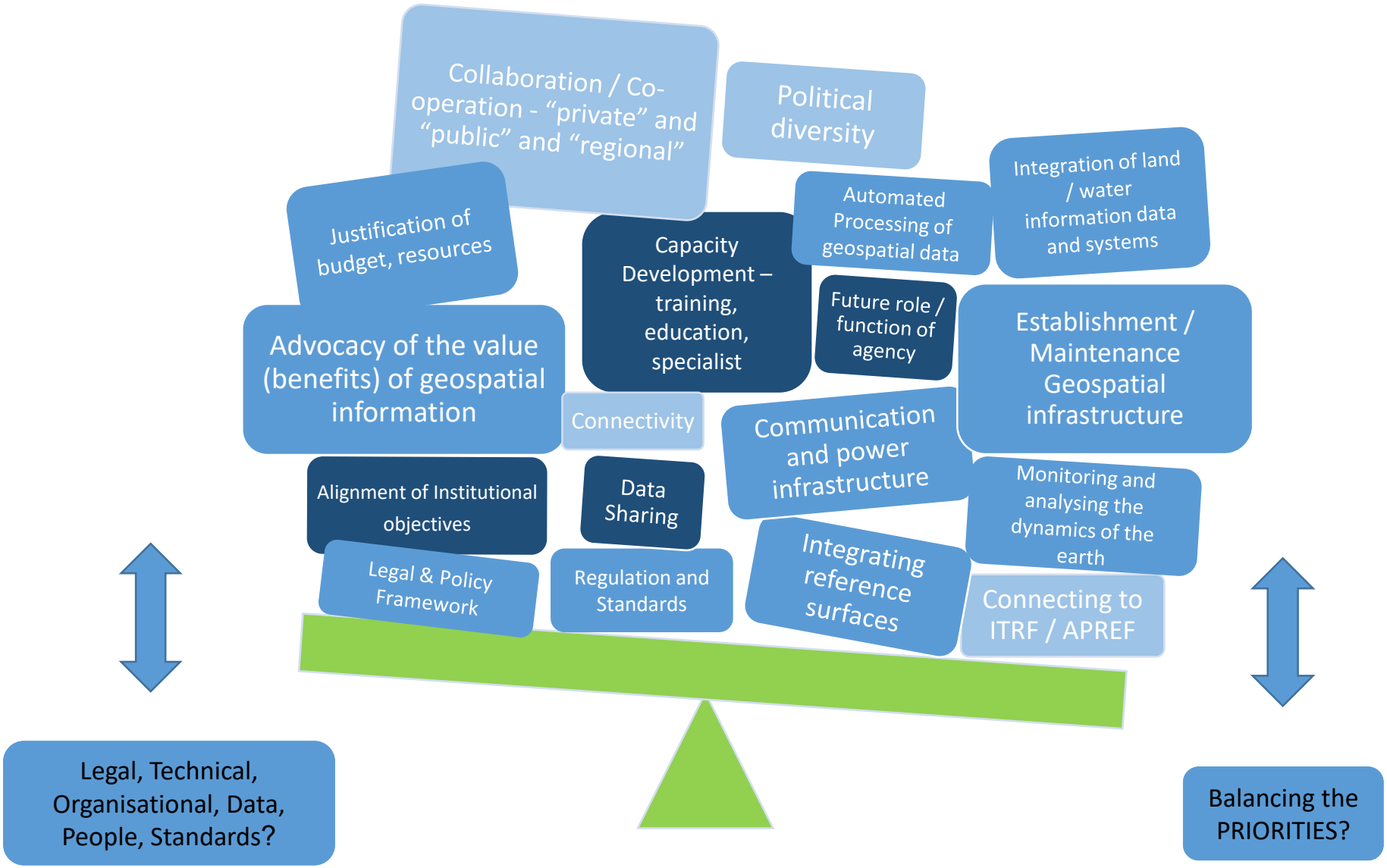
FIG WORKING WEEK 2019
22–26 April, Hanoi, Vietnam
"Geospatial Information for a Smarter Life and Environmental Resilience"

