

*Reference Frame in Practice
Operational Aspects of GNSS CORS*

***Legal, Policy and Regulatory
Implications***

18-20 September 2018 – Suva, Fiji

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Presentation Content

From a *survey and geospatial information* legislation, policies and regulation perspective -

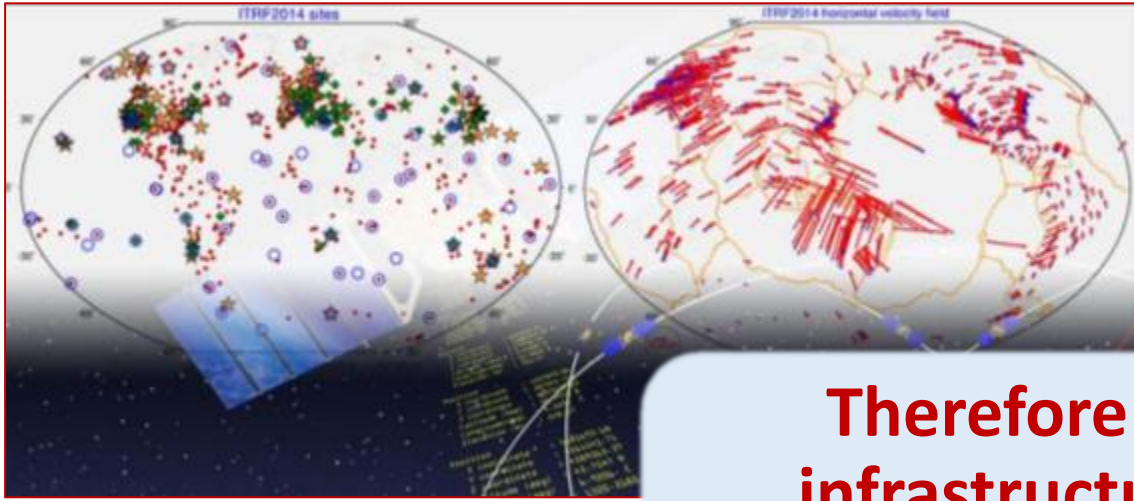
- Examine the environment, and define the “problem” or “challenge” in terms of the operational aspects of GNSS CORS
- Discuss the legislative framework, process and content wrt components of GNSS CORS
- Review other related topics and associated challenges



***Analysis of the GNSS CORS environment to
discover our question***

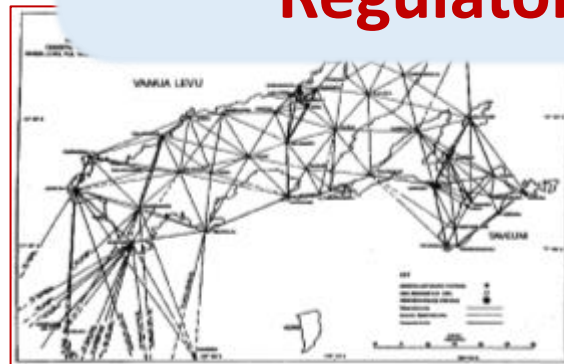
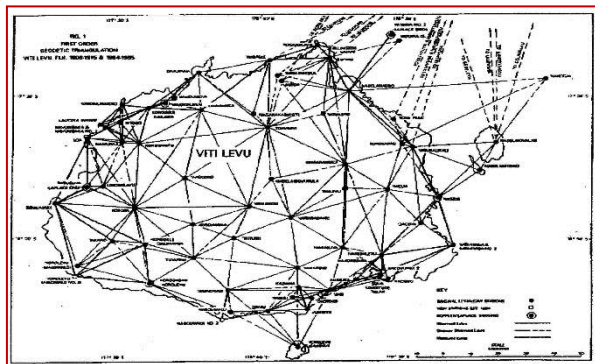
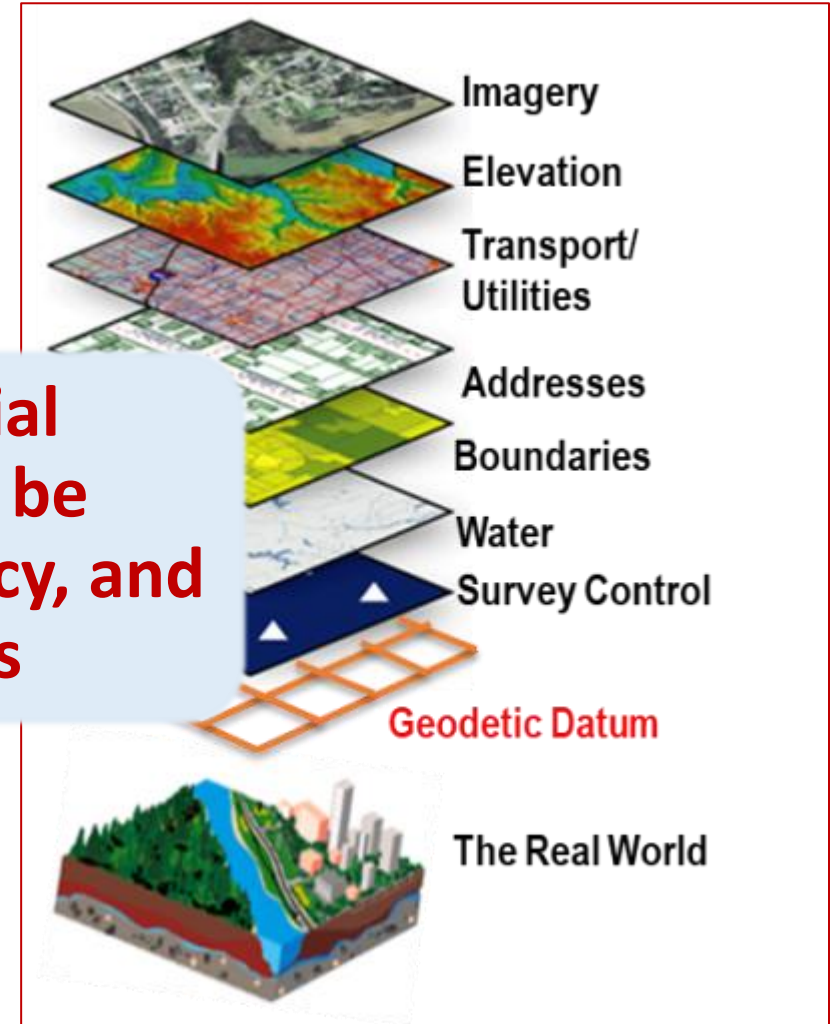


GNSS CORS are intrinsically connected to....



Reference Frame

Therefore “geospatial infrastructure” must be considered in Legal, Policy, and Regulatory matters



Geodetic Datums

Geospatial Datasets

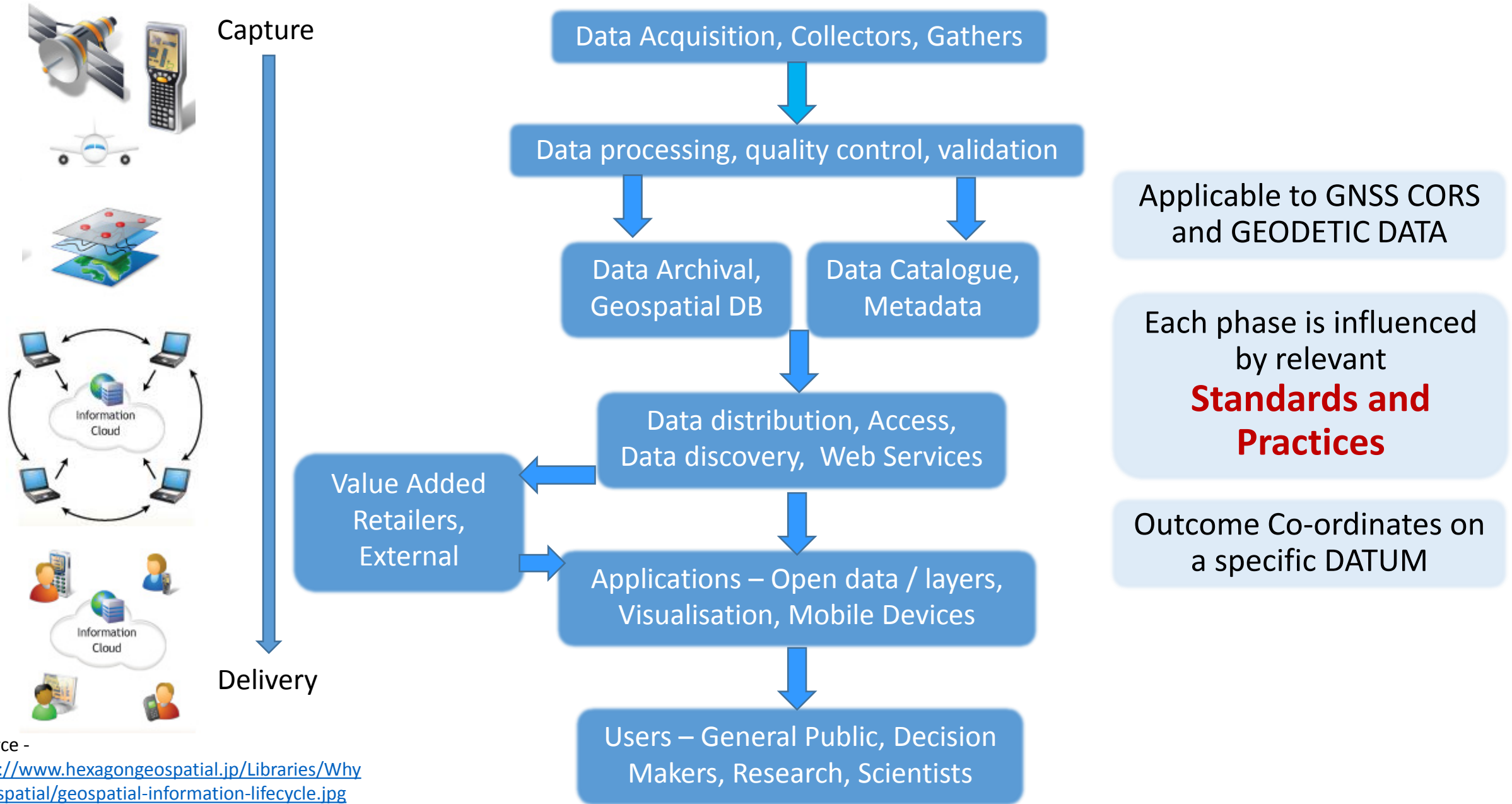
Geospatial Information – Fundamental or Foundation Datasets



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

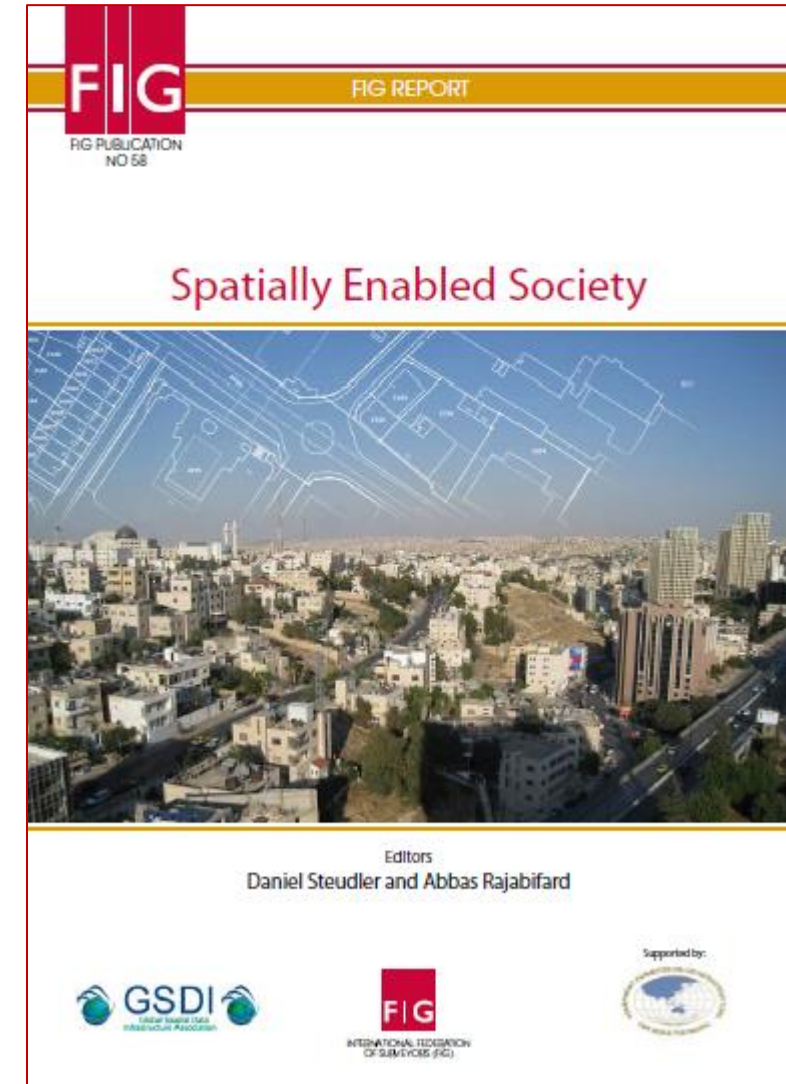
Generic Geospatial Information Cycle



Key Indicators of a “Geospatial Enabled Society”

