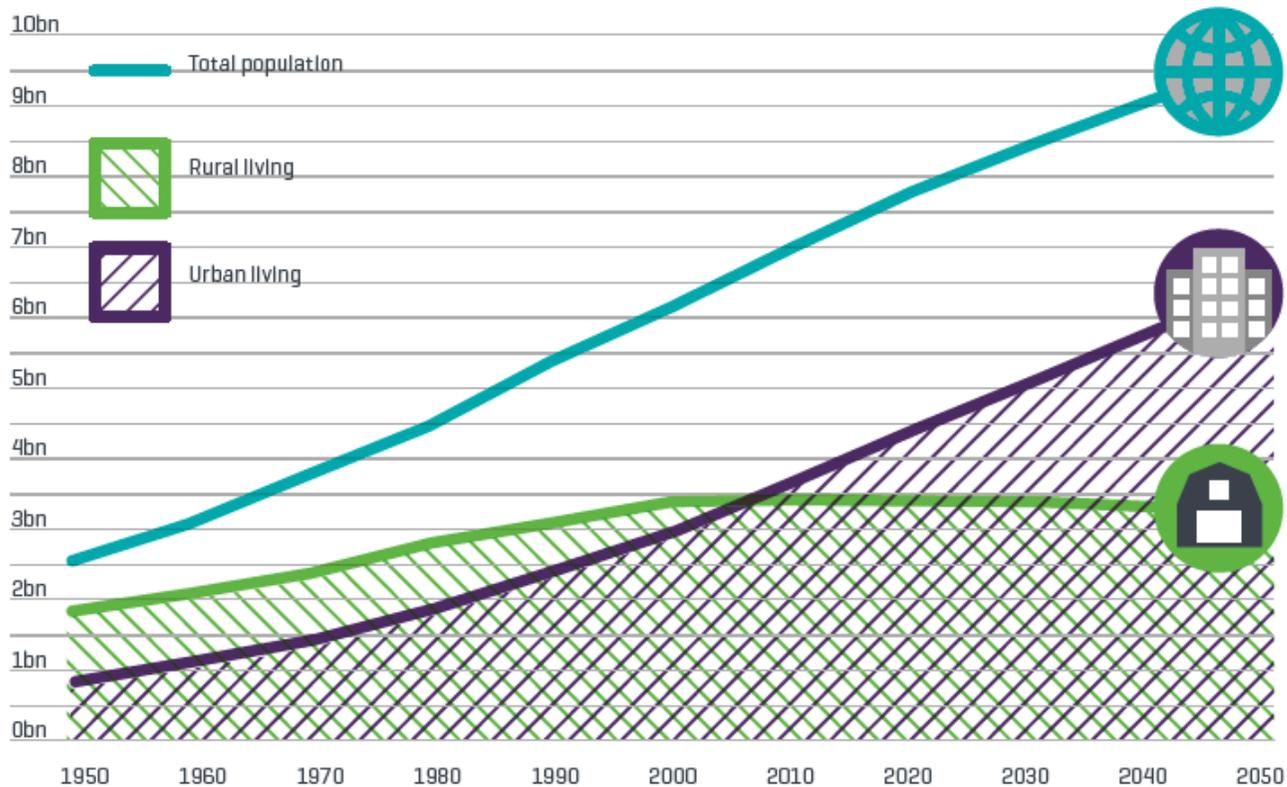
- Be prepared for continuous change by transforming their attitude towards change, be progressive in their thinking, be agile, be less risk adverse.
- Collect, process, deliver, reliable, accurate, interoperable and “24/7” geospatial information to decision makers in real time via a combination of “disruptive technologies” and crowd sourcing techniques
- 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.



Global Challenges and Trends Affecting – Datum Modernisation

Rapid Urbanisation

- By 2050 - 2/3 thirds of the world's population (approx. 6 billion people) to live in “**mega**” cities serviced by “**smart**” technology.



Global Challenges and Trends Affecting – Datum Modernisation

Rapid Urbanisation

- Predictions indicate this will occur primarily in **Asia** along with an **expanding middle class and increased economic activity** in numerous sectors



MEGACITIES ON THE RISE

More than half of the world's megacities – cities with 10 million or more people – are now in Asia. By 2025, Asia will likely have **21 out of a global total of 37 megacities**.