TS06I. Developing Capacity for Geodetic Infrastructure and Systems I

Building Survey and Geospatial Capacity in Asia and the Pacific Region

Rob Sarib – Chair
FIG Asia Pacific Capacity Development Network

Never ending challenges



The *COMMON* 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 of 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 and inclusive – gender, age, professional disciplines, cultural
- Increased UN GGIM lead activity – mandates for countries, leveraging opportunities

The *COMMON* challenges being experience by geospatial / survey mapping agencies, such as -

- Continually justifying role, existence, value and importance to decision makers (executive mgt / financial / political)
- Responsible governance / admin frameworks – transparency, accountability to the community, evidence based decision making
- Competing and securing resources
- Modernising legislation, developing relevant and agile policies and guidelines
- Developing agency “plans” to align with high level strategic objectives
- Updating and complying with industry standards and practices
- Modernising land administration systems to ensure indefeasibility of registration of rights, restrictions and responsibilities
- 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

The *COMMON* challenges being experience by geospatial / survey mapping agencies, such as –

- 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
- Having access to reliable communications
- Provision of data in the "cloud", via distributed web services, data retrieval through catalogues and visualisation via Web Map Services… in near real time
- Building and maintaining geospatial / geodetic infrastructure and systems
- Modelling and monitoring of the dynamics of the earth and environment in real time for variety of applications
- Implementation of dynamic reference frames and datums
- Establishing linkages with stakeholders for capacity building, training, education and recognition of qualifications
- Balancing priorities – legal, technical, organisational, data, and people

Countries Geospatial Readiness Index 2019

LEADERS

Rank 2019	Country	CGRI- 2019 Score (0-100)
1	USA	100.00
2	United Kingdom	62.16
3	Germany	49.51
4	The Netherlands	47.03
5	Canada	44.45
6	Denmark	44.06
7	China	41.19
8	Singapore	41.16
9	Belgium	41.11
10	Switzerland	40.94