Drivers of good land administrative, management & governance”

- **Security of tenure** – defined 3D rights responsibilities restrictions
- **Integrated land and water geospatial information system** – 3D digital visualisation
- **Foundation or fundamental datasets** – open
- **Legislation, Policy, standards, practices, guidelines** – modernised and relevant
- **Modernised geospatial reference system** (incl. infrastructure)
- **Agile flexible high performing people** – have the capacity to meet the challenges for the future
- **Collaborative environment**

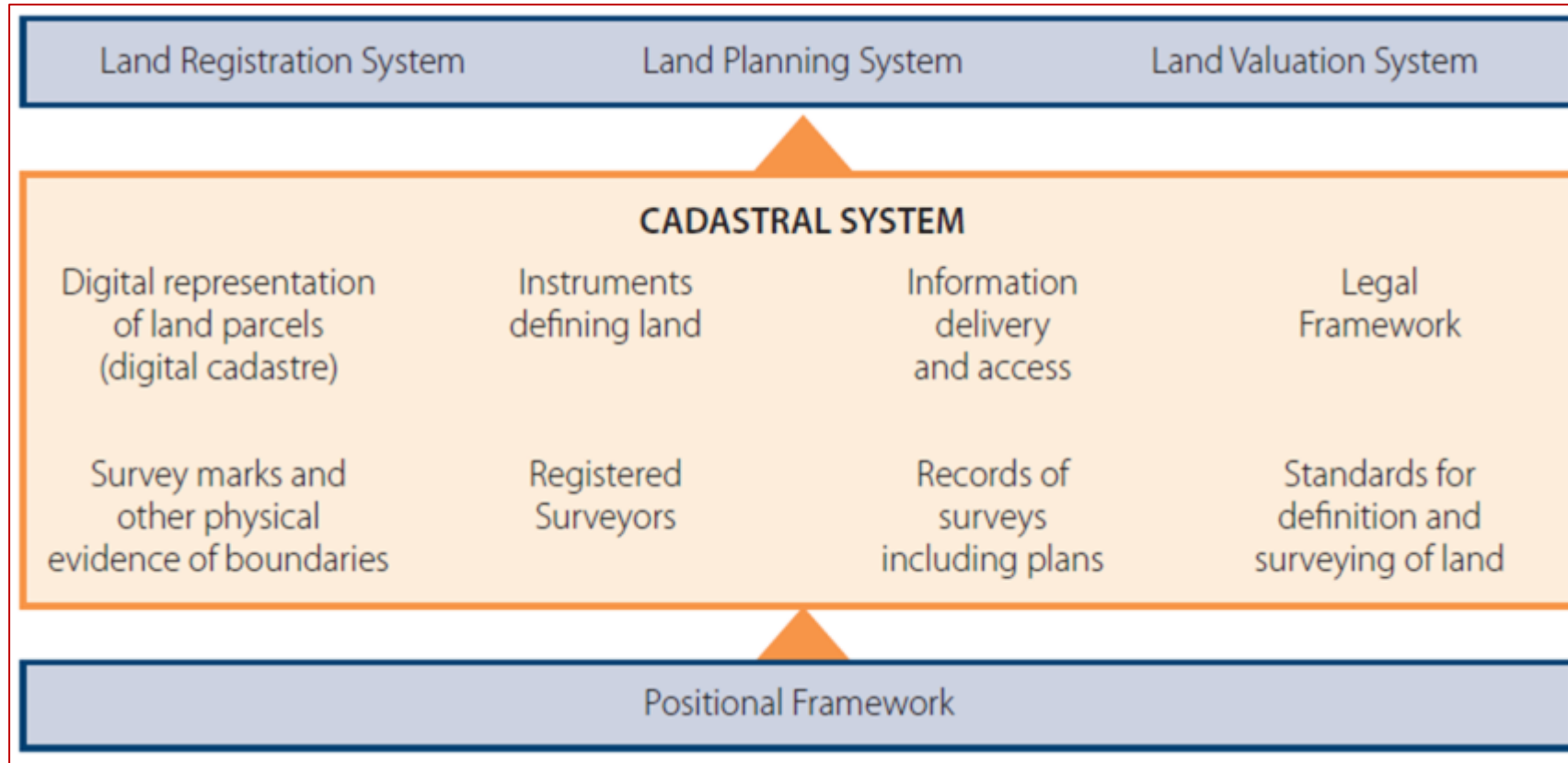


Source – FIG Publication 58 Spatial Enabled Society

Land and 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*

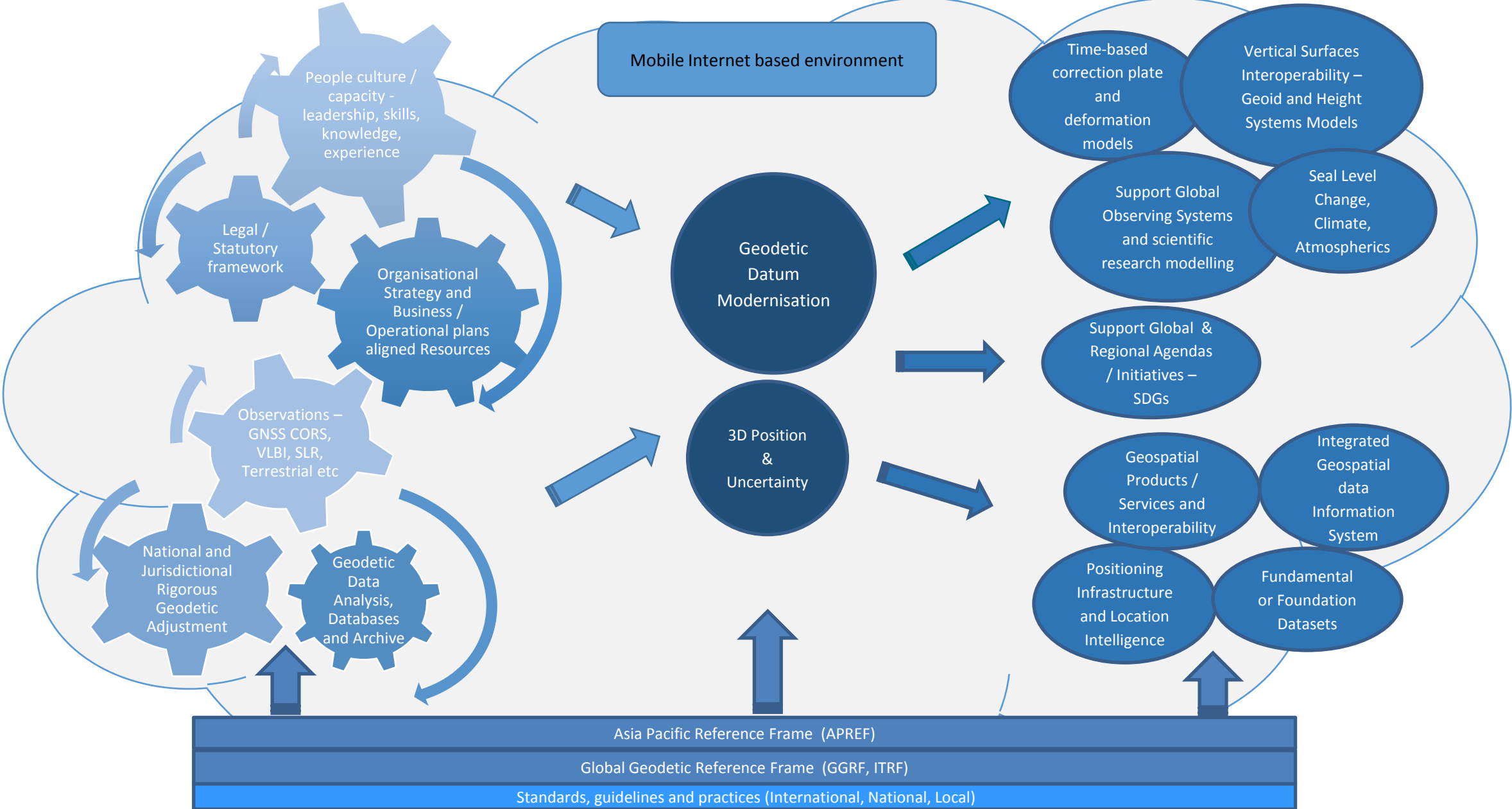
Modern Land (Water) Administration System



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 Geodetic Framework



Source – Peterson & Sarib

Global Geodetic Reference Frame (GGRF) Resolution



Ambassador Peter Thomson from Fiji introducing the resolution to the UN General Assembly. Photo: Kyoung-Soo Eom


UN GGIM - GGRF - Sub Committee on Geodesy

First Geodetic RESOLUTION !

- ***General Assembly resolution 69/266*** of 26 February 2015
- ***“A global geodetic reference frame for sustainable development”***, which calls for greater ***multilateral cooperation on geodesy***, including the ***open sharing of geospatial data, capacity-building*** in developing countries, the creation of ***international standards and conventions***, and contributions to the ***global reference frame and regional densifications***
- Achieved through relevant ***national mechanisms and intergovernmental cooperation.....***

“Made governments and the geodetic community to form an agenda that considered not only technical / scientific issues but also political, social and environmental challenges”

United Nations A/RES/69/266

 **General Assembly** Distr.: General
11 March 2015

Sixty-ninth session
Agenda item 9

Resolution adopted by the General Assembly on 26 February 2015
[without reference to a Main Committee (A/69/L.53 and Add.1)]

69/266. A global geodetic reference frame for sustainable development

The General Assembly,

Reaffirming the purposes and principles of the Charter of the United Nations,


Reaffirming also its resolution 54/68 of 6 December 1999, in which it endorsed the resolution entitled “The Space Millennium: Vienna Declaration on Space and Human Development”,¹ which included, inter alia, key actions to improve the efficiency and security of transport, search and rescue, geodesy and other activities by promoting the enhancement of, universal access to and compatibility of space-based navigation and positioning systems, including Global Navigation Satellite systems,

Reaffirming further its resolution 57/253 of 20 December 2002, in which it endorsed the Plan of Implementation of the World Summit on Sustainable Development (Johannesburg Plan of Implementation),² and means of implementation, which included, inter alia, strengthening cooperation and coordination among global observing systems and research programmes for integrated global observations, taking into account the need for building capacity and sharing of data from ground-based observations, satellite remote sensing and other sources among all countries,

Reaffirming its resolution 66/288 of 27 July 2012, in which it endorsed the outcome document of the United Nations Conference on Sustainable Development, entitled “The future we want”, in which Heads of State and Government recognized the importance of space-technology-based data, in situ monitoring and reliable geospatial information for sustainable development policymaking, programming and project operations,