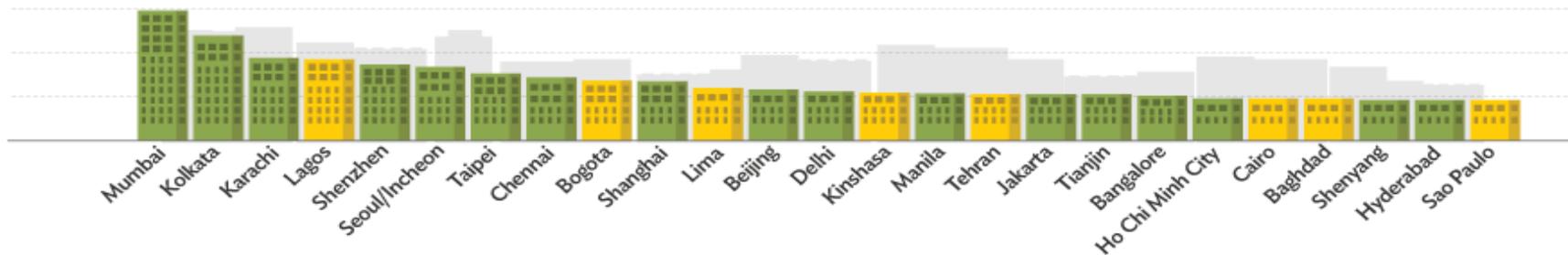
ASIA'S MEGACITIES BY 2025

Bangalore, India	Kolkata, India
Bangkok, Thailand	Lahore, Pakistan
Beijing, PRC	Manila, Philippines
Chennai, India	Mumbai, India
Chongqing, PRC	Osaka-Kobe, Japan
Delhi, India	Shanghai, PRC
Dhaka, Bangladesh	Shenzhen, PRC
Guangzhou, PRC	Tianjin, PRC
Hyderabad, India	Tokyo, Japan
Jakarta, Indonesia	Wuhan, PRC
Karachi, Pakistan	

* PRC = People's Republic of China



TOP 25 CITIES BY POPULATION DENSITY IN 2007 (person/square kilometers)



Global Challenges and Trends Affecting – Datum Modernisation

Rapid Urbanisation will require

Provision of geospatial information from surveyors that will ***influence*** decisions by government or industry wrt -

- Evaluation and implementation of urban and land use planning
- Management of sustainable development of finite resources and the environment
- Administration of utilities, services, public infrastructure and assets such as power generation and distribution, water reticulation, waste treatment, transportation networks
- Affordable and efficient housing
- Generation, supply and delivery of sufficient food for the population

Global Challenges and Trends Affecting – Datum Modernisation

Disruptive Technologies

(technologies which will transform the way we do our normal business or affect the present day lifestyle patterns)

- Mobile Internet enabled low-cost computing devices
- Automation of work, knowledge and tasks via software and systems with artificial intelligence
- Internet of things – networks of Internet based sensors that collect data to assist with processing, analysis, monitoring and decision making.
- Cloud technology for provision of data, services or applications through the Internet or networks
- Advanced robots or robotics that has ability to perform delicate procedures or assist with everyday life.
- Autonomous vehicles.



Global Challenges and Trends Affecting – Datum Modernisation

Will impact the work of the geospatial industry -

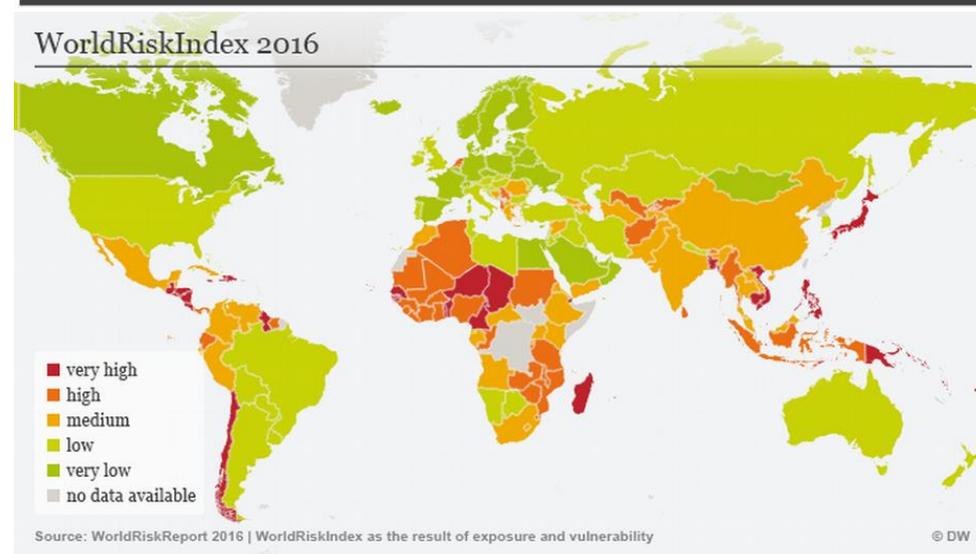
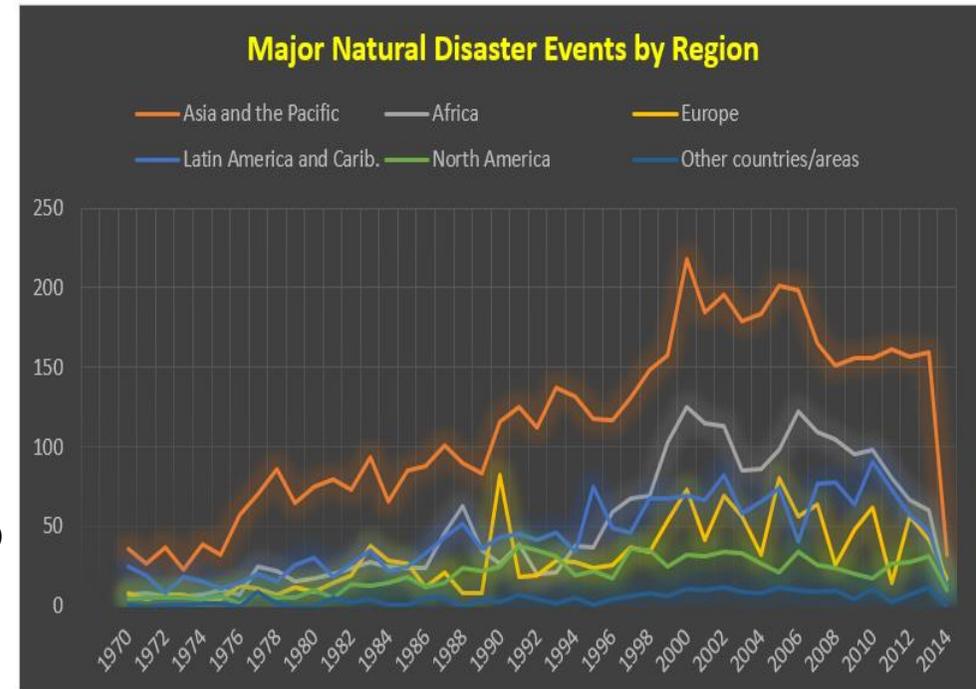
- by facilitating greater connectivity and access to geospatial data in real time thus enabling **real time monitoring and analysis**.
- create business opportunities and innovation to improve productivity and revenue;
- foster more location based applications or services and or embedded intelligent systems.
- change the way surveyors generate digital information, visualise and interact with multi land / geographic / infrastructure / asset mgt / resource systems –
 - BIM ;
 - emergency management where authorities merge the physical and virtual worlds; and
 - computational and visualisation software accessible via online or the Cloud.