Source : Geospatial Media and Communications

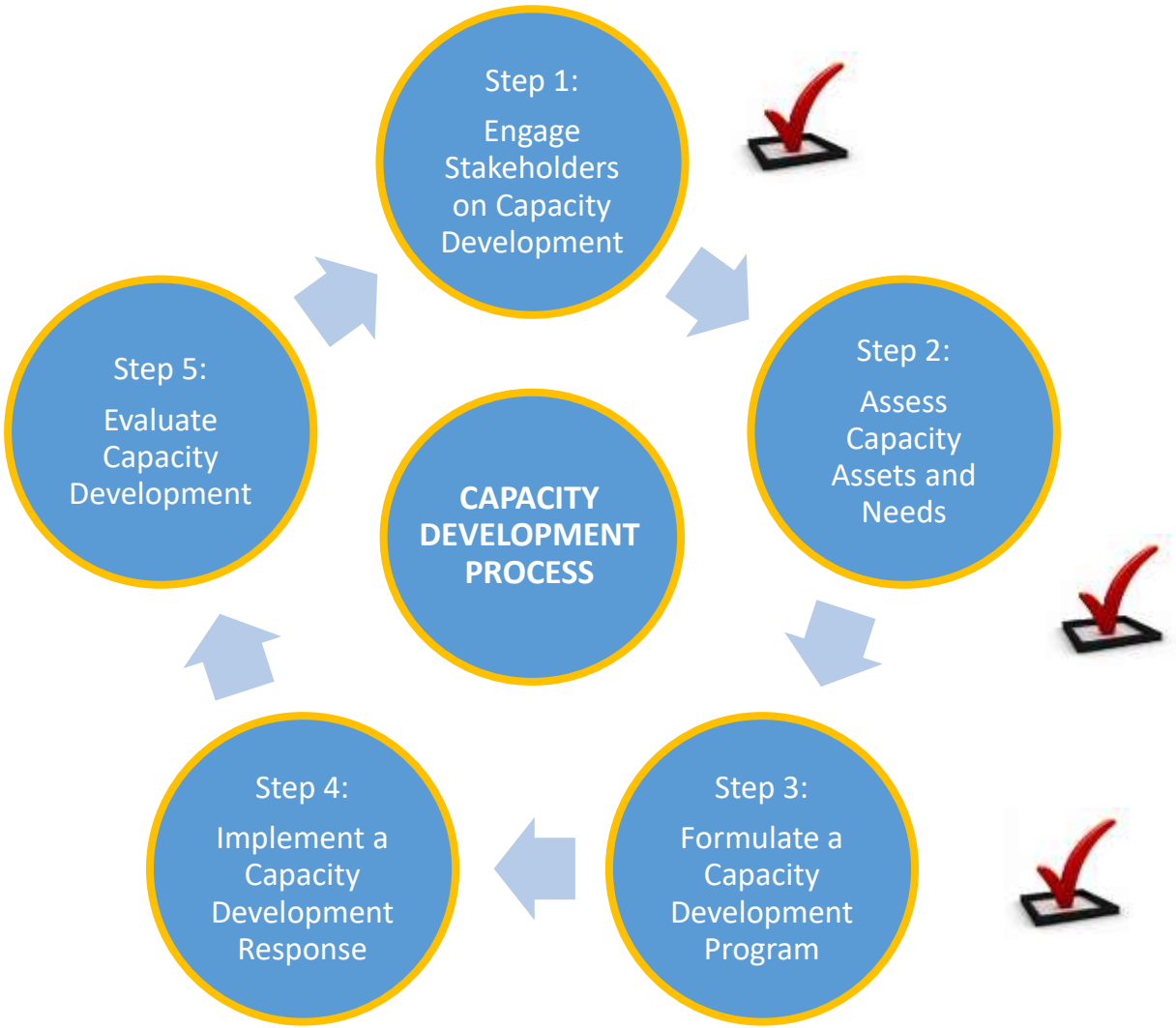
ASIA PACIFIC RANKINGS			
COUNTRY	OVERALL SCORE	OVERALL RANK	REGIONAL RANK
China	41.19	7	1
Singapore	41.16	8	2
Japan	39.03	12	3
South Korea	38.70	13	4
Australia	38.10	15	5
New Zealand	35.77	20	6
India	31.91	25	7
Thailand	21.82	36	8
Philippines	20.17	37	9
Indonesia	19.94	38	10
Malaysia	19.66	39	11
Brunei	15.47	45	12
Sri Lanka	13.46	54	13
Vietnam	13.32	55	14
Bangladesh	9.68	67	15
Nepal	9.41	69	16
Regional Average	25.55		

Characterised by the following capabilities -

- 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?

Capacity Development Process



Via a collaborative / unified manner

FIG Asia Pacific Region Capacity Development Strategy

Collaboration is the KEY !