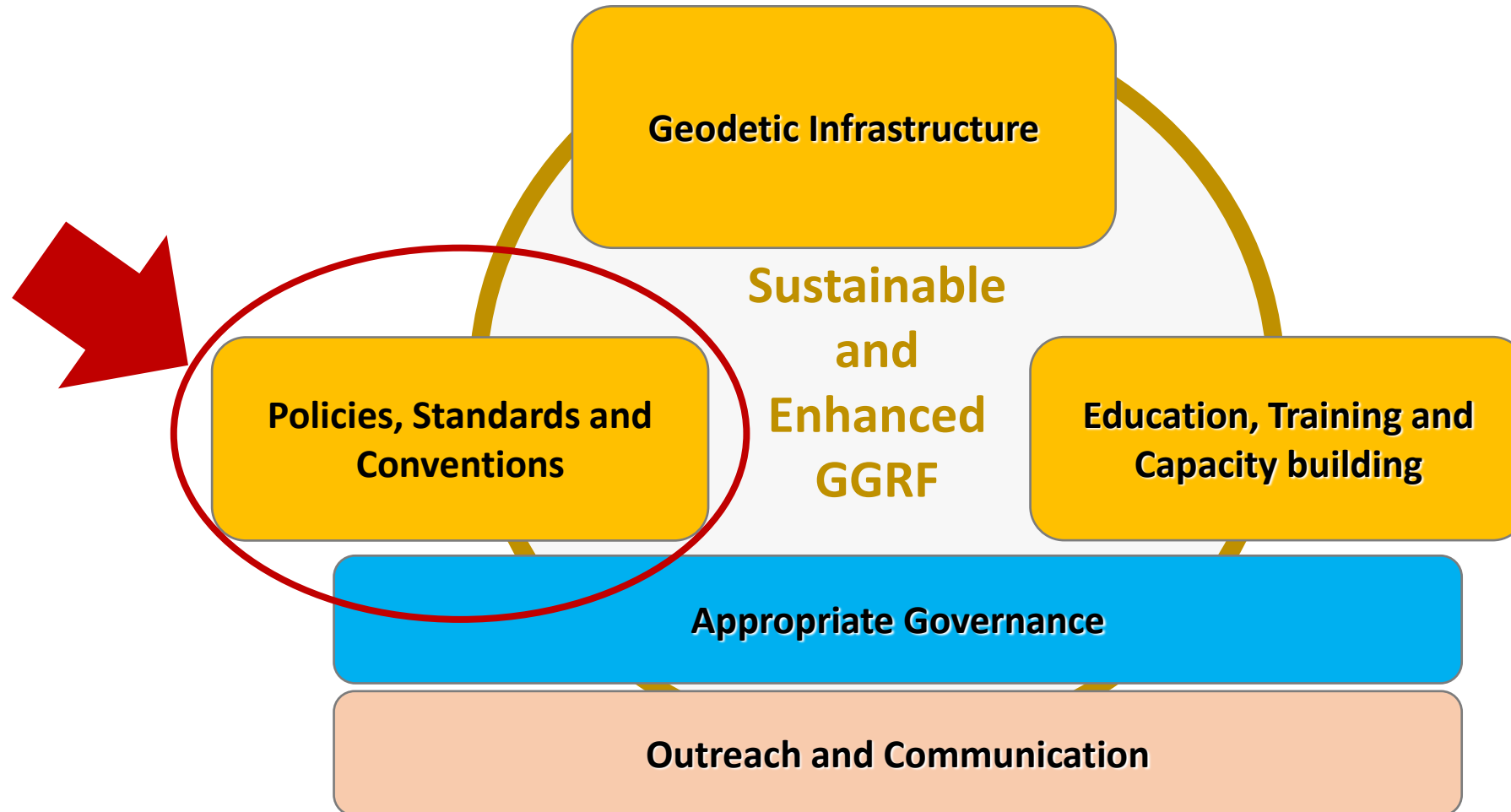
Noting Economic and Social Council resolution 2011/24 of 27 July 2011, by which the Council established the Committee of Experts on Global Geospatial Information Management, encouraged Member States to hold regular high-level,

¹ Adopted by the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), held in Vienna from 19 to 30 July 1999 (A/CONF.184/6, chap. I, resolution 1).
² Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August–4 September 2002 (United Nations publication, Sales No. E.03.II.A.1 and corrigendum, chap. I, resolution 2, annex).

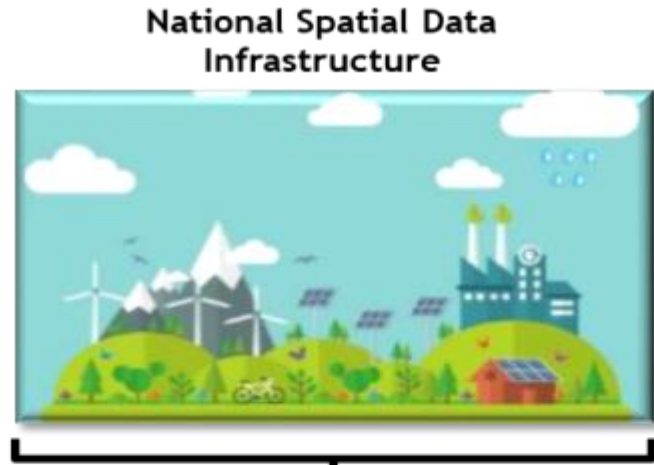


VISION

An accurate, sustainable and accessible Global Geodetic Reference Frame to support science and society

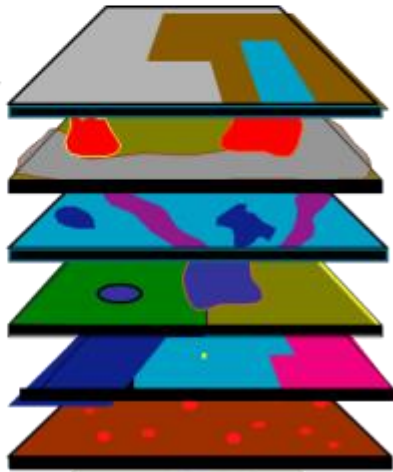


Driving the “GGRF Linkage”



High quality, timely and reliable data

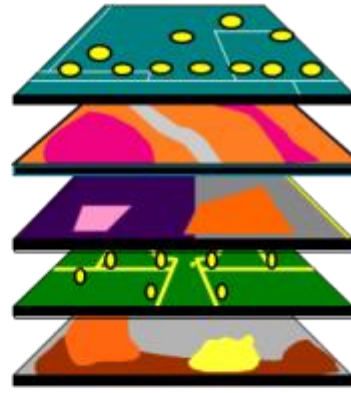
Elevation
Water/Ocean
Land use/cover
Transport
Cadastre
Population
Infrastructure
Settlements
Admin. Bdys.
Imagery
Geology/soils
Observations
Place Names
Addressing



Geodetic & NPI

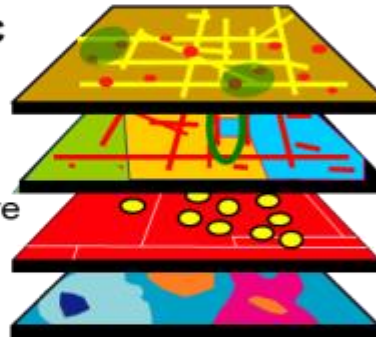
SOCIAL

Society
Poverty
Education
Health
Population
Employment
Water
Sanitation
Equality
Gender
Governance



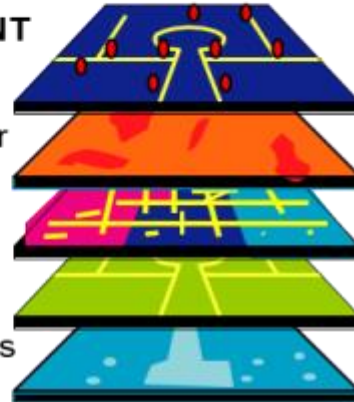
ECONOMIC

Well-being
Cities
Water
Energy
Infrastructure
Industry
Sanitation
Economy



ENVIRONMENT

Water
Seas/oceans
Land use/cover
Ecosystems
Forests
Agriculture
Climate
Biodiversity
Natural hazards
Pollution



- The WHOLE to the PART
- Data is *underpinned* by the *geodetic framework* or *positioning infrastructure*
- To facilitate IT, computers, systems, software and applications to communicate - *interoperability*
- To facilitate extraction and amalgamation of spatial data - *unification*
- To facilitate *measuring and monitoring of SDGs*
- At all levels – *local, national, regional, and global.*

Legal, Policy and Regulatory Implications

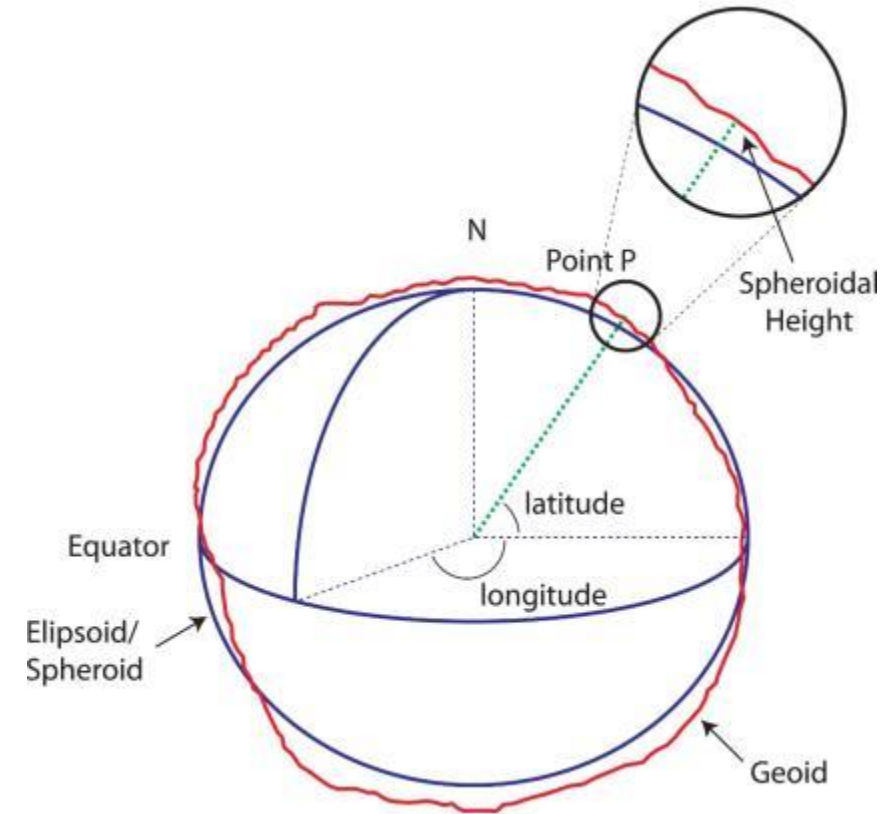
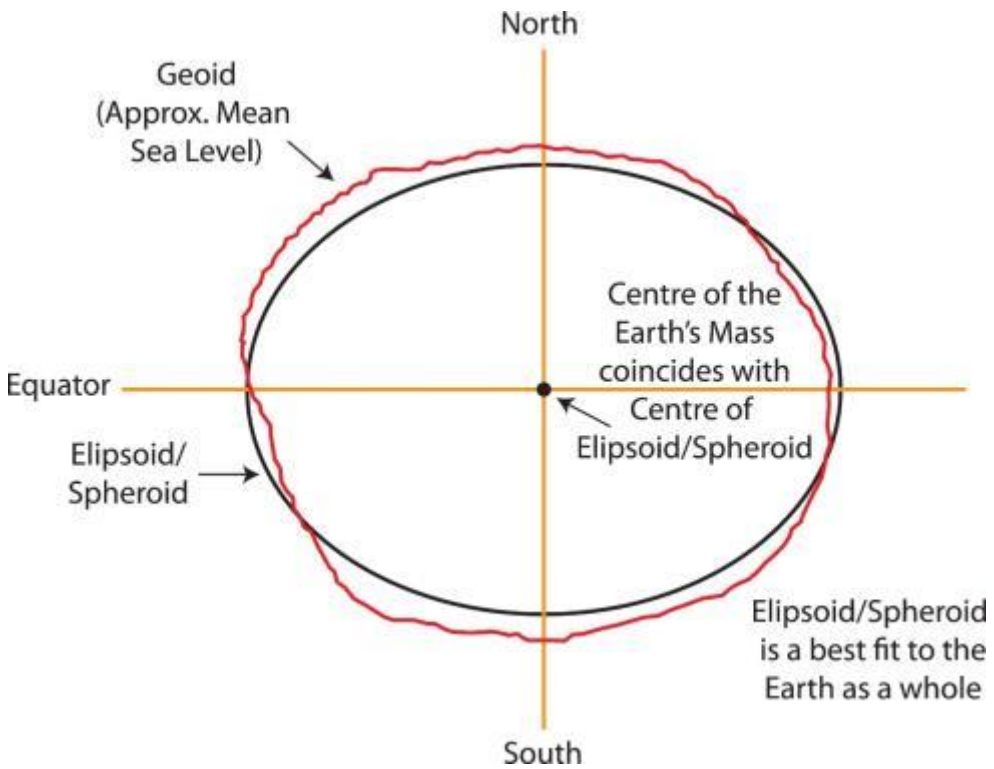
From a GNSS CORS perspective, legal, policy and regulatory matters –

- Should recognise the critical role, function and terms relating to reference frames, and geodetic datums.
- Must consider the “underpinning role” and impact on geospatial activity & datasets; land & water information systems and frameworks
- Need to reference standards (quality) and best or acceptable practices (techniques)



What are the common “features” shared by GNSS CORS and geospatial infrastructure and systems?