Global Challenges and Trends Affecting – Datum Modernisation

Environmental phenomena

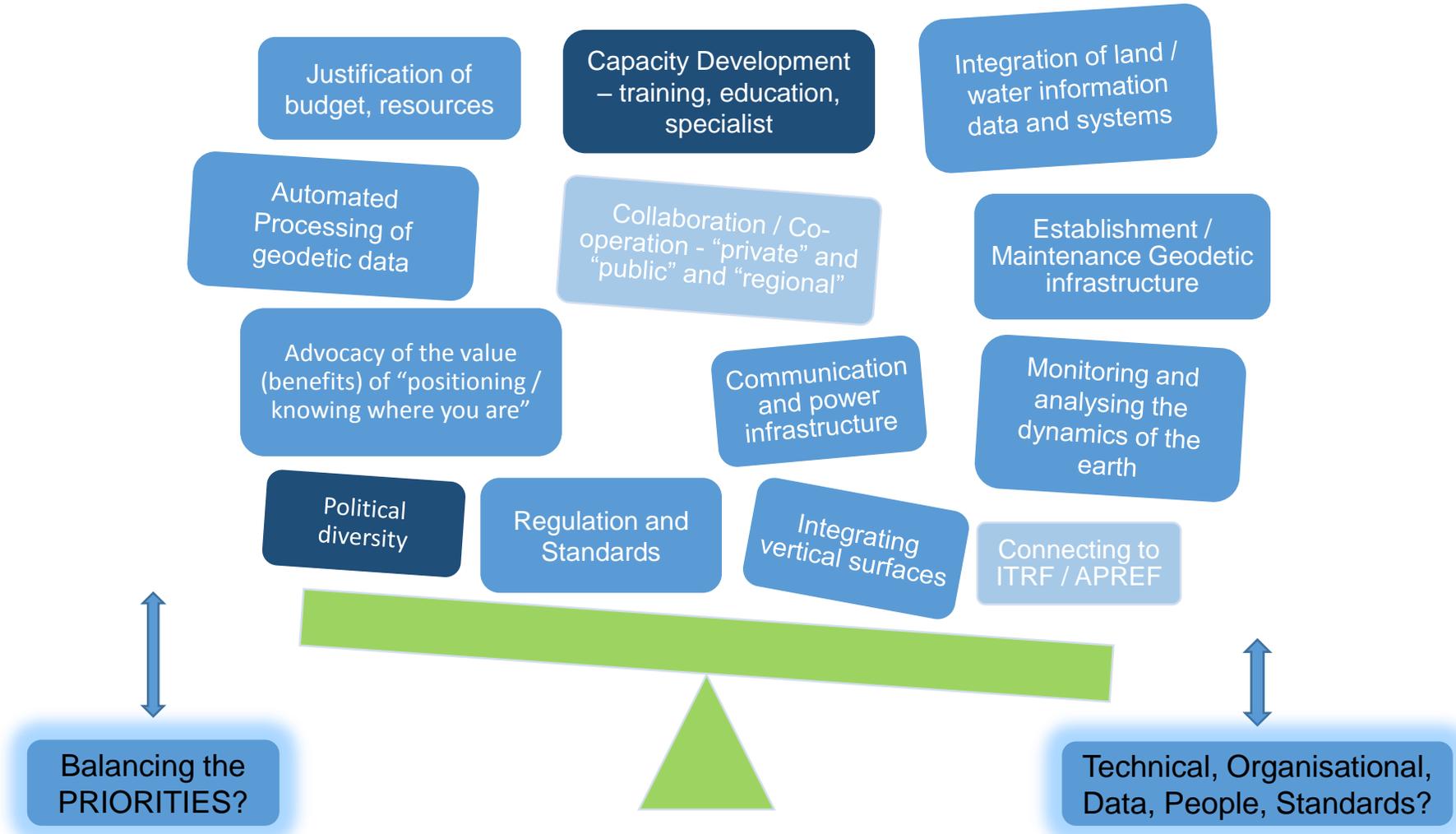
- climate change, sea level rise, earthquakes, tsunamis, and cyclones.
- In 2015, 346 disasters affected 98.6 million people ; estimated economic damage of \$66.5 billion USD.
- Asia and the Pacific are rated high on the world risk and vulnerability index, translating to an increased incidence of natural disasters and therefore greater impact on inhabitants.
- Reports also state that the quality of critical infrastructure such as communication, transportation and utility systems will determine the effectiveness of disaster response.
- Impact – reliance on geospatial industry to **supply and deliver information** for such systems will be vital to the management and outcomes of **disaster relief, re-construction and the building of resilience**.



