
## Virtual High Level Forum on UN-GGIM

## 2nd June 2020

**The Integrated Geospatial Information Framework**

**Nine Strategic Pathways for National Leadership in Geospatial Information Management**

# Strategic Pathways 4, 5 and 6 - The Technology Pillar

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# Data - Innovation - Standards

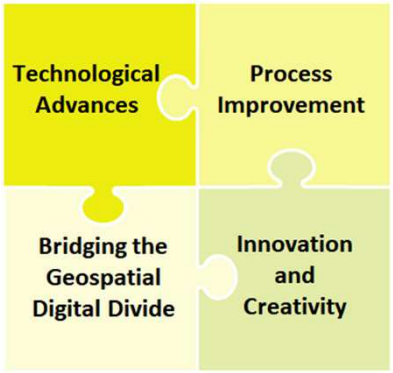
## Importance and relevance

The Strategic Pathway Elements are the most important things to achieve when working towards integrated geospatial information management.

### Data


**Data Governance**

### Innovation




**Process of Innovation**

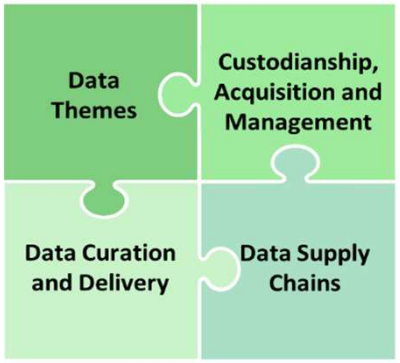
### Standards


**Standards Framework**

# Data - Innovation - Standards

## Actions and Tools

- **Elements** are achieved by completing **Actions**
- Actions are identified in the Country Action Plan
- Tools help deliver the Actions
- Principles guide our Actions




**Strategic Pathway 4: Data**

### Actions

**Getting Organized**
- Data Framework
- Data Inventory
- Dataset Profiles

**Planning for the Future**
- Data Gap Analysis
- Data Theme Road Map

**Capturing and Acquiring Data**
- Data Capture
- Data Acquisition Program

**Managing Data Sustainably**
- Data Custodianship Policy and Guidelines
- Data Governance
- Data Management Plan
- Maintained Metadata
- Data Release
- Data Storage and Retrieval Systems

**Maintaining Accurate Positioning**
- Maintained Geodetic Infrastructure

**Integrating Data**
- Geospatial and Statistical Integration
- Geocoding and Aggregation
- Data Supply Chains
- Data Interoperability

### Tools

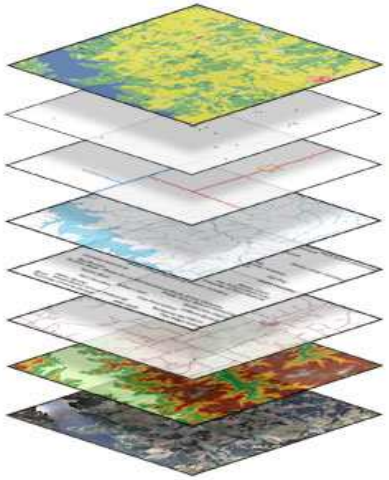
- Fundamental Geospatial Data Themes
- Data Theme Description Template
- Data Inventory Questionnaire
- Dataset Profile Template
- Gap Analysis Matrix
- Data Theme Road Map Template
- Data Custodianship Policy Principles
- Data Governance Roles and Responsibilities
- Data Management Plan Elements
- Metadata Creation Checklist
- Data Release Guidelines
- Guidance for Improving Geodetic Infrastructure
- Global Statistical Geospatial Framework
- Guidance for Geospatial and Statistical Integration

# Data - Innovation - Standards

## Outcomes: access to integrated geospatial data

- Increased range and scope of integrated data
- Data is discoverable and reusable for:
  - national development initiatives
  - innovation
- Productivity improvements through:
  - well-defined data supply chains/no duplication
  - data and technology interoperability