Geodetic Datum & Co-ordinates



What legal, policy or regulation do we need to develop w.r.t *Geodetic Datum & Co-ordinates?*

- Which delegated authority will establish, declare and define the geodetic datum & co-ordinates?
- Which “delegated” authority will maintain the infrastructure, and systems that defines and provides access to the geodetic datum & co-ordinates?
- How will the relevant delegated authority manage related infrastructure, and systems?



What legal, policy or regulation do we need to develop w.r.t *Geodetic Datum & Co-ordinates?*

- How will the delegated authority articulate and implement the use of geodetic datum and co-ordinates?
- How will the delegated authority motivate stakeholders and consumers to implement / adopt / take ownership?
- How will the delegated authority monitor and ensure adherence or compliance?



What are the legal, policy and regulatory questions w.r.t *Geodetic Datum & Co-ordinates?*

- How prescriptive should the “legislation” be? Could it be more outcome (product / service delivery) focused?
- ALSO from a broader context should geospatial referencing or co-ordination of fundamental datasets on a specific geodetic datum be mandatory? For example should land boundaries be defined by co-ordinates?



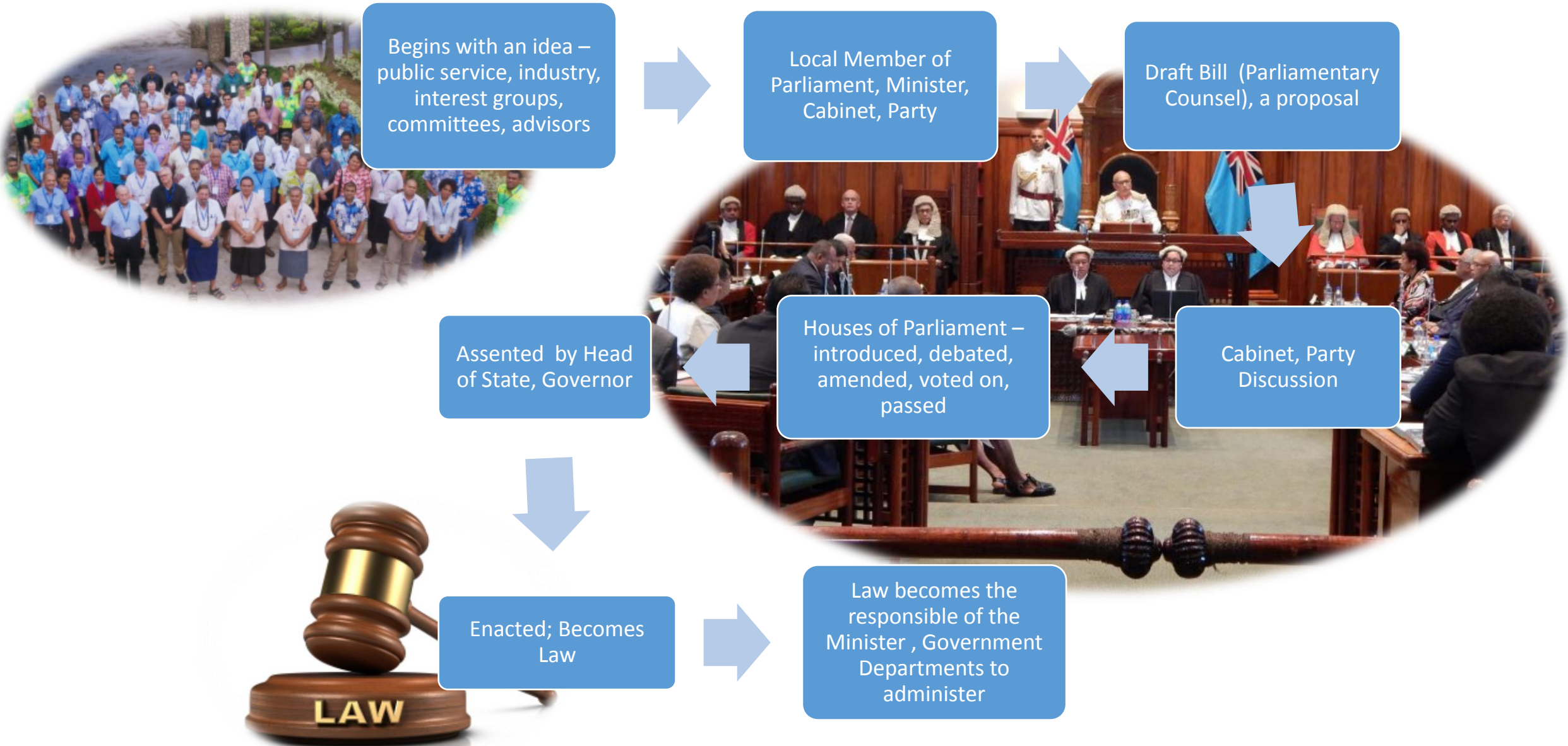
What government legislative action is needed?

and

What are the legal, policy, regulatory options?



Creation of Legislation



Legislative Framework



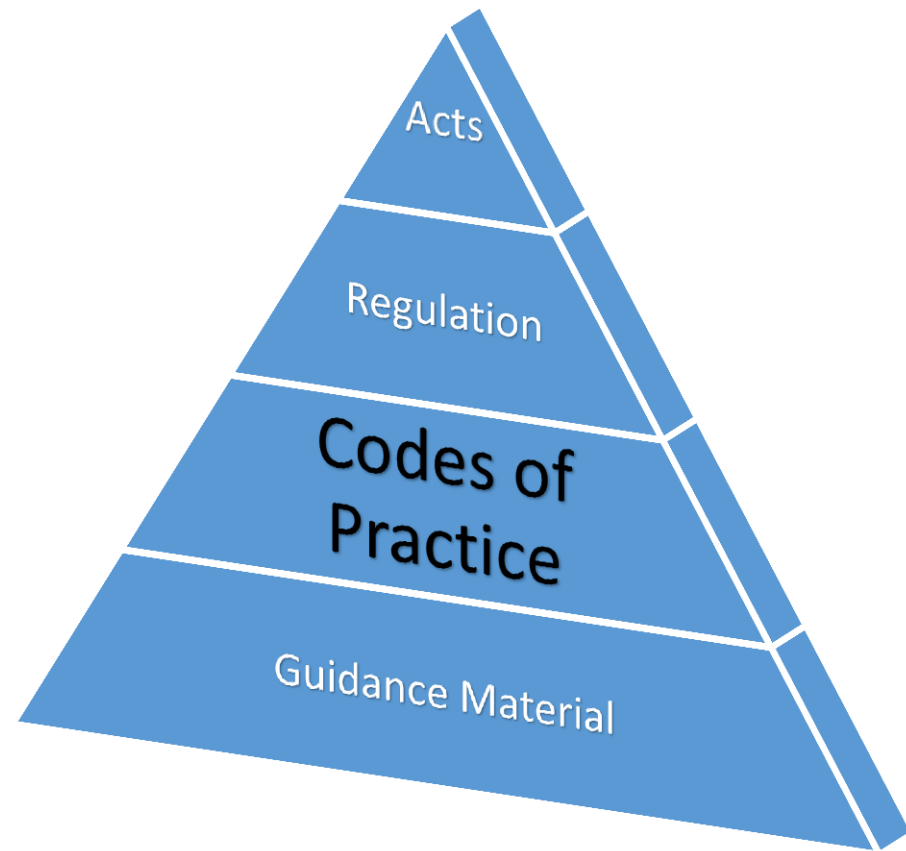
An ACT is legislation passed by the Parliament. Acts can be amended by another Act of Parliament. Acts set out the broad legal and policy principles. Acts are public documents.

To create or amend an Act is quite often a lengthy (time consuming) and costly procedure. Hence, an Act should be framed and worded in such a manner that it does not frequently have to be resubmitted to the legislature for amendments.

Regulations (rules, codes, directions, by-laws) are commonly known as "subsidiary legislation" or "delegated legislation". These are rules that dictate how the provisions of the Act are applied.

Regulations generally do not have to be passed by Parliament in the same way as Acts. To create (or amend) regulation it is often executed by the executive branch of government (i.e. Minister / Delegated Authority) and then notified by publication in the Government Gazette or similar.

Legislative Framework

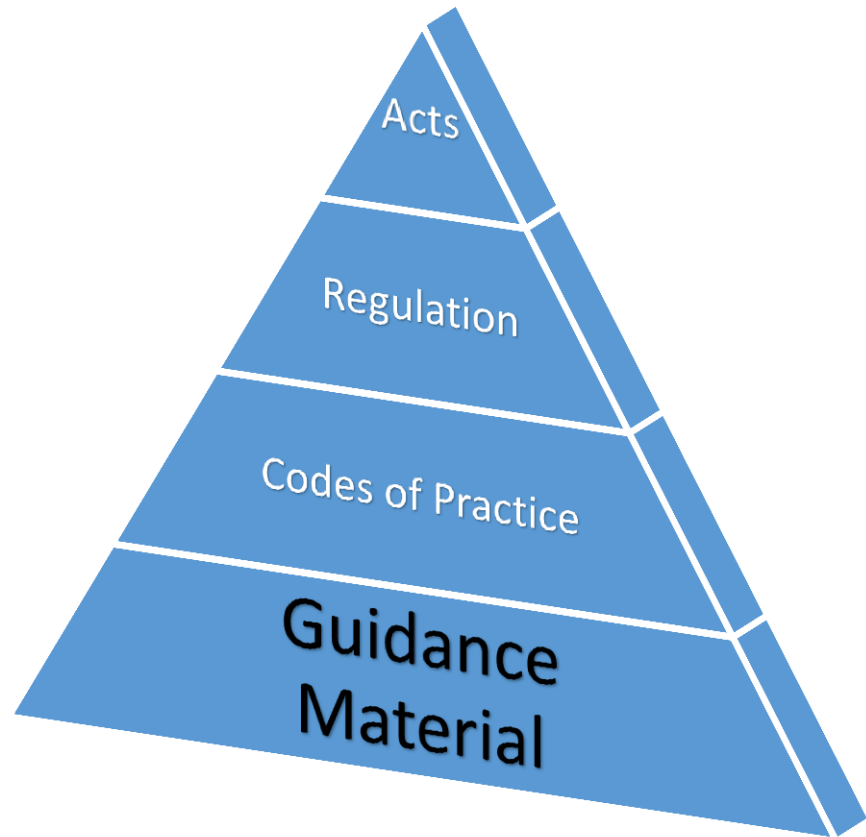


Codes of Practice are supplementary to requirements under the Acts and regulations. They are intended to clarify any ambiguity or uncertainty in the Acts and regulations. Codes of practice also set out requirements and recommendations on aspects that are not explicitly covered by regulations.