Organisations / Regions / Countries needed to consider -

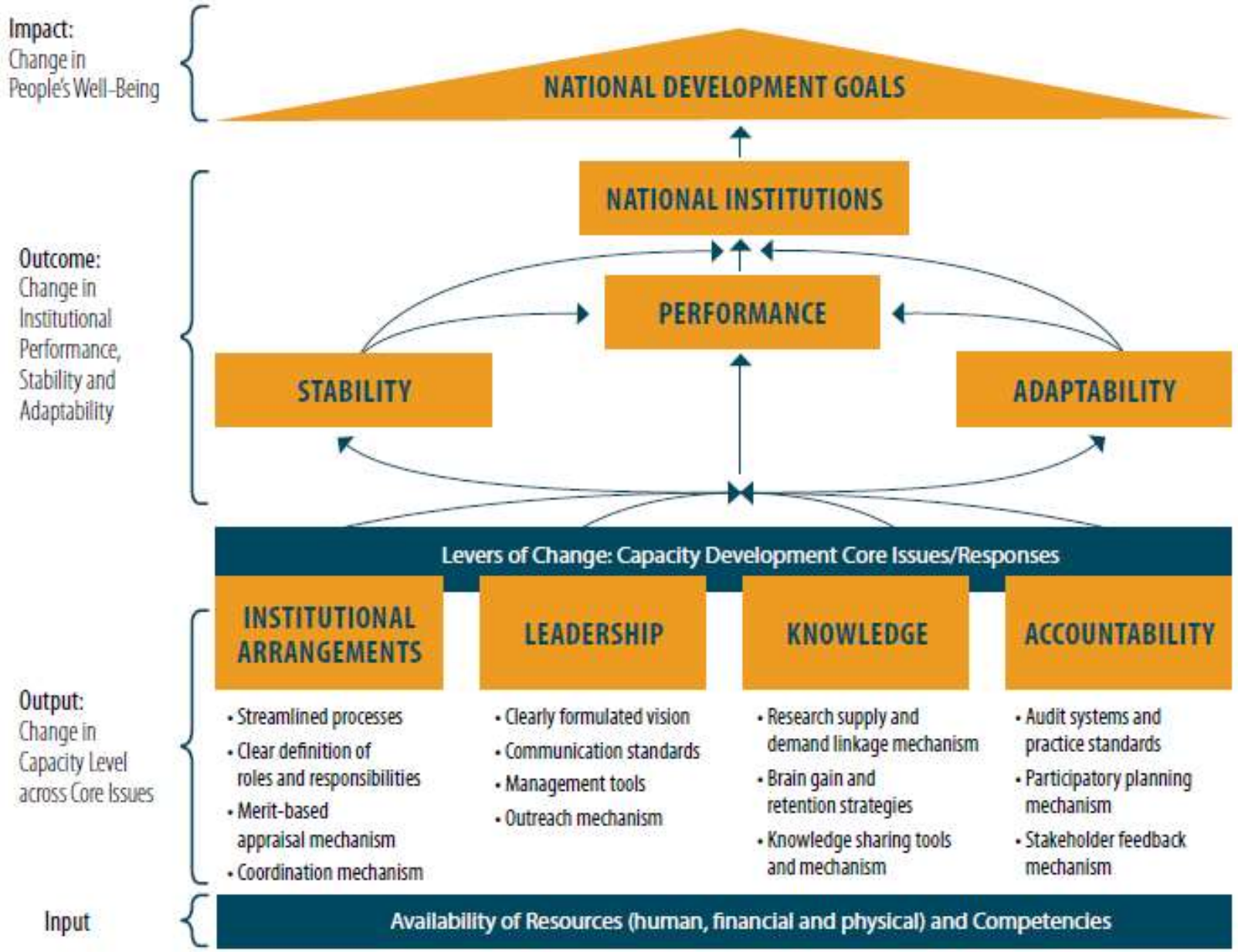
WHY do we need to develop our capacity? What will be its purpose? Drivers – social, economic, political?

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?

SWOT – Analysis ?

Capacity Development Strategy, Framework , Implementation



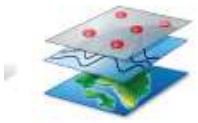
Discover the "why" that will unify agencies and influence the decision makers (and politicians)

Understand your geospatial information (foundation datasets)

Source - http://www.anzlic.gov.au/fsdf-themes-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