**Outcomes**



**Benefits**

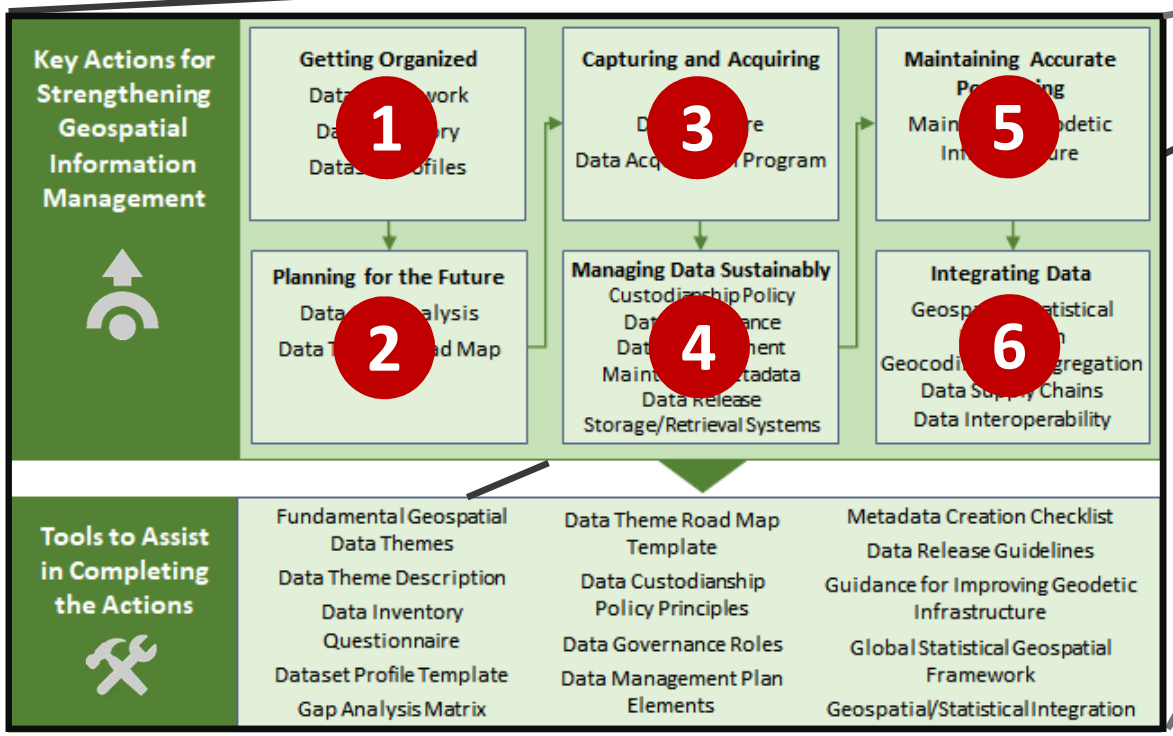
## Benefits: reuse and repurpose leading to…..

- Economic growth and improved quality of life for citizens
- Monitor and measure progress towards achieving SDGs and strategic priorities of government

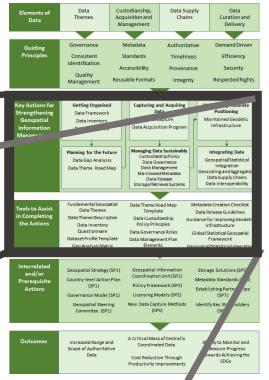
# Strategic Pathway 4: Data

## Developing the Action Plan

### Suggested Road Map


### SP4: Structure



# Strategic Pathway 4: Data

## Getting Organised

### SP4: Actions


### Data Themes

UN-GGIM Working Group on Global Fundamental Geospatial Data Themes


### Dataset Profiles

| Dataset | Data Characteristics | | | | | Data Governance | | | Access, Usage and Licencing Arrangements | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Description | Data Structure | Update Frequency | Accuracy | Coverage | Data Steward | Data Custodian | Data Owner | Access Method | Access Site | Access Category | License |
| Cadastre | Land parcel boundaries (polygons and/or lines with dimensions). It contains all crown land and freehold. | Vector | Daily | +/- 0.5m | Whole of State | Lands Department | ICT Department | Lands Department | Viewable Downloadable Searchable | Geoportal | Open | Non-Commercial |
| Conservation Areas and Estates | Legislated lands and waters; e.g. national parks, nature reserves, conservation parks, etc.) | Vector | Ad hoc | +/- 10m | Whole of State | Environment and Heritage Department | ICT Department | Environment and Heritage Department | Viewable Downloadable Searchable | Geoportal | Open | Attribution |
| Contaminated Sites | Confirmed contaminated sites | Vector | Ad hoc | +/- 5m | Whole of State | Mines Department | ICT Department | Mines Department | Viewable Downloadable Searchable | Department Network Drives | Restricted | Special Licence |