Regional Challenges and Trends Affecting – Datum Modernisation



Discussion Forum...



Regional Challenges and Trends Affecting – Datum Modernisation



Issue / Challenge	Specific Problem	Strategy to Mitigate
Data Sharing Data charging versus “open” / “free” data policy Data infrastructure vs data service delivery	Sharing of data limited resulting in non-optimum outcomes National legislation /regulation / policy hinders sharing	Preparation of an pro-forma data agreement to assist with setting up agreements Establishing a forum for discussion, exchange of ideas Encourage participation in common regional / sub regional cause or driver such as APREF Focus the need on broader objectives / perspectives so as to articulate the importance of data sharing Political “will” is an important factor and needs to be addressed and obtained Examine the “parameters” / caveats surrounding data sharing and then discuss Refer to international standards as a means e.g RINEX / SINEX
Regional unifications	Lack of data sharing and standards impede unification Duplication of infrastructure and data custodianship Interoperability / integration of data and systems	More advocacy on standards, and guidelines; the benefits of application and adherence.

Regional Challenges and Trends Affecting – Datum Modernisation

Issue / Challenge	Specific Problem	Strategy to Mitigate
<p>Technical capability</p>	<p>Lack of technical expertise is impeding geodetic infrastructure</p>	<p>Consider using or creating a data centre in the region</p> <p>More workshops on implementation</p> <p>Opportunities to be trained at agencies that have the experience (noting - funding is an issue)</p> <p>Engage better with academic institutions</p> <p>Develop a regional training framework based on “standards”, specifications, guidelines</p> <p>Explore opportunities with private sector to provide training (noting funding is an issue)</p> <p>Raising awareness of geospatial in primary / secondary educational curriculum</p> <p>Develop a mechanism for short term attachments, internships on specific projects / disciplines (noting funding is an issue)</p> <p>Use the network of professional surveyors</p> <p>Use the national requirements for CPD to develop knowledge on geodesy / geospatial</p>

Regional Challenges and Trends Affecting – Datum Modernisation

Issue / Challenge	Specific Problem	Strategy to Mitigate
Resourcing Human + financial	Lack of expertise impeding implementation of geodetic infrastructure Maintenance of infrastructure and systems Ongoing justification of budgetary support	Scholarships specific to geodesy / geospatial from donor or development agencies / partners Forums with prospective donor or development agencies /partners to understand their process Advocate / promote the need / value for geodetic / geospatial infrastructure at national / regional / global levels and its importance to society and the economy
Legislation and policy	Absence of legislation and policies impede implementation of datums Security of data clauses within legislation / regulations Modernisation of legislation (digital info)	Examine the issues / challenges from a regional perspective Prepare a proposal regarding legal requirements and compliance
Business models	Roles / Responsibilities of government and private sector changing and is unclear thus leading to indecision and possible duplication and wastage of resources	Understand the options – share experiences. More inclusion and discussion amongst the various sectors
Implementing change (modernisation)	Lack expertise in developing change programs impeding geodetic infrastructure (communicating change)	Legislate or mandate geodetic aspects Ensure the technical issues are communicated / implemented before implementation occurs

Regional Challenges and Trends Affecting – Datum Modernisation



Issue / Challenge	Specific Problem	Strategy to Mitigate
Communication infrastructure	Unreliable or lack of communication Impeding geospatial / geodetic infrastructure opportunities Regulations re frequency “spectrum” can be an issue	Share knowledge experiences to manage this challenge Engage with more telecommunication operators
Academic surveying institutions not providing relevant or quality courses	Impedes sustainability of infrastructure and operations	Engage with relevant institutions Consider partnerships / programs with academic institutions More collaboration amongst academic agencies
Decision makers not understanding the importance / value of geospatial / geodetic infrastructure This also applies to the “society” understanding our value.	Lack of political will and suitable “champions” to advocate the value of geospatial / geodetic infrastructure	Promote the social, economic benefits / importance (disaster / saving lives) at the national / regional level Articulating the cause and the effect scenarios “Top down and bottom up” approach. Try to get interest / involvement at the Ministerial level – think like them? Innovate ways to get their attention - do not focus just on the technical but alternative social / economic “drivers” Information and awareness campaigns at all levels of government / public / society and make it LOUD.
Attracting more young professionals to surveying	Succession planning Sustaining the integrity of the infrastructure.	Have a “geodetic” open day! Attend careers workshops.