These requirements and recommendations are based on *industry best practice* and are developed in consultation with industry, and other interested parties. They are usually consistent with *local, regional and international standards, guides and codes*, and advice from regulatory authorities

They provide guidance to operators (and users) to meet specifications and / or their responsibilities. They are often not legally binding but are normally admissible in a Court as evidence. If a code of practice is not used then a better system and justification needs to be provided / demonstrated.

Legislative Framework



Guidelines provide the answers to FAQ's. They are generally published by a agency / department to provide information relevant to a specific issue or subject.

Many are developed with input from industry, other interested parties and members of the public. While they are not legally binding, such guidance is created to support application of the relevant Acts and regulations and promote leading practice.

They often contribute to the *overall knowledge of the subject*, and assist users to understand what is practical, and choose options that best suit their circumstances.

Legislative Framework wrt Geodetic Datum & Co-ordinates



- **The Act** is a broad statement of law, setting out the geodetic datum & co-ordinate principles, and the duties, obligations and rights of the delegated authority.
- **Regulations** support the Act, stipulating information about geodetic datum & co-ordinate specifications, implementation, use and the function of the delegated authority
- **Codes of Practice** are a practical guide on the how to achieve the geodetic datum & co-ordinates requirements / specifications articulated in the Regulations, and based on “standards & best practices”
- **Guidelines** are explanatory documents that offer additional information and knowledge about geodetic datum & co-ordinates in relation to the Act, Regulations and Codes of practice.

Legislative Proposals wrt Geodetic Datum & Co-ordinates

In relation to “*surveying and geospatial information*” **ACTs**

- Delegated authority should be (principally) the Surveyor-General - or alternatively a statutory position or office (a board) that holds the expertise to delineate land and water rights, restrictions and responsibilities).
- Empower the Surveyor-General (or Delegate) with the role and function to -
 - Specify the reference system and geodetic datum from “time to time”
 - Define and maintain the geodetic datum (includes infrastructure, systems etc)
 - Declare parcels or an area (or other geospatial datasets?) to be delimited by geodetic co-ordinates

..... ***“authorise the creation of regulations, rules, codes, directions, by-laws”***



Legislative Proposals wrt Geodetic Datum & Co-ordinates

In relation to “*surveying and geospatial information*” **REGULATIONS**

Delegated authority has the power to create regulations, rules, codes, directions, by-laws on -

- Specifications of the reference system, the geodetic datum, the mapping projection to be used. Stipulate the -



- International Terrestrial Reference Frame (ITRF) being used and the epoch (date /time)

- Reference ellipsoid and the parameters



- Name of the geodetic datum and how it was realised (based on GNSS CORS with uncertainties / velocities etc)

- Name of the rectangular grid co-ordinate system and projection that it is based



- Vertical datum (heights) and what it is based on i.e the origin and “geoid” model used

- Official transformation parameters (or model) used to convert between geodetic datums

Legislative Proposals wrt Geodetic Datum & Co-ordinates

In relation to “*surveying and geospatial information*” **REGULATIONS**

Delegated authority has the power to create regulations, rules, codes, directions, by-laws on -

- ***Outcome focussed*** statements relating to -
 - Collection - observations and measurements
 - Analysis and processing – accuracy, quality and uncertainty
 - Submission / lodgement conditions - data formats and content
 - Accessing / publishing / distribution / exchanging - metadata
 - Survey practice - datum / redefinition / techniques
 - Instrumentation calibration & standardisation
 - Placement and types of geodetic marks or monuments - GNSS CORS requirements

Subsidiary Legislation

CHAPTER 260

SURVEYORS

SECTION 22-SURVEYORS REGULATIONS

TABLE OF PROVISIONS

REGULATION

1. Short title
2. Interpretation
3. Surveys
4. Duties of surveyor
5. Compliance with good survey practice
6. Compliance with Surveyor-General's requisition
7. Field notes
8. Distance
9. Bearings
10. Origin of co-ordination and bearings
11. Check bearings
12. Angular and linear errors
13. Traverse computations and closures
14. Elimination of misclose
15. Traverse sheets
16. Boundaries to be marked
17. Fixation of boundaries
18. Irregular boundaries
19. Boundary marks

Legislative Proposals wrt Geodetic Datum & Co-ordinates

In relation to “*surveying and geospatial information*” **CODES OF PRACTICE AND GUIDELINES**

Delegated authority and stakeholders should create (web based) “how to” documents on –

- GNSS CORS Establishment

- Types of infrastructure “fit for purpose”
- Land administration, Network design (location of infrastructure)
- Construction, Equipment – receiver, antenna, metrological stations, etc
- Site access, security, GNSS environment, stability, access to power / communications
- Connection to datum (ITRF)
- Operation – data distribution, reliability analysis, data transmission / exchange formats and metadata, information technology or systems for products / data streaming
- Adherence to “standards” is the key! ...international and regional...



Legislative Proposals wrt Geodetic Datum & Co-ordinates

In relation to “*surveying and geospatial information*” **CODES OF PRACTICE AND GUIDELINES**

Delegated authority and stakeholders should create (web based) “how to” documents on –

- GNSS Measurement and Analysis

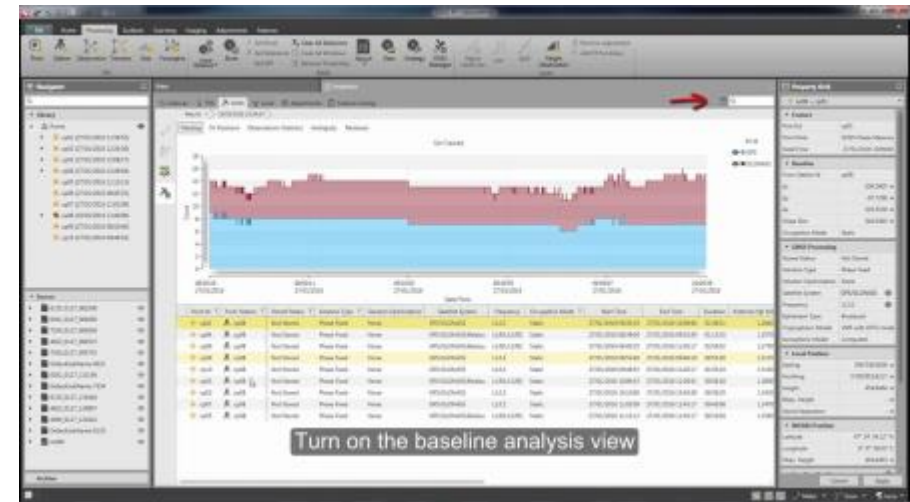
- Survey Control Projects, Cadastral Surveys, GIS / Asset Management, Height Determination, Riparian Boundaries, Drones, Imagery

- ***Error Minimisation !***

- Adjustment and evaluation of GNSS observations

- Reporting and submission / lodgement requirements

- RTK, Network RTK, Real Time data streaming



Legislative Proposals wrt Geodetic Datum & Co-ordinates

In relation to “*surveying and geospatial information*” **CODES OF PRACTICE AND GUIDELINES**

Delegated authority and stakeholders should create (web based) “how to” documents on –

- GNS Data Management

- Managing, storing, distribution, archiving GNS data and co-ordinates
- Transformation and implementation of data to new datum
- Data base and system architecture
- Integration, Interoperability



Legislative Proposals wrt Geodetic Datum & Co-ordinates

In relation to “surveying and geospatial information” **CODES OF PRACTICE AND GUIDELINES**



DATUM MATTERS

01 Australia's datum modernisation: what you need to know

Changes are being made to the system that underlies Australia's location information. The changes will bring Australia's national latitude and longitude coordinates into line with global satellite positioning systems, enabling smartphones and other positioning technologies to accurately locate features marked on our maps.

What do the changes affect you?

Surveying is a fundamental aspect of the public domain infrastructure that underpins the nation's infrastructure. Public domain infrastructure includes roads, bridges, water supply, and other infrastructure. The changes to the datum will affect the accuracy of location information for these infrastructure assets. The changes will also affect the accuracy of location information for other infrastructure assets, such as buildings and other infrastructure.

Why is this important?

The accuracy of location information is critical for many aspects of our lives. It is used for navigation, mapping, and other applications. The changes to the datum will ensure that location information is accurate and consistent across all applications.

When will the changes take effect?

The changes to the datum will take effect on 1 July 2020. The changes will be implemented in a number of stages, with the first stage taking effect on 1 July 2020.

Who is responsible for the changes?

The changes to the datum are being implemented by the Geospatial Data Australia (GDA) 2020 project, which is a joint effort between the Geospatial Data Australia (GDA) 2020 project and the Geospatial Data Australia (GDA) 2020 project.

GDA 2020 **ICSM**

Fact sheet 1: Modernising Australia's datum: what you need to know



Modernising Australia's Datum
from **Small Island Studio**

03:10

The video features a hand holding a smartphone displaying a map, a red tractor, and a white airplane flying over a green landscape. The title 'Modernising Australia's Datum' is prominently displayed in blue and white text, with 'from Small Island Studio' below it. A play button icon and a progress bar are visible at the bottom.



DATUM TECHNICAL FACT SHEET

T1 GDA94 to GDA2020 transformation grids

Transformation grids provide users of spatial data with a consistent and nationally consistent method of transforming data between reference frames. The transformation grids have been developed by the Geospatial Data Australia (GDA) 2020 project, which is a joint effort between the Geospatial Data Australia (GDA) 2020 project and the Geospatial Data Australia (GDA) 2020 project.

What grid should I use?

Current grid

A system coordinate with global only data (e.g. satellite imagery) should always be referenced using the current or most recent datum, such as GDA94 or GDA2020. It is also possible to use the current or most recent datum for data that is not global only data (e.g. street maps).

Transformation grids

1. Transformation grids provide users of spatial data with a consistent and nationally consistent method of transforming data between reference frames.
2. Transformation grids have been developed by the Geospatial Data Australia (GDA) 2020 project, which is a joint effort between the Geospatial Data Australia (GDA) 2020 project and the Geospatial Data Australia (GDA) 2020 project.

GDA 2020 **ICSM**

TECH Fact sheet 1: GDA94 to GDA2020 transformation

- **Relevance to governments and the community wrt benefits / informed decision making; SDGs**
- **Modernisation implementation plan and project**
- **Explain the various datum's and how to transform between them**

Legislative Proposals wrt Geodetic Datum & Co-ordinates

In relation to “*surveying and geospatial information*” **CODES OF PRACTICE AND GUIDELINES**

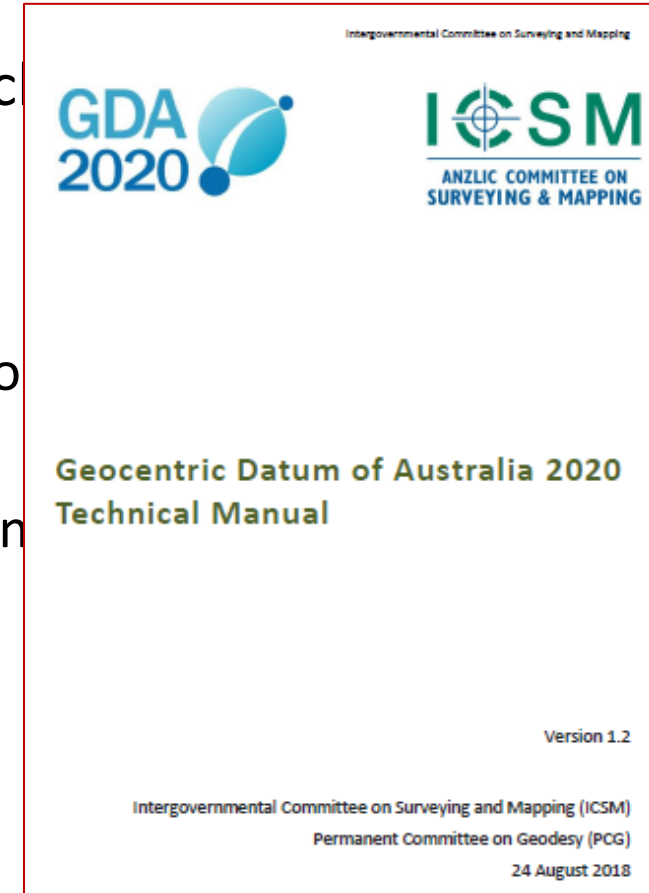
Delegated authority and stakeholders should create (web based) technical “handbooks, videos or fact sheets” on –