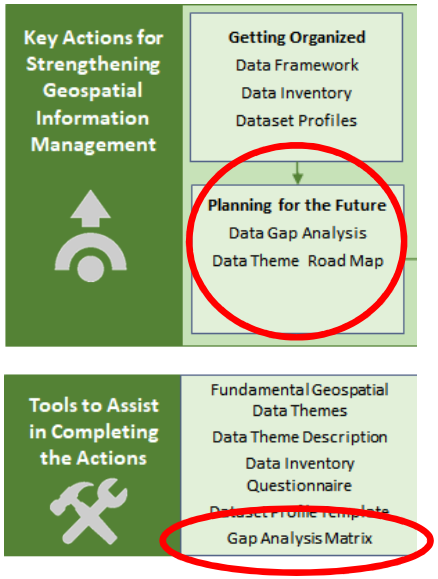
### Data Inventory Questionnaire

| |
|---|
| **Dataset** |
| Dataset Name |
| Name of Custodian |
| What is the data used for? |
| What other organizations use/rely on this dataset? |
| **Contact** |
| Point of Contact Name |
| Point of Contact Position / Title |
| Point of Contact Details (Email, Phone) |
| **Coverage** |
| What area does the data coverage? |
| Is there an index of data coverage [Yes/No]? |
| What is the coordinate system for the Data? |
| **Data Resolution / Scale** |
| What is the resolution of the data (e.g. scale)? |
| **Data Accuracy** |
| What is the horizontal accuracy of the data? |
| What is the vertical accuracy of the data? |
| **Data Lineage** |
| Describe the source(s) from which the data was derived and the method(s) used. |
| **Data Attribute Accuracy** |
| What is the accuracy of the attribute values within the data? |
| **Data Logical Consistency** |
| How is data logical consistency managed (e.g. topology rules) |

# Strategic Pathway 4: Data

## Planning for the Future

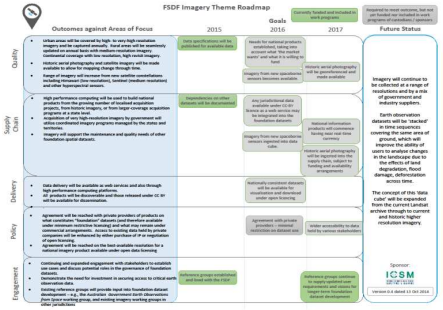

### SP4: Actions




### Gap Analysis Matrix

| Current Situation | Desired Future State | Gaps in Capability (Challenges) | List of Actionable Strategies |
|---|---|---|---|
| Example:<br>The nation has significant data holdings that are adequately maintained but there is a lack of information on urban infrastructures, particularly dwellings. | Example:<br>A high-quality representation of the landscape. | Example:<br>A building footprints dataset that can be used to understand potential economic loss from exposure to natural hazards. | Example:<br>Investigate cost effective automated image interpretation and change detection methods to capture the location of existing buildings and identify new buildings as they are constructed. |
| | | | |