The Geodetic Reference Frame Resolution

Fifth Plenary Meeting of the Regional Committee UN-GGIM-AP - Kuala Lumpur

The Meeting,

Reaffirming that the Global Geodetic Reference Frame underpins satellite positioning technology, provides the framework for all geospatial activity and is a key enabler of spatial data interoperability, disaster risk reduction, land management, and supports sustainable development;

Recognizing the General Assembly Resolution (A/RES/69/266) on the Global Geodetic Reference Frame for Sustainable Development;

Recognizing also the importance of data sharing to enable global and regional products and services to be related to individual countries to support decision makers to address social and environmental issues such as rapid urbanisation, sustainable development, disaster management, and complex crustal dynamics;

Noting the challenges of building technical capacity in the Asia Pacific region to modernise national geospatial and geodetic infrastructure, in particular GNSS CORS densification, geodetic datum determination, unification of height systems, and integration and interoperability of fundamental datasets,

Noting further the challenges of sustaining geospatial and geodetic infrastructure with respect to accessing reliable communications, obtaining and justifying resources, and modernising relevant legislation, policies, and practices particularly in the context of the administering geospatial and geodetic data,

Noting further the lack of awareness of the value and importance of geospatial and geodetic infrastructure amongst some sectors of government, industry and the wider community,

Noting further the present limited availability of qualified young geodetic surveyors in the region,

Recommends that the Regional Committee of United Nations Global Geospatial Information Management for Asia and the Pacific:

- a) ***Support geodetic experts*** to attend appropriate regional forums, such as the UN-GGIM-AP Working Group 1 meetings;
- b) ***Engage in multilateral collaboration*** to facilitate the ***exchange of information, knowledge and experiences*** so as to address the geospatial and geodetic infrastructure and system challenges;
- c) ***Adopt the International Terrestrial Reference Frame (ITRF)*** by participating in regional geodetic programmes such as the ***Asia-Pacific Regional Reference Frame (APREF) and the Asia Pacific Regional Geodetic Project (APRGP)***;
- d) ***Share geospatial and geodetic data openly and freely*** to support for example the connection of national datums to global systems so that decision makers can address ***global and regional issues*** such as sea level change through the use of global and regional products and services;

- e) **Consider sharing real-time geodetic observations to support disaster risk reduction** including tsunami warning
- f) **Proactively participate in communication and outreach** activities to **raise the profile of geodesy as a service to society**;
- g) **Engage with the relevant academic community** to review and implement appropriate **courses of study or curriculum to be aligned with the modern requirements** for operational geodetic or geospatial scientists;
- h) **Advocate promote and communicate the value and importance** of geospatial and geodetic infrastructure and information to decision makers, governments, industry, and wider community;
- i) **Provide opportunities** to develop technical knowledge through **internships and short term attachment programs** for geodetic and geospatial scientists;

- j) ***Evaluate and modernise legal and institutional arrangements*** pertaining to administering geospatial and geodetic data and infrastructure;
- k) ***Encourage and facilitate technical capability*** development through training, workshops, and cooperation in GNSS CORS densification, GNSS data processing, geodetic datum and geoid determination, geodetic datum transformations, geospatial data integration and interoperability, and the use of open geodetic software and the sharing of best practice examples and use cases;
- l) ***Work closely with*** the International Federation of Surveyors (FIG), in particular the FIG Asia Pacific Capacity Development Network (AP-CDN), the Pacific Geospatial and Surveying Council (PGSC), the International Association of Geodesy (IAG) and other relevant ***organisations to develop geodetic capability in the Asia Pacific.***

Action in the LAST 12 months?

Have any of the recommendations in the “resolution” been attended to / implemented?

What **advocacy programs / initiatives** have occurred or been implemented to promote our value / importance?

Have agencies created a **geospatial information strategy and operational plans** to address the challenges and trends?

What **communication frameworks** have been put in place to share experiences, ideas, data, information?

Action in the LAST 12 months?

Is your geodetic datum linked to **ITRF / APREF**?

Have you contributed geodetic data to **APREF**?

Have there been discussions about a **regional collaborative approach** to confront -

- Geospatial infrastructure development and challenges?
- Capacity development?
- Education gaps / specialist training?

What is your / our next action?

“Regional” Capacity Development Plan ? BUT - How ? Who?

‘ Developing countries should own, design, direct, implement and sustain the process themselves’

Capacity Development

A focus on empowering and strengthening endogenous capabilities

- Makes the most of local resources – people, skills, technologies, institutions – and builds on these
- Favours sustainable change
- Takes an inclusive approach in addressing issues of power inequality in relations between rich and poor, mainstream and marginalized (countries, groups and individuals)
- Emphasizes deep, lasting transformations through policy and institutional reforms
- Values ‘best fit’ for the context over ‘best practice’; as one size does not fit all

United Nations Development Program approach?