- Geodetic Datum Technical Manual

- Technical details about the reference system, geodetic datum and coordinates derived (including height / geoid)
- Formula and worked example of geodetic calculations (including transformations)
- Historical datums
- Links to on-line services and applications

- Frequently Asked Questions

- More directed at the non geospatial / survey user or non traditional user of positioning
- Business, operational and implementation information



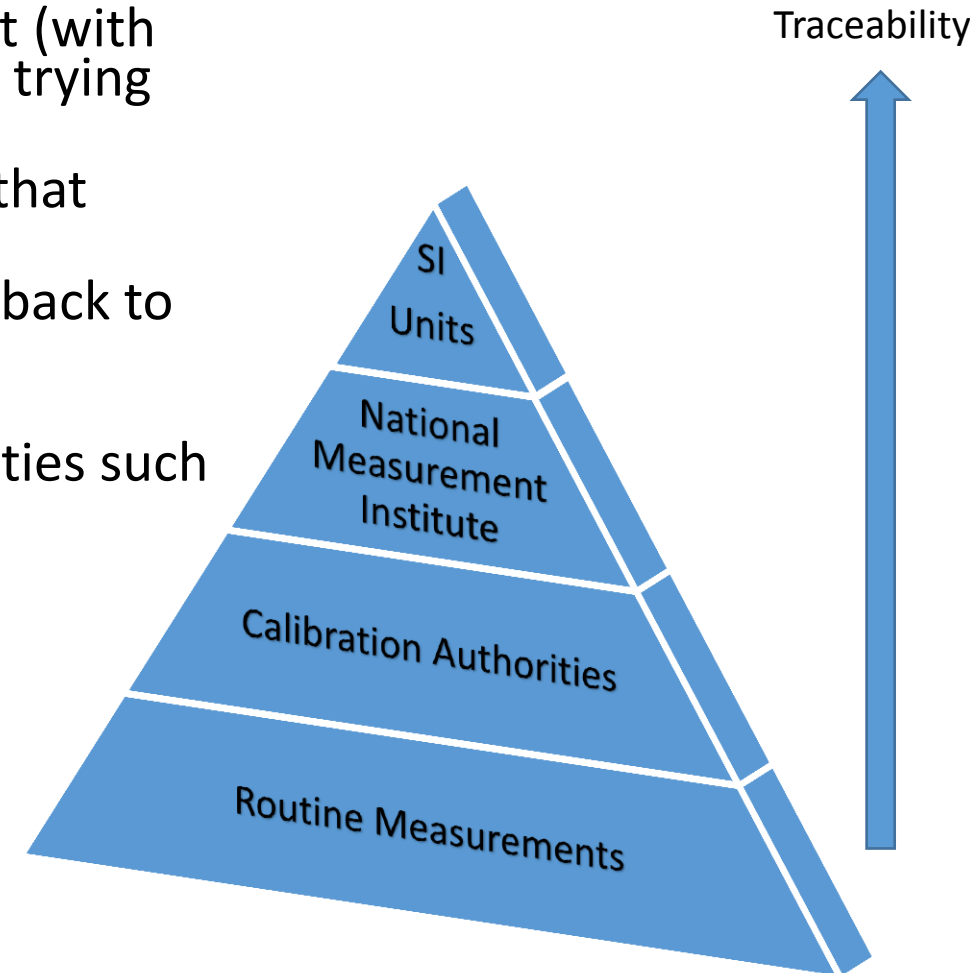
Legislative Proposals wrt Geodetic Datum & Co-ordinates

- <https://www.linz.govt.nz/data/geodetic-system/standards-specifications-publications/standards-guidelines>
- <https://www.linz.govt.nz/data/geodetic-system/standards-specifications-and-publications/geodetic-specifications>
- <http://www.icsm.gov.au/publications/standard-australian-survey-control-network-special-publication-1-sp1>
- <http://www.icsm.gov.au/what-we-do/geocentric-datum-australia>
- <https://www.ngs.noaa.gov/>
- <https://kb.igs.org/hc/en-us/categories/200027417-Network-Information>
- ***Standards & Practices***



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- **Traceability of a GNSS measurement to a reference standard (i.e length - metre)**
 - Traceability is a method of ensuring that a measurement (with uncertainties) is an accurate representation of what it is trying to measure
 - Traceability ensures an unbroken chain of comparisons that ends at a National Metrology Institute (NMI)
 - In other words, a resultant measurement can be traced back to a reference standard through a series of accurate and documented calibrations
 - Reference standards of measurement or physical quantities such as
 - ✓ length (metre)
 - ✓ mass (kilogram)
 - ✓ time (second)
 - ✓ electric current (ampere)
 - ✓ thermodynamic temperature (kelvin)
 - ✓ amount of substance (mole)
 - ✓ luminous intensity (candela)**(International System (SI) of Units)**



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- **Traceability of a GNSS measurement to a reference standard**
 - Legislative considerations if non-existent -
 - ✓ Who will be empowered to administer Act, Regulations, Codes of Practice / Guidelines? Provisions for delegated authority?
 - ✓ What will the reference standard applicable for GNSS measurements – position (co-ordinates)? length?
 - ✓ How will it be linked / traceable to SI of Units?
 - ✓ Development of relevant procedures and processes to establish the reference standard, administer and operate the system
 - ✓ Incorporating and implementing “the change” into existing and related legislation

Policy versus Legislation

Generally -

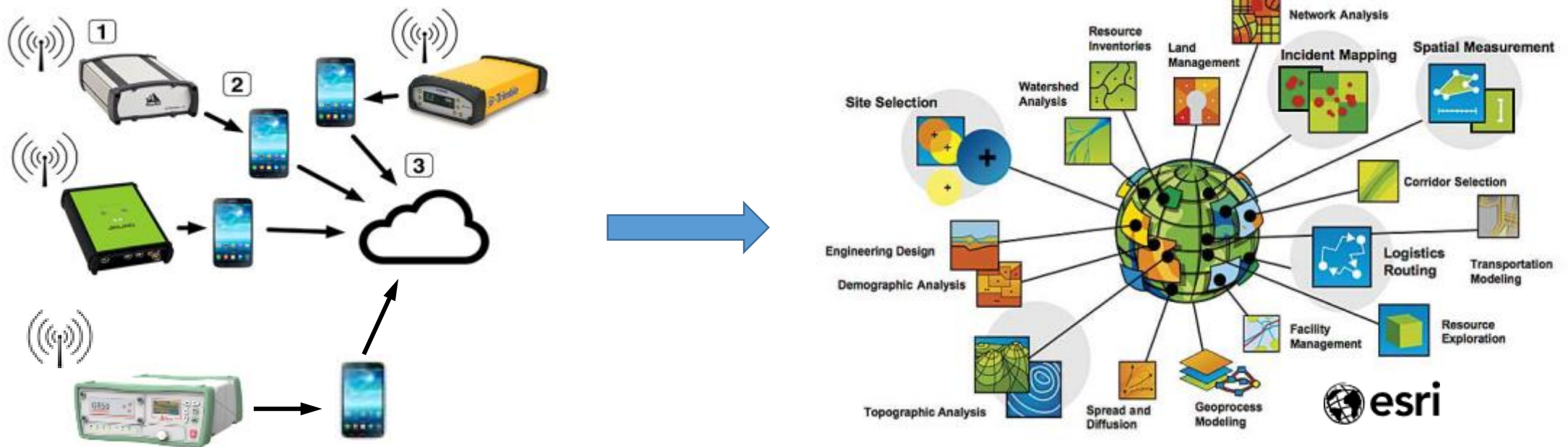
- A **government policy** is a statement or an announcement of a government's activities, plans, intentions, and guiding principles relating to issues / challenges of the day AND what it can achieve for the society as a whole.
- It is often used to declares **how a government agency** implements legislation, changes law, instigates a public or community initiative or makes decisions.
- **Policy making** can also be the process of transforming an idea into an action.
- Legislation is statutory law.



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- Sharing of Geodetic (and Geospatial) Data

- Are there any policies for “inter-agency” or “country” sharing or exchanging of geospatial & geodetic data?
- GNSS CORS data – more efficient reference / datum management and positioning services; facilitate interoperability of datasets, assets, service delivery
- Overall – supports better informed decision making and sustainable management and development of our assets and earth resources



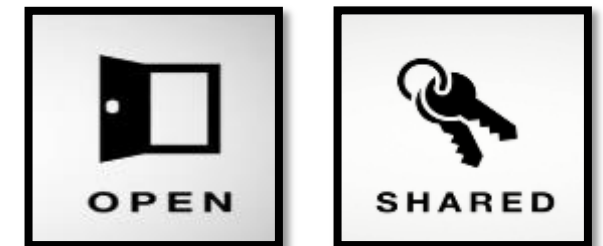
Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- Geodetic Data Sharing / Exchanging Policy Development considerations -
 - Begin the discussions and analyse the state of play
 - Who should be involved in the discussions – internally and externally, traditional and non-traditional?
 - What is your government's position or opinion on geodetic data sharing?
 - Why do you want to share geodetic data? Benefits? Importance?
 - What geodetic data can be shared and to whom? – GNSS CORS, tidal, terrestrial
 - Who is the owner and / or data custodian of the geodetic data?



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- Geodetic Data Sharing / Exchanging Policy Development considerations -
 - Do you have the capacity to share geodetic data? - people, technical, institutional
 - Are there impediments or restrictions or challenges (real or perceived) associated with sharing geodetic data? – technical, political, legal, social, economic?
 - Should geodetic data be “shared or open” OR with licensing agreements with expressed permissions on how it shall be accessed, used, re-distributed and published?
 - What are the guiding principles of sharing geodetic data? – core values, ideologies, standards
 - How will the policy be administered and implemented?



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- Geodetic Data Sharing / Exchanging Policy Development considerations -

- **Open Data** – data that can be accessed, used, and shared by anyone without restrictions.

- ✓ Weather records, earthquake monitoring data, and particle physics information has been opened up for research to develop solutions or assist risk management

- **Closed data** - data that only people in an organisation can see.

- ✓ National security data, mobile phone use, confidential business reports

- **Shared data** (a hybrid of both) – data that can be use by a specific group of people for a specific purpose; broad term that is often used to cover data that is collected everyday.

- ✓ Supermarket shopping habits, electoral register

- The difference between these is about **who can use data and how!**



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- Licensing Agreement -



United Nations Committee of Experts on
Global Geospatial Information Management

Compendium on Licensing of Geospatial Information

(final draft as at June 2017)

http://ggim.un.org/ggim_20171012/docs/meetings/GGIM7/Agenda%20-%20Compendium%20on%20Licensing%20of%20Geospatial%20Information.pdf

Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- Monitoring, ensuring compliance and enforcement of legislation

- Primary enforcer / adjudicator

- ✓ Surveying Board, Surveyor General, the Profession

- Investigations and hearings

- Natural justice

- Suspensions, Penalties, Fines,

- Managing disputes / Appeals

- Positioning disagreements

- ✓ “hierarchy of evidence”

- Third Party Accreditation



No this is not the old good SG, bad SG routine -
this is the old bad SG, worst SG routine

Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- As evidence in legal proceedings
 - In most cases to define “where is it” ?
 - Relevance of acts and clauses pertaining to
 - ✓ Authoritative voice or opinion
 - ✓ Integrity of information – source, reliability and accuracy / uncertainty (and errors)
 - ✓ Precedence
 - ✓ Use of standards and codes of practice etc



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

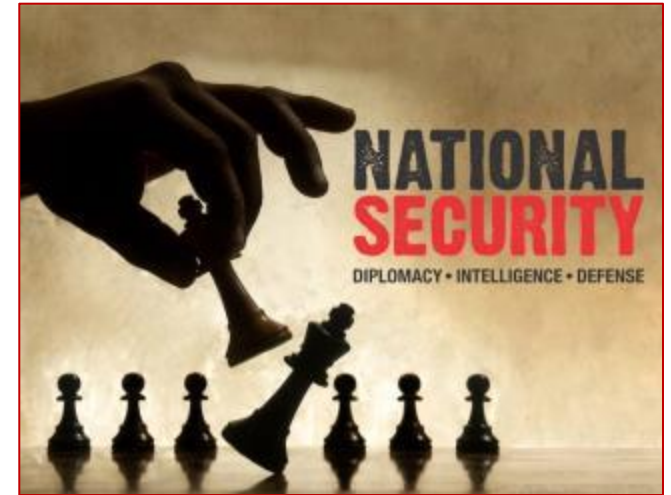
- National Security and Defence.