### Road Map



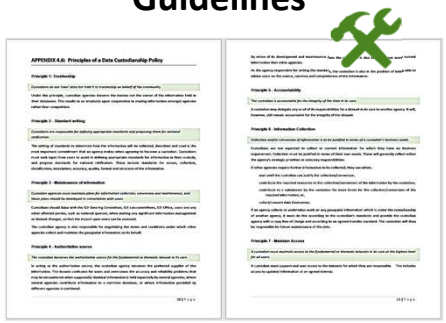

*Courtesy Australian Government*

# Strategic Pathway 4: Data

## Capturing and Managing Data

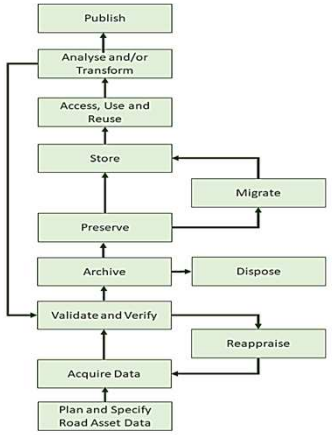

### Data Governance


### Custodianship Guidelines



### Data Release Guidelines

### Data Lifecycle




### Supply Chains


### National Data Acquisition/ Procurement Programs

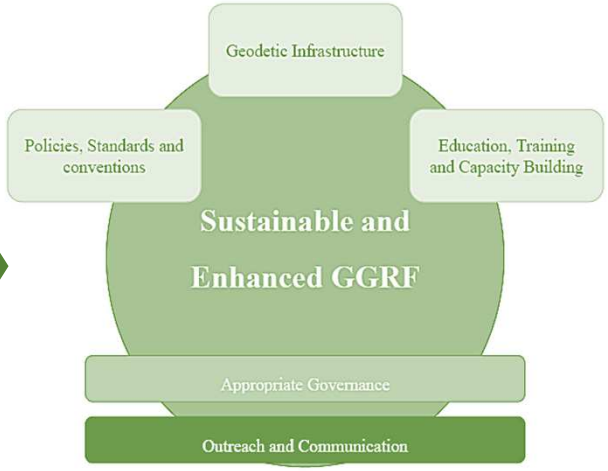
# Strategic Pathway 4: Data


## Improving the Positioning Infrastructure

Instruments
Datums
Geodetic Services
Physical Infrastructure

- Survey Marks
- CORS Networks
- Geodetic/survey databases
- Qualified staff

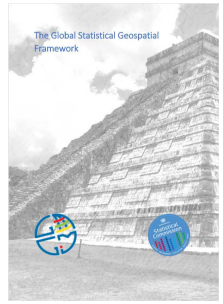
## Global Geodetic Reference Frame




Prepared by UN-GGIM Subcommittee on Geodesy and adopted by UN-GGIM

## Geostatistical Data Integration


Expert Group on the Integration of Statistical and Geospatial Information

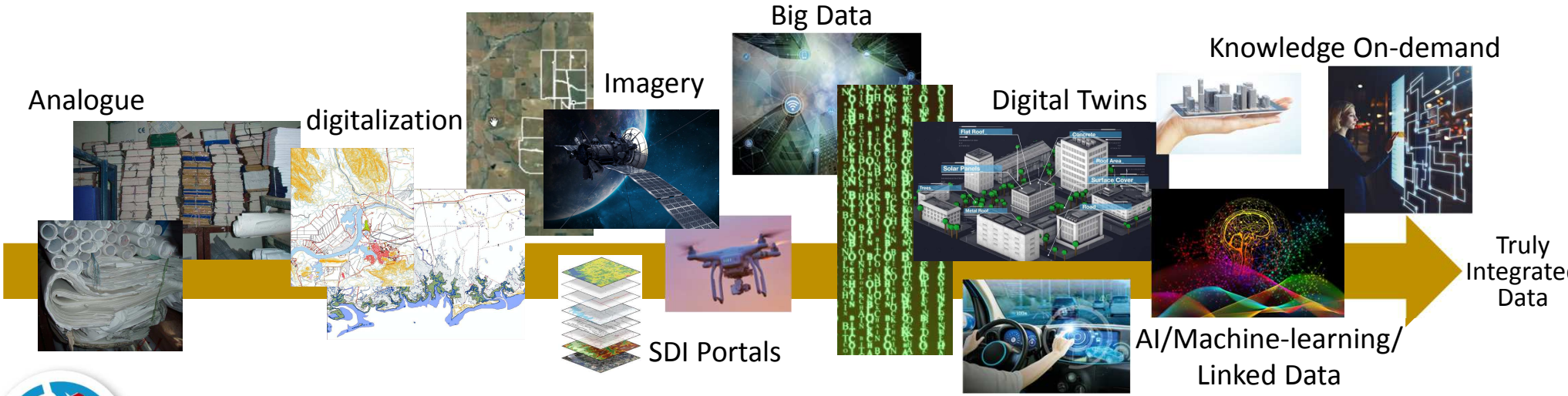



GSGF Adopted Framework

# Strategic Pathway 5: Innovation

- Countries have different ‘innovation’ starting points
- Innovation is ‘context’ dependent