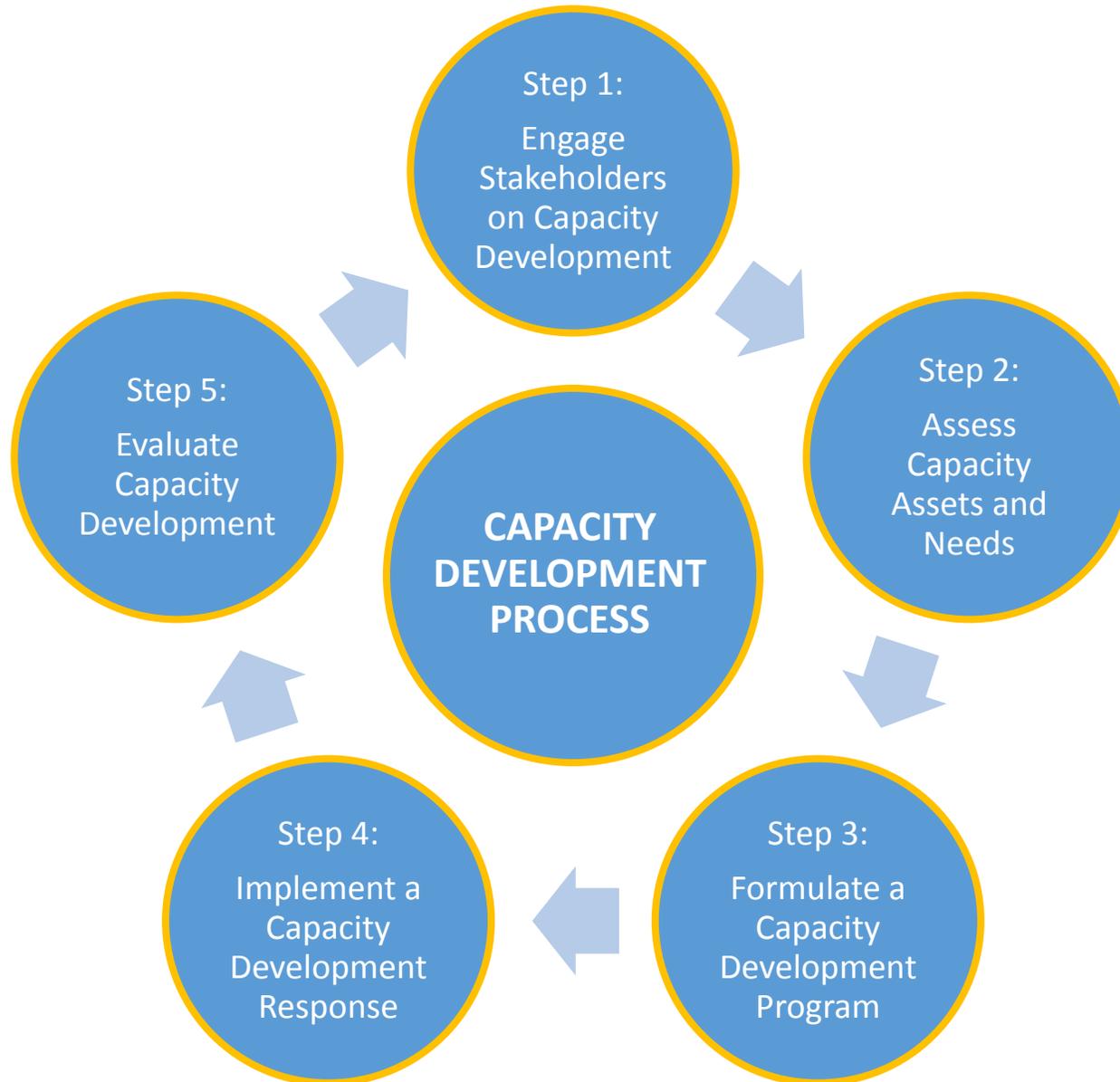
Questions to be answered us?

TO WHAT END do we need to develop this capacity?
What will be its purpose?

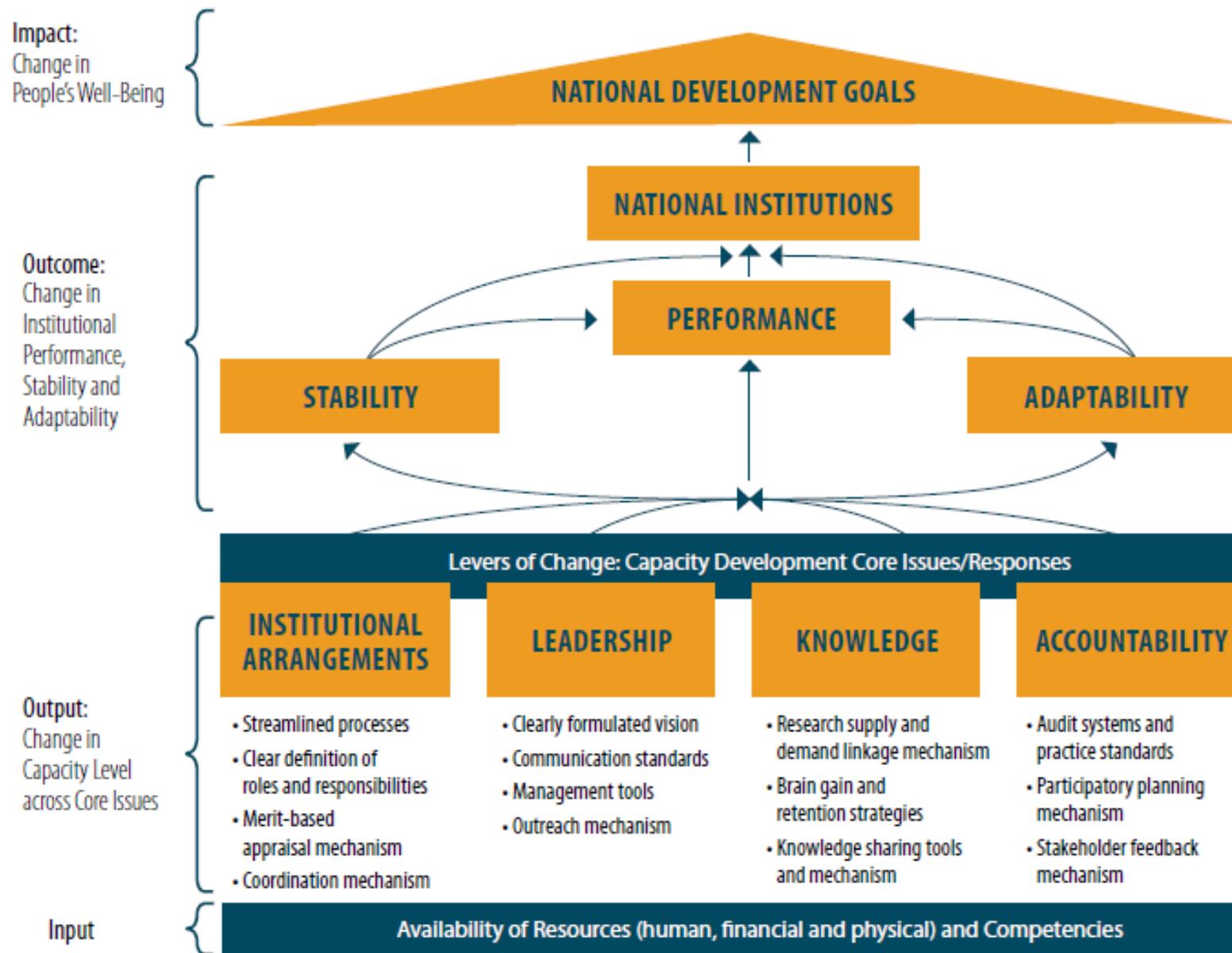
WHOSE capacities need to be developed?
Which groups or individuals need to be empowered?