Ensure that “geodetic data” legislation is NOT -

- contravening National Security / Defence acts or policies, and
- NOT impacting the safety of people / community, OR the protection of other information or assets.

- Privacy

- Laws that generally relate to “information or an opinion, whether true or not, and whether recorded in a material form or not, about an identified individual, or an individual who is reasonably identifiable”
- For example - individual’s name, signature, address, telephone number, date of birth, medical records, bank account details and commentary or opinion about a person what about “*where*” some one is?



<https://www.ftc.gov/reports/protecting-consumer-privacy-era-rapid-change-recommendations-businesses-policymakers>

Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

• Freedom of Information –

- A right of access to documents held by Government ministers and most agencies.
- Most freedom of information (FOI) requests involve people seeking access to documents containing their personal information.
- Individuals can also request access to documents containing other information, such as information about government policies, programs and decision-making processes.
- Generally it applies to information held in the form of a “document”, which means it could include :
 - ✓ any paper or other material on which there is writing or a mark, figure or symbol
 - ✓ electronically-stored information
 - ✓ maps, plans, drawings and photographs
 - ✓ any article from which sounds, images or writing are capable of being produced.



..... it is about transparency and accountability

Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- Intellectual property

- Intellectual property (IP) is the property of your mind or proprietary knowledge. It is a productive new idea you create.
- Encompasses copyrights, patents, and trademarks; includes other types of rights, such as trade secrets, publicity rights, moral rights, and rights against unfair competition; also comprises of artistic works like music and literature, inventions, words, phrases, symbols, and designs.
- IP Legislation is often described as an economic incentive for innovation / creativity as it provides people and businesses with the “property” rights to the information and intellectual goods that they create
- **Who owns the IP to Geodetic Datum and Co-ordinates? Geospatial information?**



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

• Indemnity and Liability

- It is about risk allocation and mitigation
- An **indemnity** is the situation whereby one individual takes on the obligation to pay for any loss or damage that has been or might be incurred by another individual.
- The right to indemnity and the duty to indemnify are generally articulated via a contractual agreement, which ALSO generally protects against liability, loss, or damage.
- **Liability** generally means being bound or obliged in law or a contract to do, pay, or make good something. Individuals or agencies often seek to limit liability.
- OR is there **sovereign immunity**?
 - ✓ Government authorities sheltered from legal liability?
 - ✓ “Cannot commit a legal wrong and is immune from civil suit or criminal prosecution”?



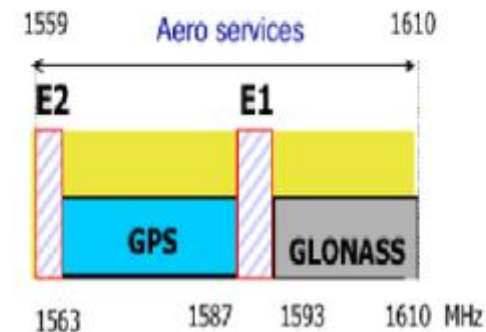
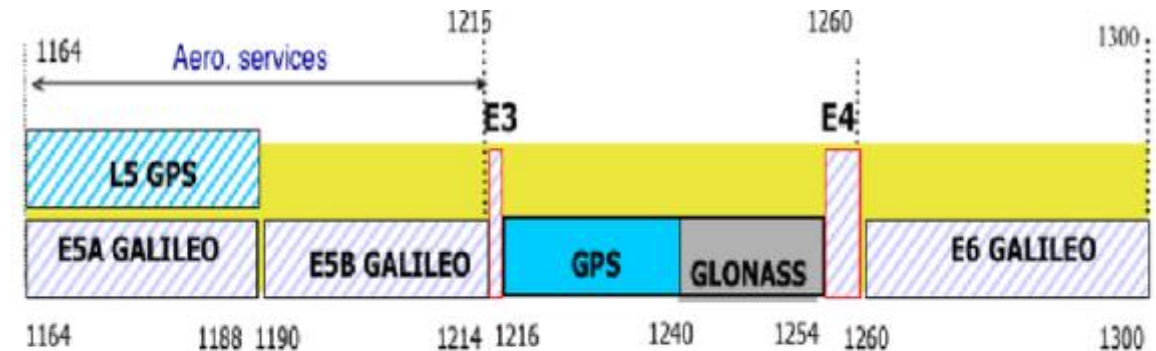
Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- In relation to geodetic datum and co-ordinates (position / location) ; geospatial datasets; downstream applications -
 - ✓ Incorrect information / data – what type of indemnification or liability policy statements should there be?
 - ✓ What protection is there for an organisation (or country) from legal action from another in regards to GNSS failure? Errors in ITRF? Applications?



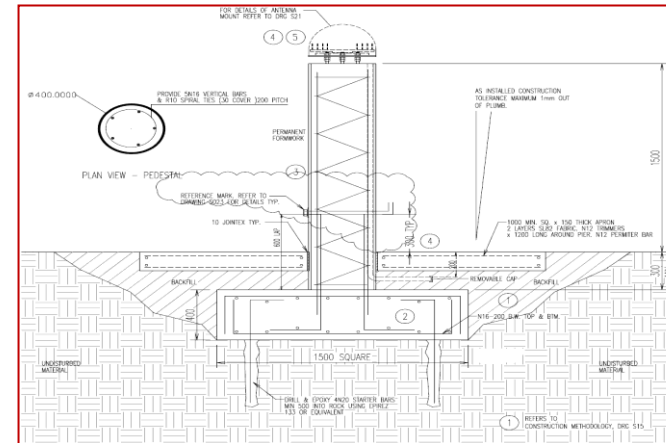
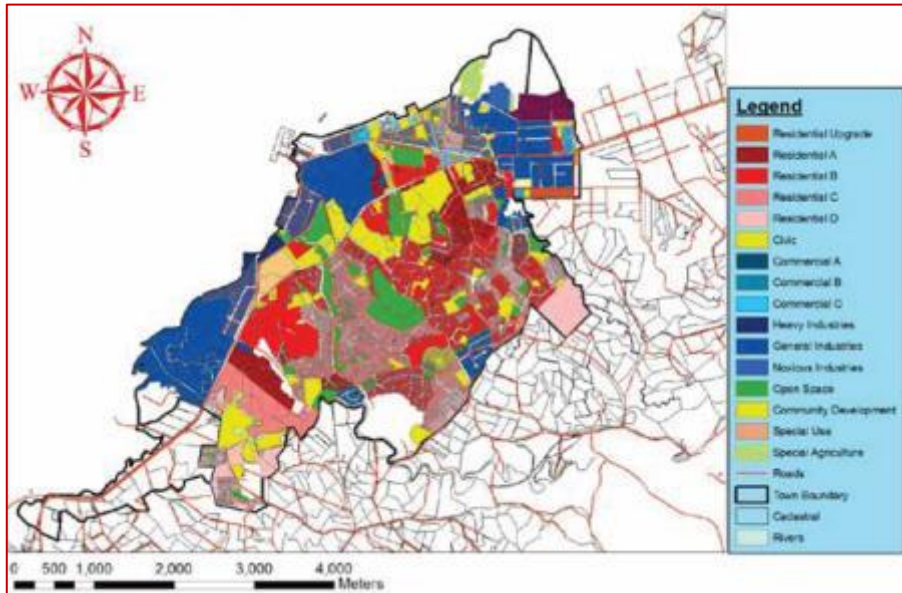
Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- Communication – Spectrum Management
 - It is about who is responsible for managing the radiofrequency spectrum and how this is achieved
 - The authority divides a country's radiofrequency spectrum into a number of frequency bands and specifies the general purpose and use for each band
 - From a GNSS perspective – system and radio signal frequencies range from 1100 – 1700 Mhz (GPS, Galileo, Beidou, GLONASS, QZSS)
 - What legislation exists to -
 - ✓ protect these “spectrums”
 - ✓ Administer rights and restrictions associated with transmitting and receiving GNSS signals and associated services



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

- Land Use Planning, Tenure and Building Regulations
 - Is building of GNSS CORS facilities a permitted use on traditional or leased lands?
 - Security of land tenure? Land Acquisition, Traditional Land rights
 - From a construction / engineering perspective does it comply with building codes / permits?
 - A mechanism to ensure GNSS CORS are placed in accordance with specifications and in locations that will maximise benefits and avoid duplication



Other Legislative Challenges wrt Geodetic Datum & Co-ordinates

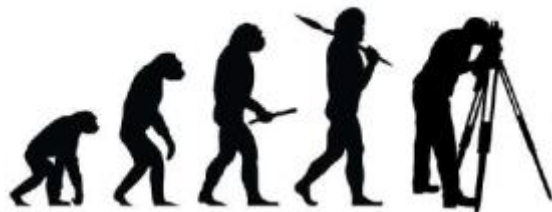
- GNSS CORS construction
 - Compliance procurement legislation – value for money, open, transparent process
 - Work Health safety requirements.

The Challenges Impacting Geodetic Coordination

- ***Disruptive technologies***

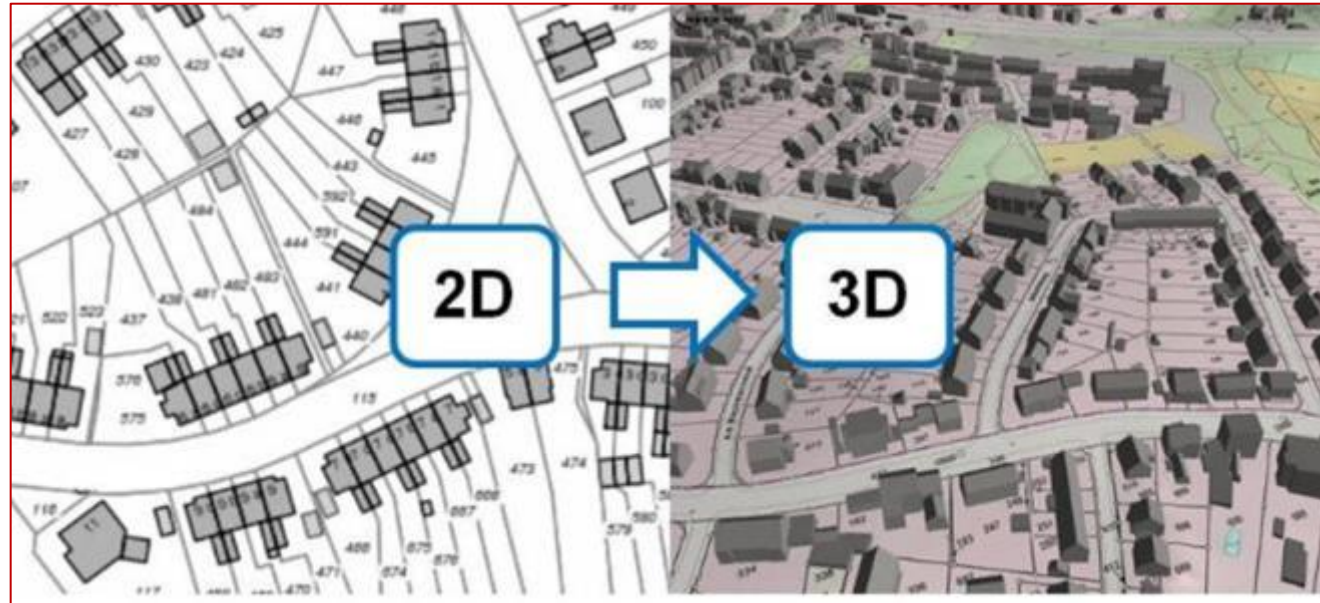
(technologies which will transform the way we do our normal business or affect the present day lifestyle patterns)