Future Trends
3rd Edition
Complementary


# Strategic Pathway 5: Innovation

## Bridging the geospatial digital divide

**Digital Access Gap**

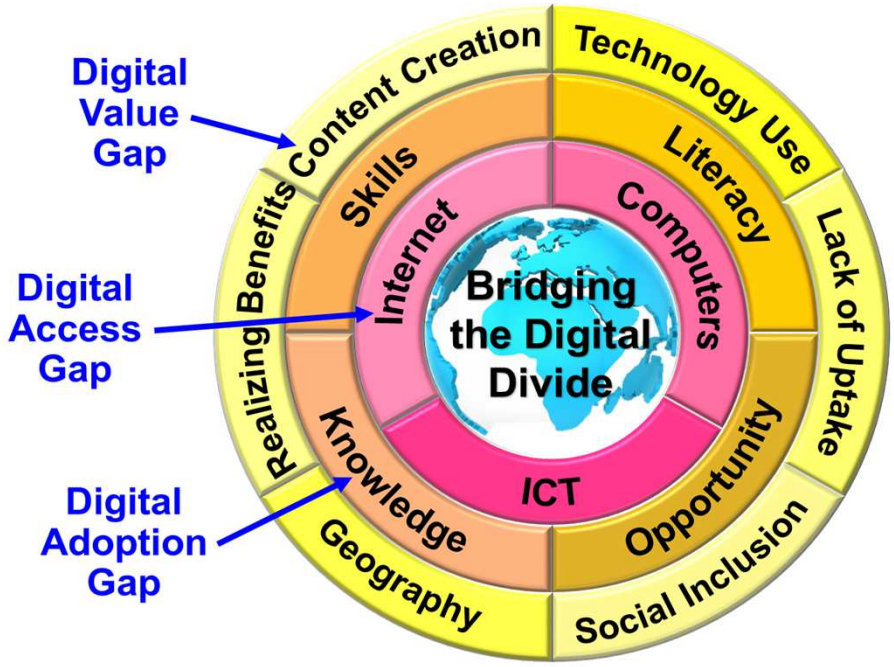
- Poor Internet access
- Power outages
- Lack of computing infrastructure

**Digital Adoption Gap**

- Skills and knowledge
- Low levels of investment
- Lack of awareness

**Digital Value Gap**

- Insufficient 'usable' data
- Unable to harness emerging technologies/realise benefits