WHAT KINDS of capacities need to be developed to
achieve the broader development objectives?

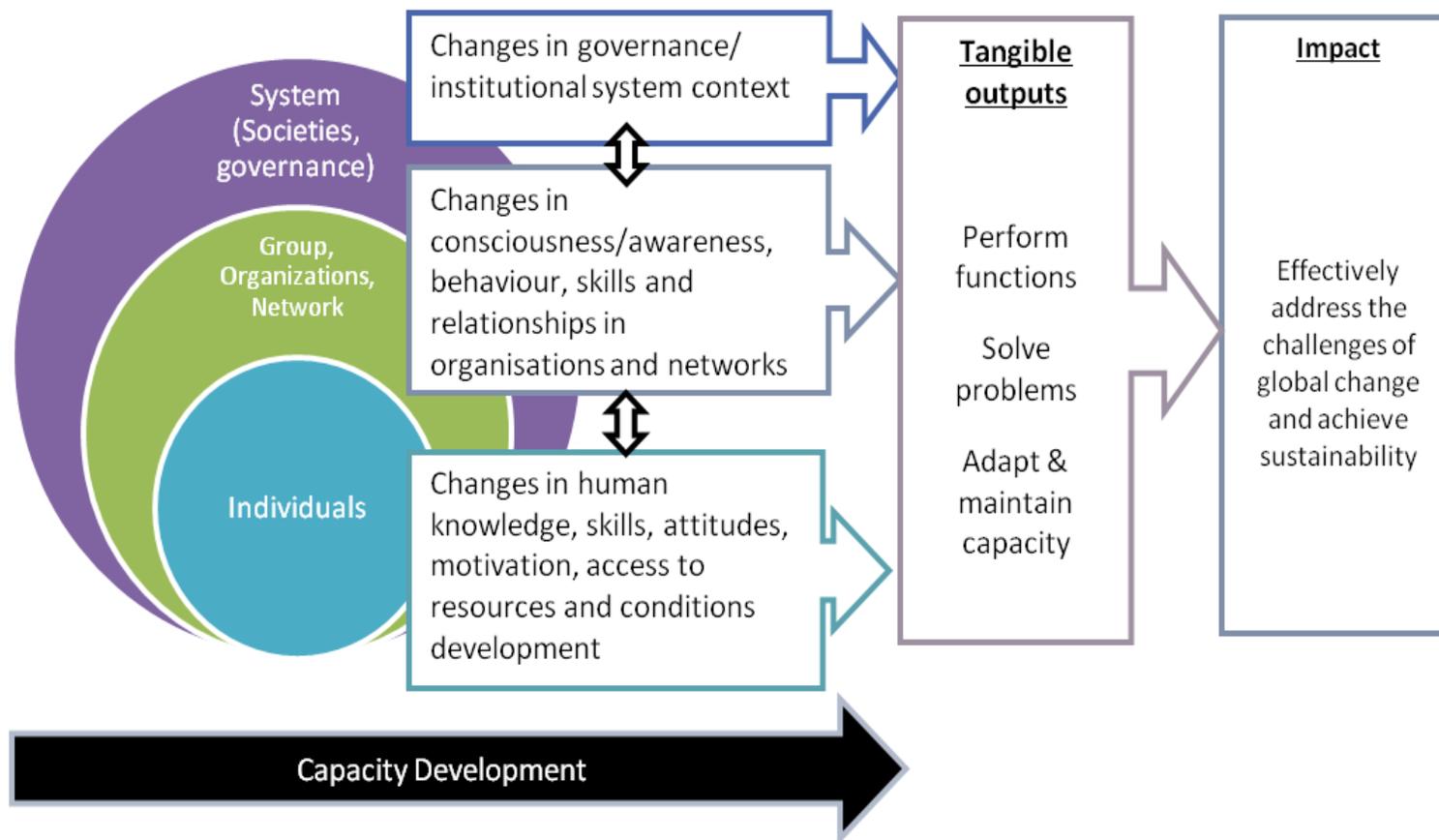
The Process ?