- 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



The Challenges Impacting Coordination

- ***Delivery of 3 dimensional cadastres (+ time)*** w.r.t registration of rights, restrictions and responsibilities ; especially - unit / strata titles, volumetric surveys; streamlining the “land development process” (*red tape reduction*)

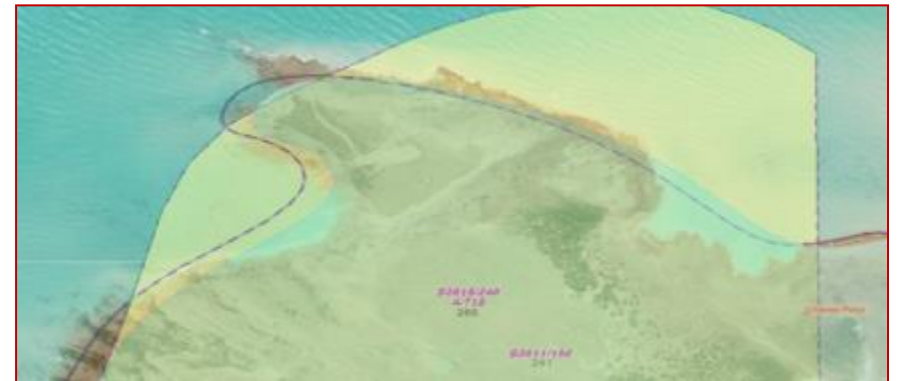


- Data model and formats (e-plan , e-geodesy)
- Service delivery / information systems – data collection (lodgement), processing, analysing, access and visualisation
- Transitional phases – data replacements, migrations, transformations

The Challenges Impacting Coordination

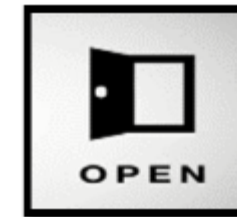
- **Technical Challenge**

- **Harmonisation, Delineation and Coordination** of existing datasets cadastre; topographic; imagery; street addressing ; valuation ; natural feature or ambulatory boundaries - river banks and beds, intertidal zones, tidal boundaries.
- Must be based on the **best available** information with **defined uncertainty**
- Must be in readily accessible and in various forms to
 - ✓ facilitate evidence based decision making
 - ✓ application by various stakeholders and users
 - ✓ communicate these boundaries in a practical but meaningful way



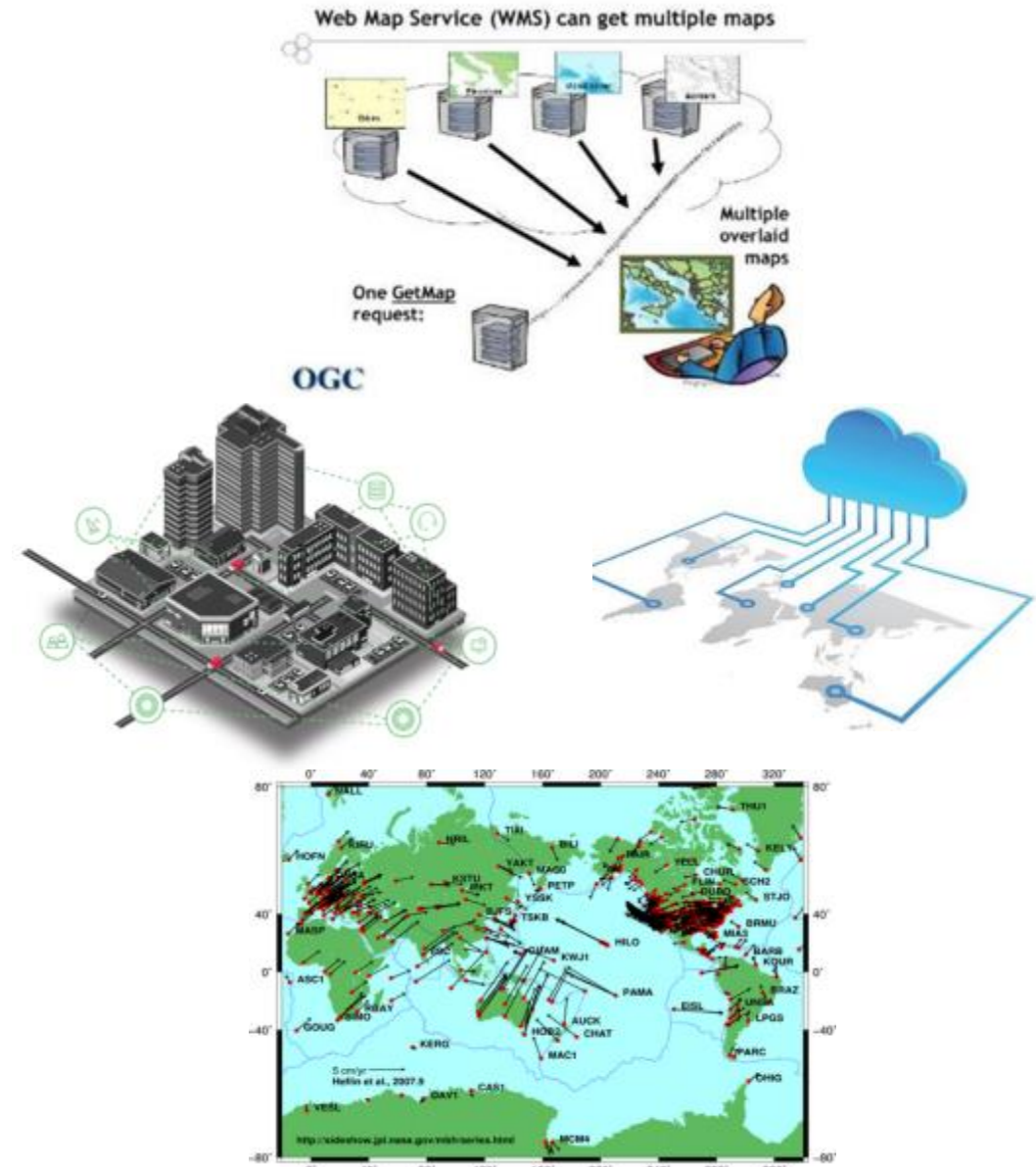
The Challenges Impacting Coordination

- ***Meeting Expectations and Demands with “finite” resources***
 - For agencies to make spatial information / datasets “open” or “shared”
 - For agencies to comply with standards (and practices) to enable the integration, interoperability, exchanging of data
 - For agencies to leverage the power of the internet, mobile phones, web-based data portals, crowd sourcing, web services



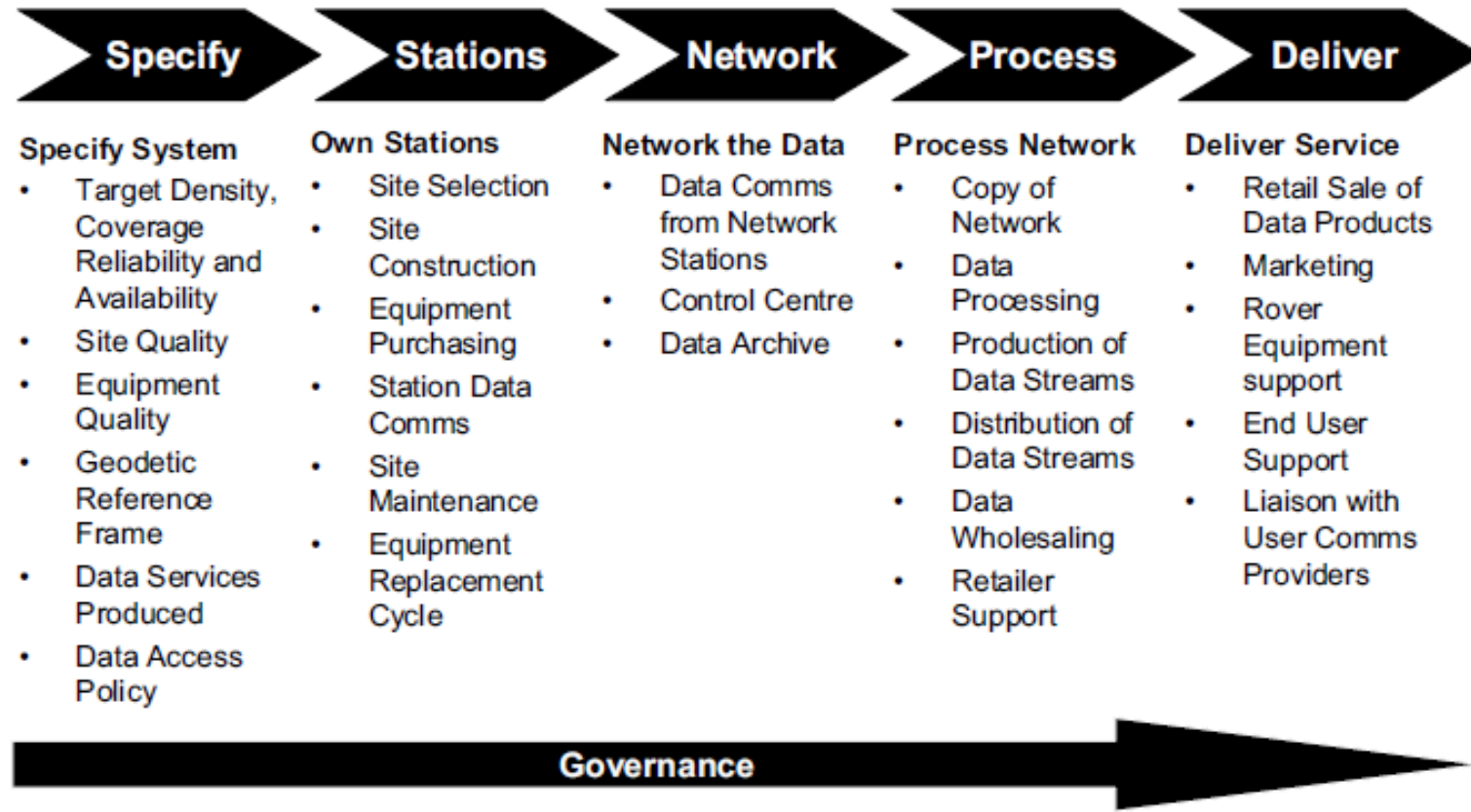
The Challenges Impacting Coordination

- **Meeting Expectations and Demands with “finite” resources**
 - For agencies to provide data in distributed web services, data retrieval through catalogues and visualisation via Web Map Services; Cloud technology
 - For agencies to address emerging geospatial trends – management of rapid urbanisation, incorporation of BIM as part of the land development process, management of earth dynamics and the changing environment, automation
 - For agencies to adapt to the roles and building the capacity for these geospatial activities, cadastral and geodetic frameworks



Where to Now and What Next?

- Whole of government policies on-
 - Managing the GNSS CORS infrastructure



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

Where to Now and What Next?

- Whole of government policies on-
 - Whether government data should be - open, closed, licensed?
 - National Spatial Geospatial Reference System and Datum
 - Fundamental datasets and SDGs
- Legislation appears to be always lagging behind technology and the challenges thus need to implement legislative reform in parallel with ***“Datum Modernisation”*** implementation plans
- Legislative reform needs to be future proof - 4 to 5 years ahead?



Where to Now and What Next?

- Legislate the “dynamic features” of geodetic datum and co-ordinates in Regulations and Codes of Practice with outcome based foci
- Develop legislation to be less prescriptive - supports innovation and facilitates flexibility / agility over time, accommodates – rapid change
- Ensure legislative changes or implementation consider institutional arrangements and resourcing



The Future – Asia Pacific Region Capacity Development Plan



***Collaboration is the KEY !
Our geospatial future is in our hands***

Consolidate our network to consider ***TO WHAT END*** 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?