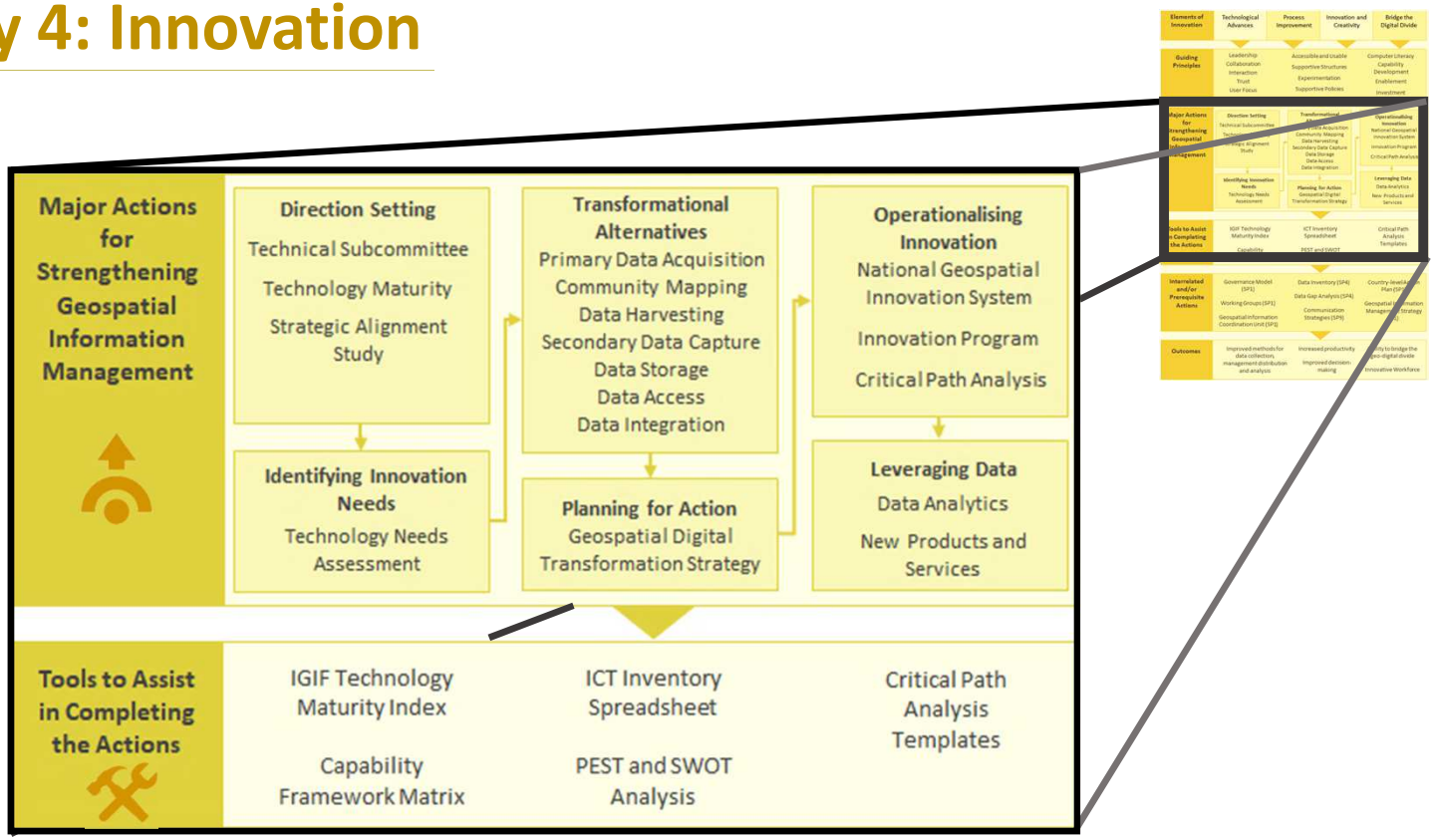


# Strategic Pathway 4: Innovation

## Actions and Tools

**Process of innovation**

- Gather information
- Understand needs
- Leap frogging to modern technology
- Incremental innovation
- Build capacity to innovate
- Innovation Framework



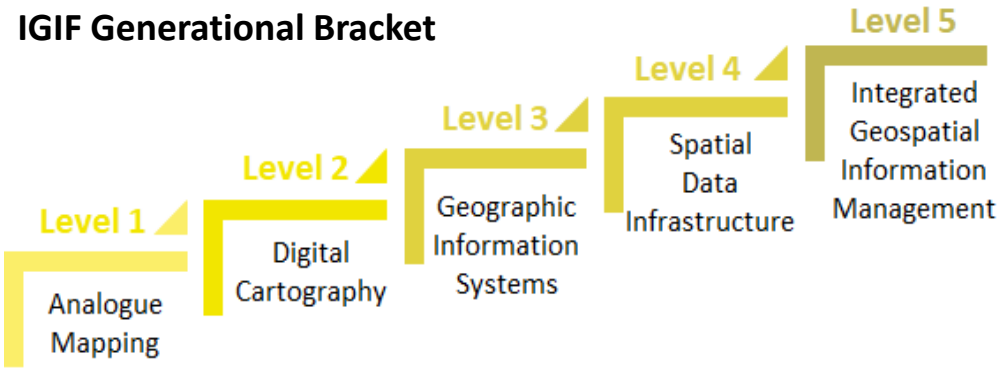
# Strategic Pathway 5: Innovation

## Actions and Tools

Direction Setting → Strategic Priorities

Data/Technology Maturity

### IGIF Generational Bracket




### IGIF Maturity Index

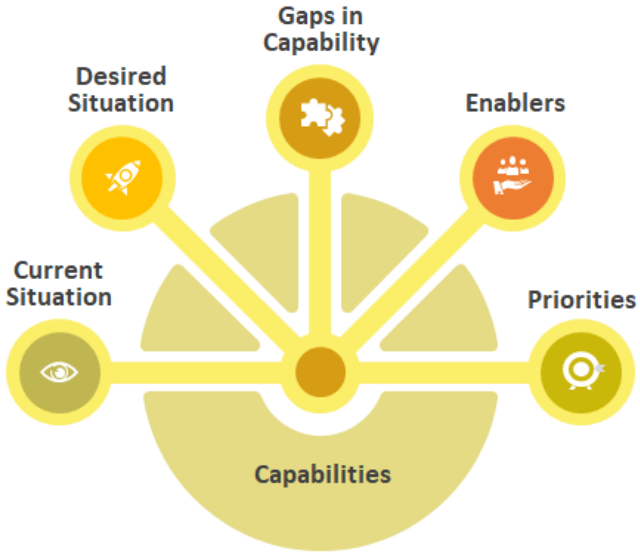
| Generational Bracket | Analogue Mapping | Digital Cartography | Geographic Information Systems | Spatial Data Infrastructure | Integrated Geospatial Information Management |
|---|---|---|---|---|---|
| Focus | Map Production | Product-based | Process-based | User Centric | Knowledge On-demand |
| Operational Level | National, Subnational, Private Sector | National | National, Subnational, Private Sector | Cross-Sector Integration | Global Network |
| Data Supply Patterns | Siloed Production | Siloed Production and Delivery | Informal individualised Supply Chains | Formalised Hierarchical Supply Chains | Published direct to the Web |
| Storage | Plan Press | Computer hard Drives, Portable Hard Disk | Optical disk/ Mainframe Computing | Cloud Storage | Cloud/Edge Computing |
| Acquisition | Photogrammetry | Digitisation/ Scanning | Digitisation/ Image Interpretation | Automated Image Interpretation, Social Media, Crowdsourcing | IoT sensors, Machine-learning, Artificial Intelligence |
| Access | Counter sales | FTP Sites | Web Portal (multiple agency portals) | Centralised National Web Portals | Global Web of Data |
| Data Formats | Paper Maps | CAD (2D) | GIS (2D) | GIS (Discontinuous, 2D, 3D, 4D) | Linked Data (Seamless 2D, 3D, 4D) |
| Users Services | NA | NA | NA | Data catalogue/ security services] | Brokering Services |
| Standards | Ad hoc Technical Specifications | Organisation-wide | National/ISO | ISO | OGC/W3C |
| Knowledge Representation | Map Legend and Production Notes | Analogue Metadata | Digital Metadata | Digital Metadata and Provenance | Metadata, Provenance, Domain and Process Ontologies |
| User Domain | Government | Government | Government, Private Sector, Academia | Government, Private Sector, Academia, Community Groups and Individuals | Everyone |
| Analytics | NIL | Predominantly Analogue Analysis | Digital Analysis, Manually Executed Algorithms | Automated Algorithm's | Real-time query Responses |
| Reference Frame | Map Projection | Various Map Projections/ Datums | National Geodetic Datums | Global Reference Frame (Static) | Global Reference Frame (Dynamic) |