Framework for Capacity Development ?



Method for Capacity Development



Source – Asia Pacific Network for Global Change Research

<http://www.apn-gcr.org/programmes-and-activities/capable/>

The Near Future We need to?

Expand our network? Become an active member?



The **United Nations Institute for Training and Research (UNITAR)** is a dedicated training arm of the United Nations working in every region of the world. The Institute's mission is to develop the capacities to enhance global decision-making and to support country-level action for shaping a better future. UNITAR empowers individuals, governments and organizations through knowledge and learning to effectively overcome contemporary global challenges.



United Nations **Global Geodetic Reference Frame Education, Training, and Capacity Building Sub-committee** – focusing on enhancing geodetic capability in regions.

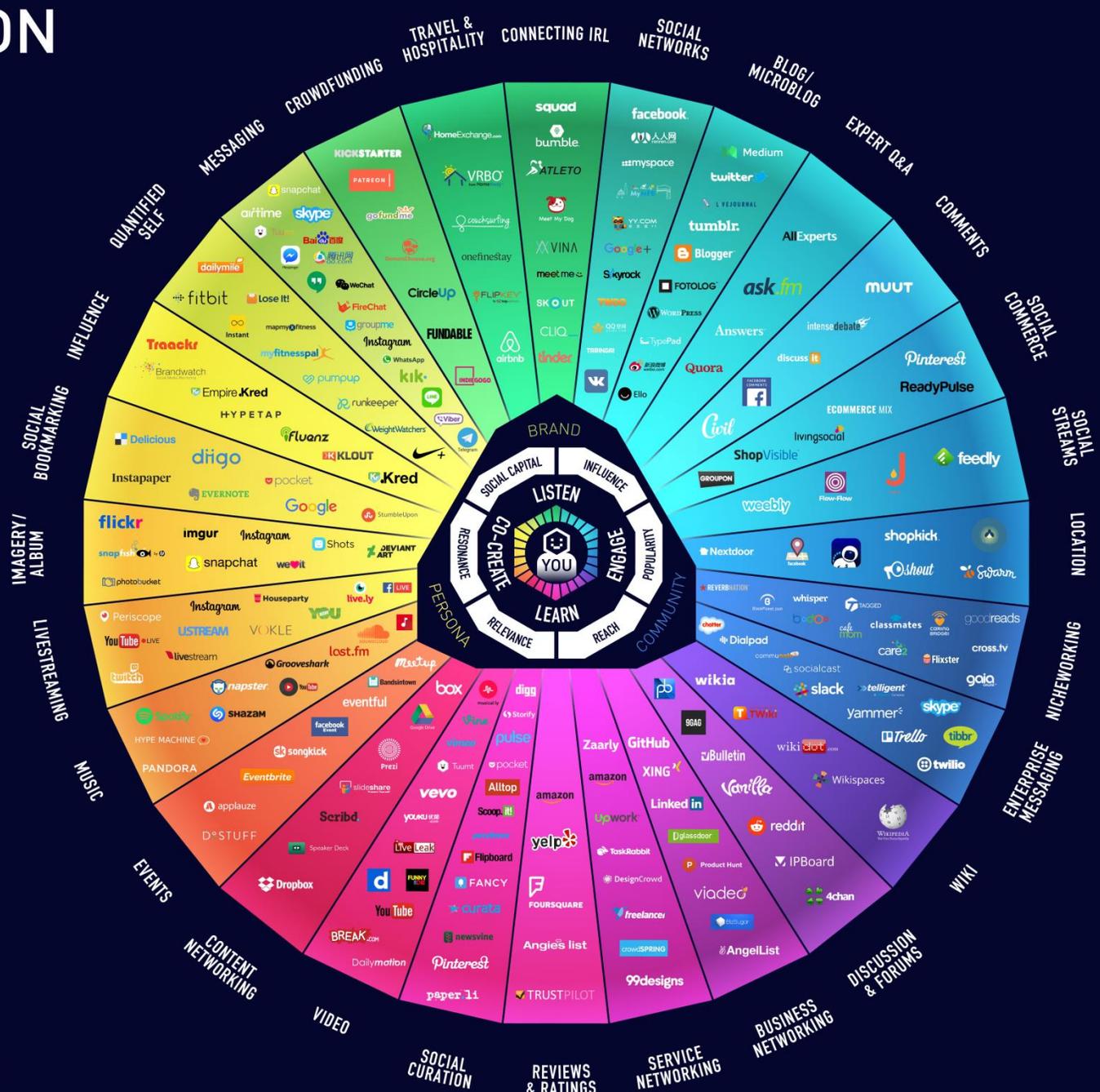
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Social Media Gave Everyone a Voice

The Conversation Prism debuted in 2008 as social media was exploding online. Social media would change everything about how we communicate, learn and share. It forever democratized information and reset the balance for influence.

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For more information check out
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Next Forum –
Kumamoto Prefecture, Japan

16 October 2017

Prior to UN GGIM AP Plenary Meeting

Forum on ***geodetic data sharing*** jointly organized by UN-GGIM-AP WG1 and the International Federation of Surveyors (FIG).

This event will examine the regional challenges, benefits and opportunities of exchanging geodetic data.

Senior decision makers responsible for geodetic data sharing policy are urged all to participate in this meeting.





***Your geodetic /
geospatial
future is in your
hands !***



ありがとうございます !