Delivery

Data Acquisition, Collectors, Gathers

Data processing, quality control, validation

Data Archival, Geospatial DB

Data Catalogue, Metadata

Data distribution, Access, Data discovery, Web Services

Value Added Retailers, External

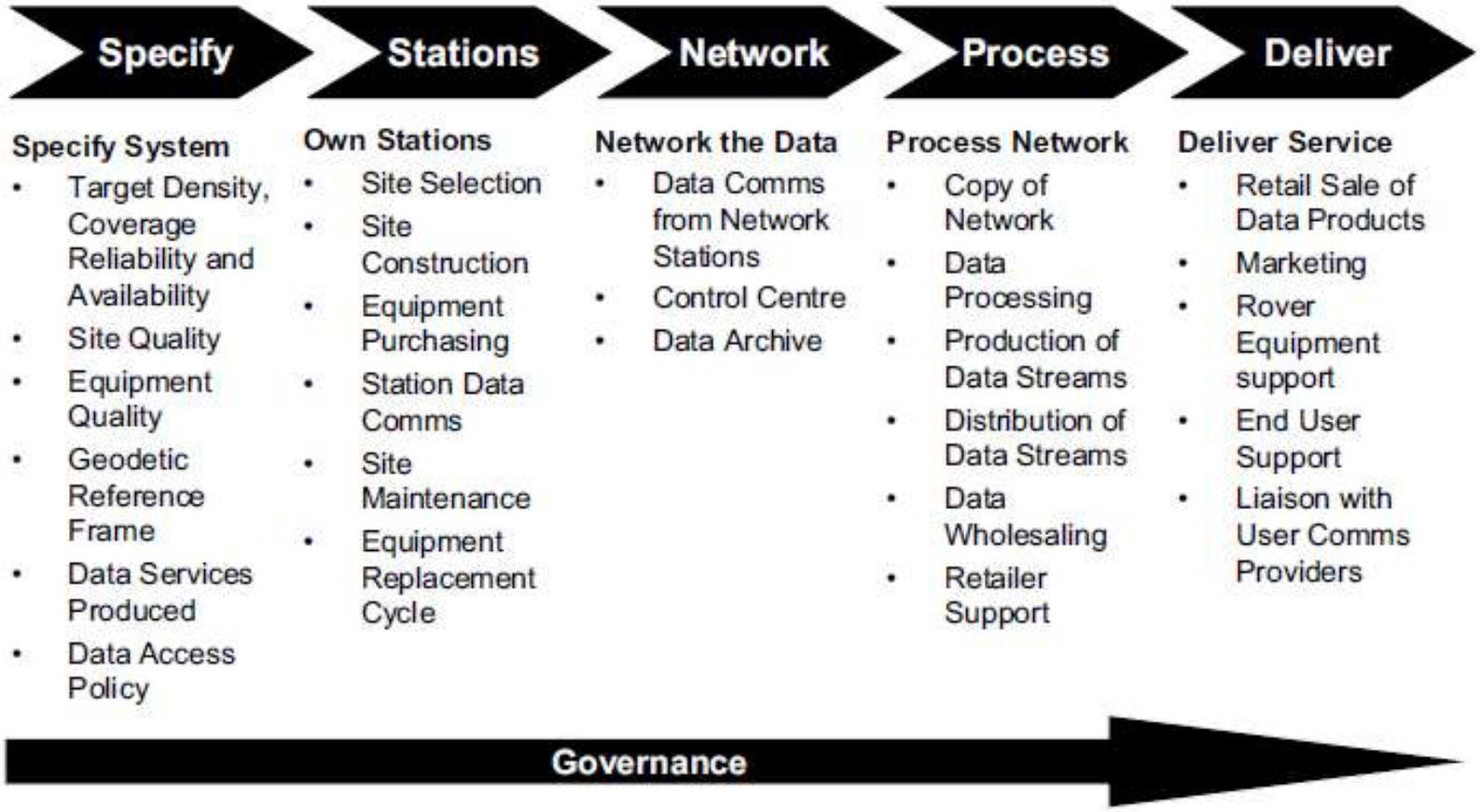
Applications – Open data / layers, Visualisation, Mobile Devices

Users – General Public, Decision Makers, Research, Scientists

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

Source - http://www.hexagongeospatial.jp/Libraries/WhyGeospatial/geospatial-information-lifecycle.jpg

Role in managing GNSS CORS infrastructure?



Source - Matt Higgins "A model for organisational roles within a Positioning Infrastructure"