# Strategic Pathway 5: Innovation


## Actions and Tools

Identification of Needs → Data / Technology / Skills

**Capability Framework**




**Supporting Tools**

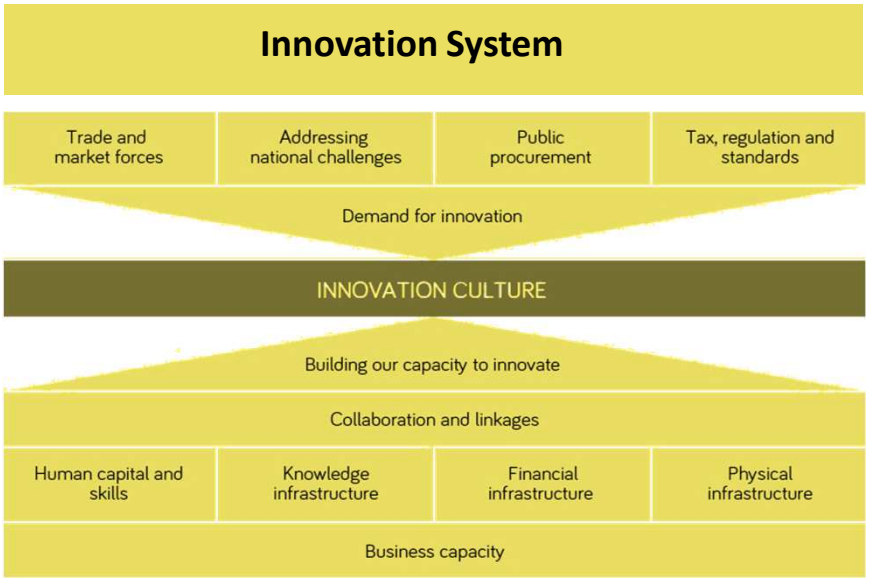
Needs Assessment and Gap Analysis Template

ICT and Software Inventory

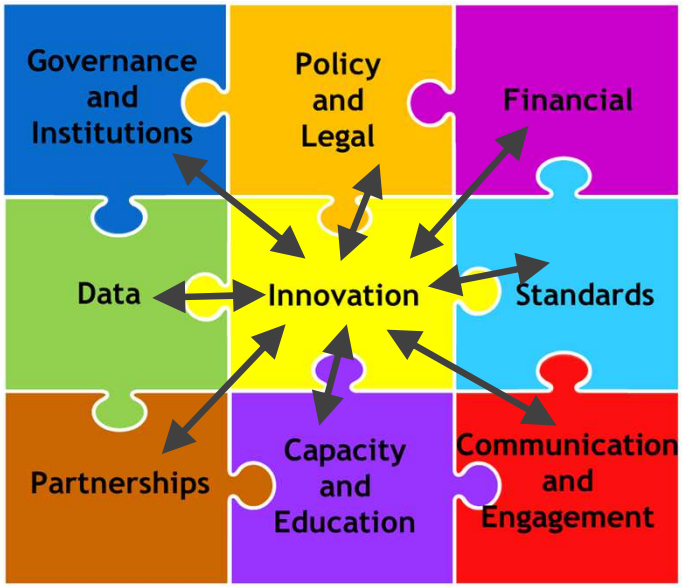

# Strategic Pathway 5: Innovation

## Actions and Tools

The innovation system is the flow of technology and information among people, businesses and institutions. It establishes an innovation culture through developing capacity to innovate.