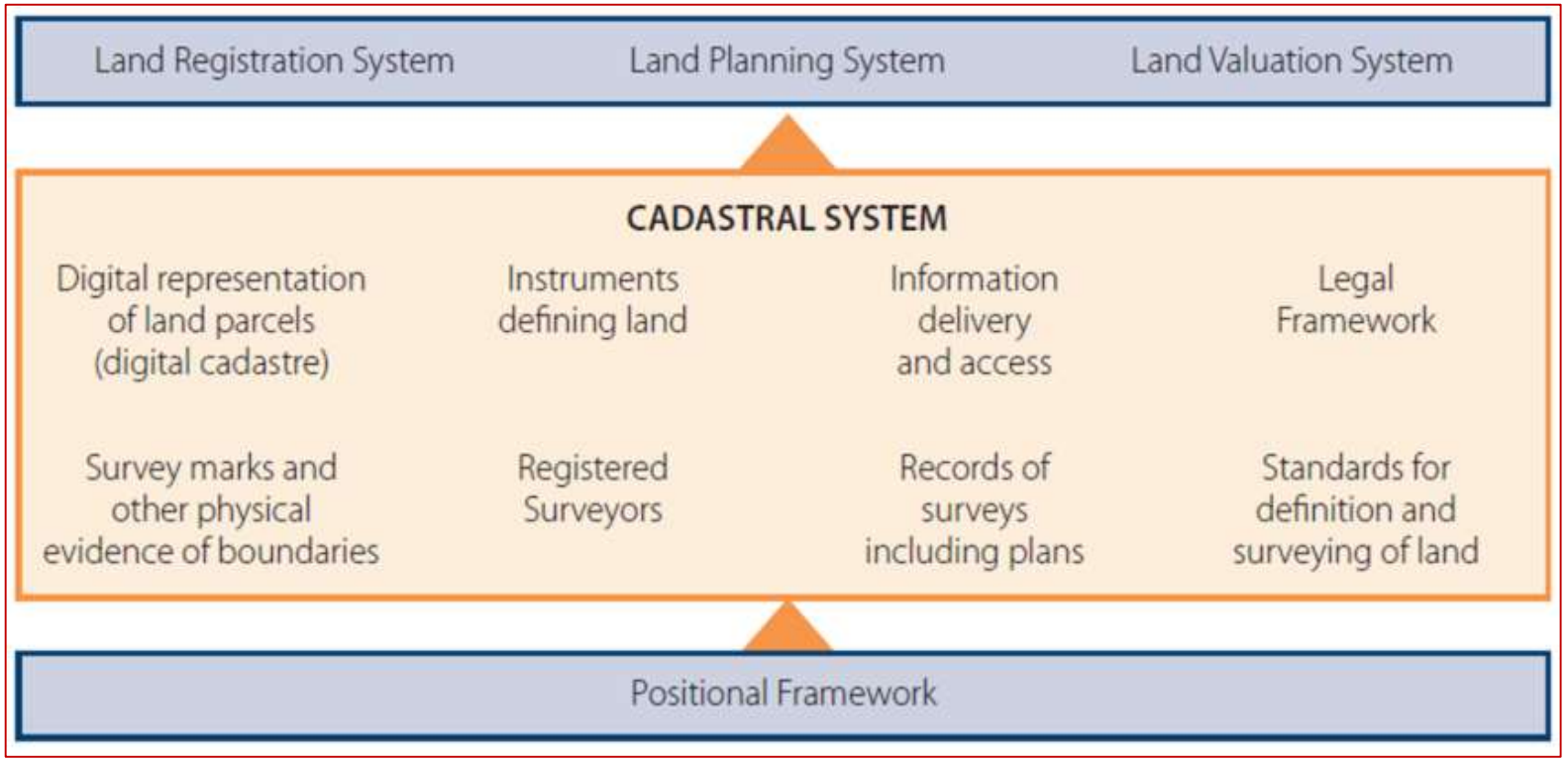
Understand Land / Marine Administration, Management, and Governance

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

- Management ***processes*** *for the* ***use and development of land /marine resources***

- Governance framework of ***legislation, policies, processes and institutions by which land / marine , property and natural resources are managed***

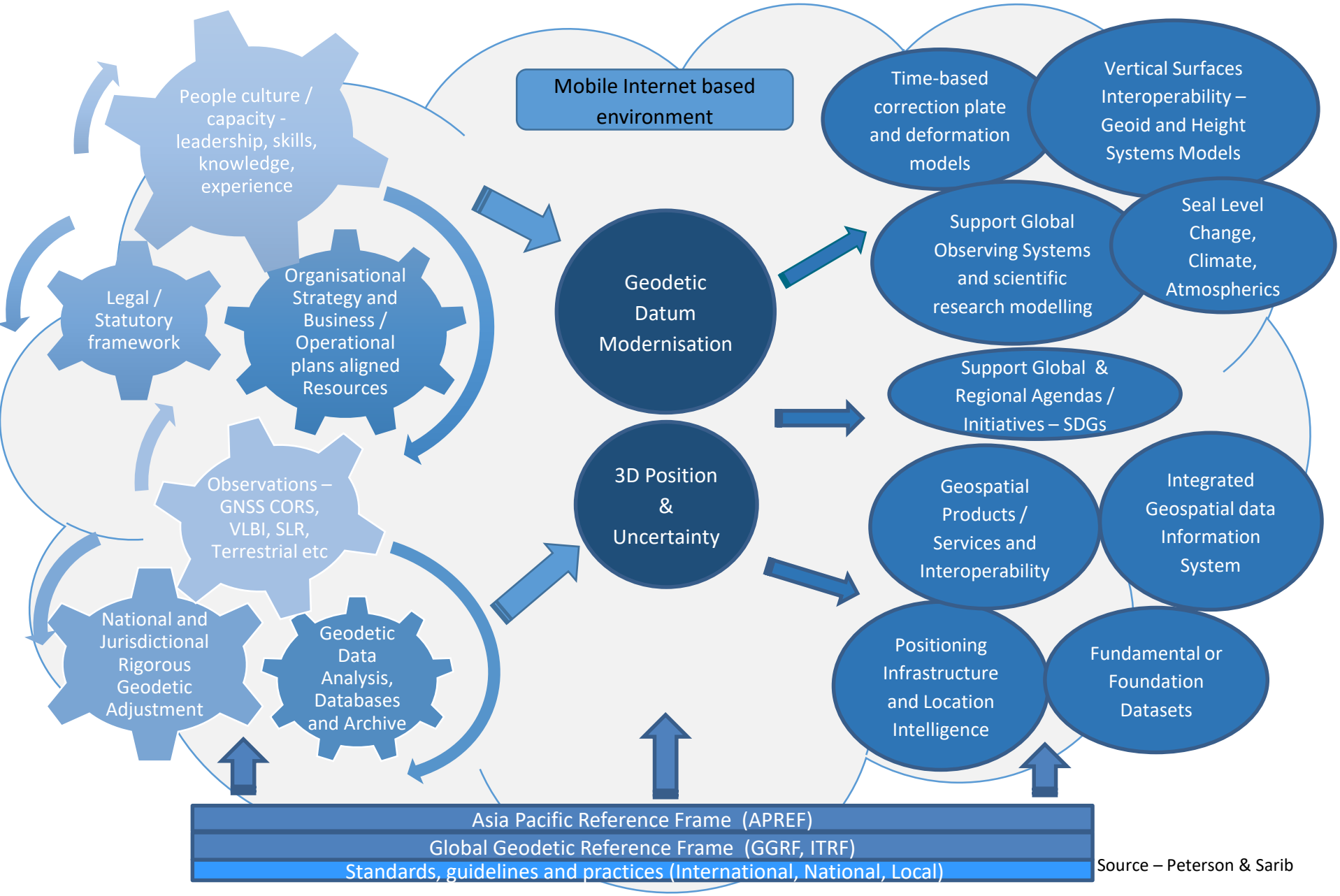
Modern Land Administration System



Source - https://www.icsm.gov.au/sites/default/files/Cadastre2034.pdf

- ***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***

Modernised Geospatial Framework



Source – Peterson & Sarib

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

Capabilities / Competencies for the Future

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

- Prepare for ***continuous change;*** transform our 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.

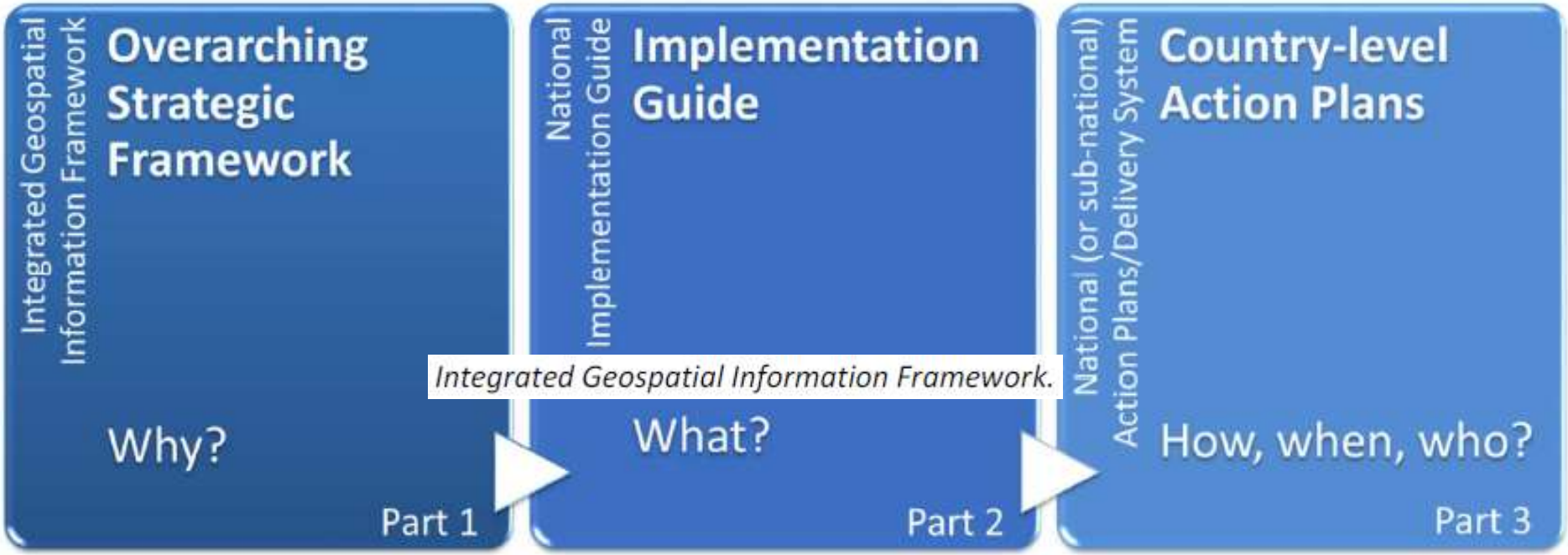
Capabilities / Competencies for the Future

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

Plans that are inspirational 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 !

Leverage UN initiatives as mandates for policy development

FIG AP CDN Perspectives

To develop capability organisations and agencies need to consider –

- Analysing their ***role and responsibilities*** in geospatial information
- Collaborating with other ***disciplines outside geospatial /geodesy***
- 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, other FIG commissions & networks, UN GGIM AP, UN ETCB etc

Collaboration is the key !

Good Will and Volunteerism is NOT Sustainable - we need to

Formalise collaboration / co-operation - *Shared objectives and expectations ; Defined roles and responsibilities ; Measurable benefits and value ; Shared commitment*

FIG AP CDN Perspectives

Moving forward the FIG AP CDN recommend more capacity development 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 based on IGIF and aligned with national / regional objectives
- ***Modernising*** legislation, policy, standards & practices and guidelines
- Preparing proposals and ***business cases*** for national geospatial or geodetic or capcity development initiatives and resourcing (or specific projects)
- ***Technical matters*** - geospatial and geodetic infrastructure, systems and operations
- Building a framework and mechanisms to ***share our knowledges and experiences*** – “a body of knowledge”

FIG Asia Pacific Capacity Development Network

"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

"Overall, the Asia Pacific, followed by North America, is the biggest market for LI. These two regions are expected to maintain their leadership in the foreseeable future as well."

Geospatial Media and Communications - GeoBuiz-19 Report

Darwin, Australia – 15 to 18 August 2019 South East Asia Survey Congress (SEASC)

SEASC 2019 DARWIN

KEY DATES

15 AUGUST 2018
REGISTRATION OPENS

30 APRIL 2019
CALL FOR ABSTRACTS CLOSES

20 MAY 2019
EARLY BIRD REGISTRATION CLOSES

15-18 AUGUST 2019
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