*Australian Innovation System*




# Strategic Pathway 5: Innovation

## Actions and Tools

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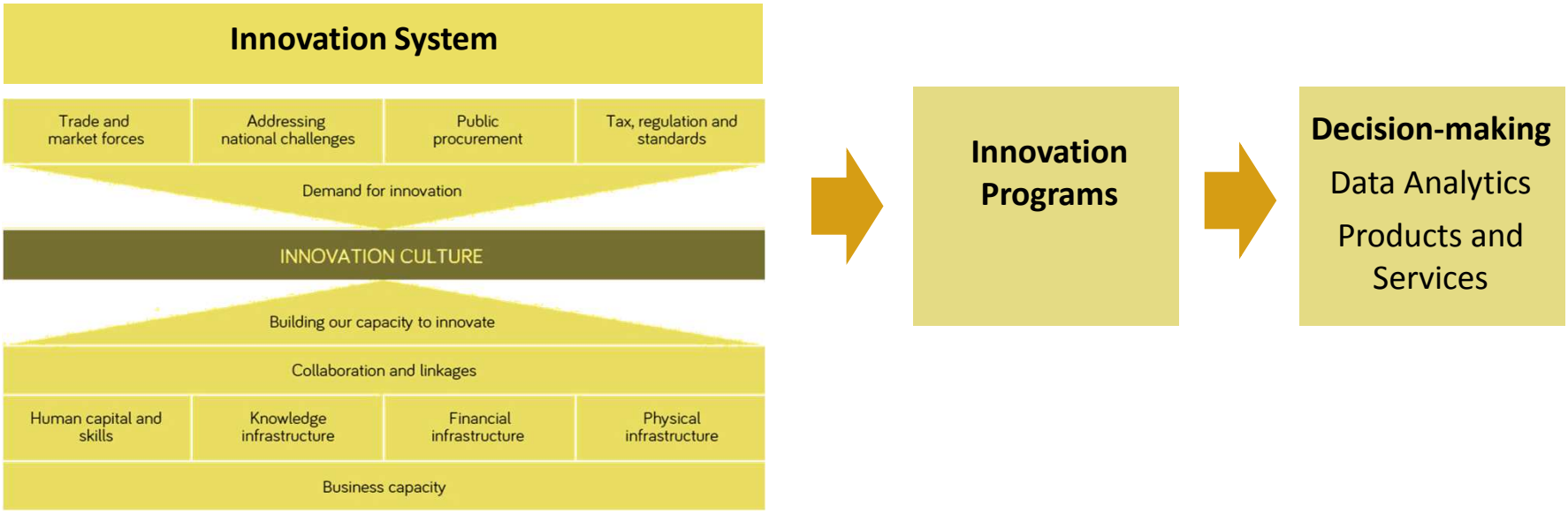



*Australian Innovation System*


# Strategic Pathway 5: Innovation

## Actions and Tools

Innovation does not occur with one big action, but rather through a series of many coordinated forward-looking steps.

**Technologies and Methods**

- Primary Data Acquisition
- Community Mapping
- Data Harvesting
- Secondary Data Capture
- Data Storage
- Data Access
- Data Sharing
- Data Integration

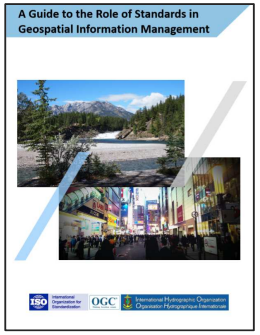
# Strategic Pathway 6: Standards


## Introduction

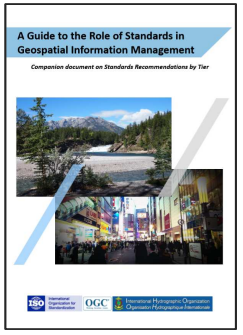
- Key enabler for:
  - Data integration
  - System interoperability
  - Innovation
- Standards Development Organisations
  - ISO/TC 211 Geographic information/Geomatics
  - Open Geospatial Consortium
  - International Hydrographic Organization

- Strategic Pathway 4 complemented by:
  - A Guide to the Role of Standards in Geospatial Information Management
  - Companion Document on Standards, recommendation by Tier

**The Standards Guide**



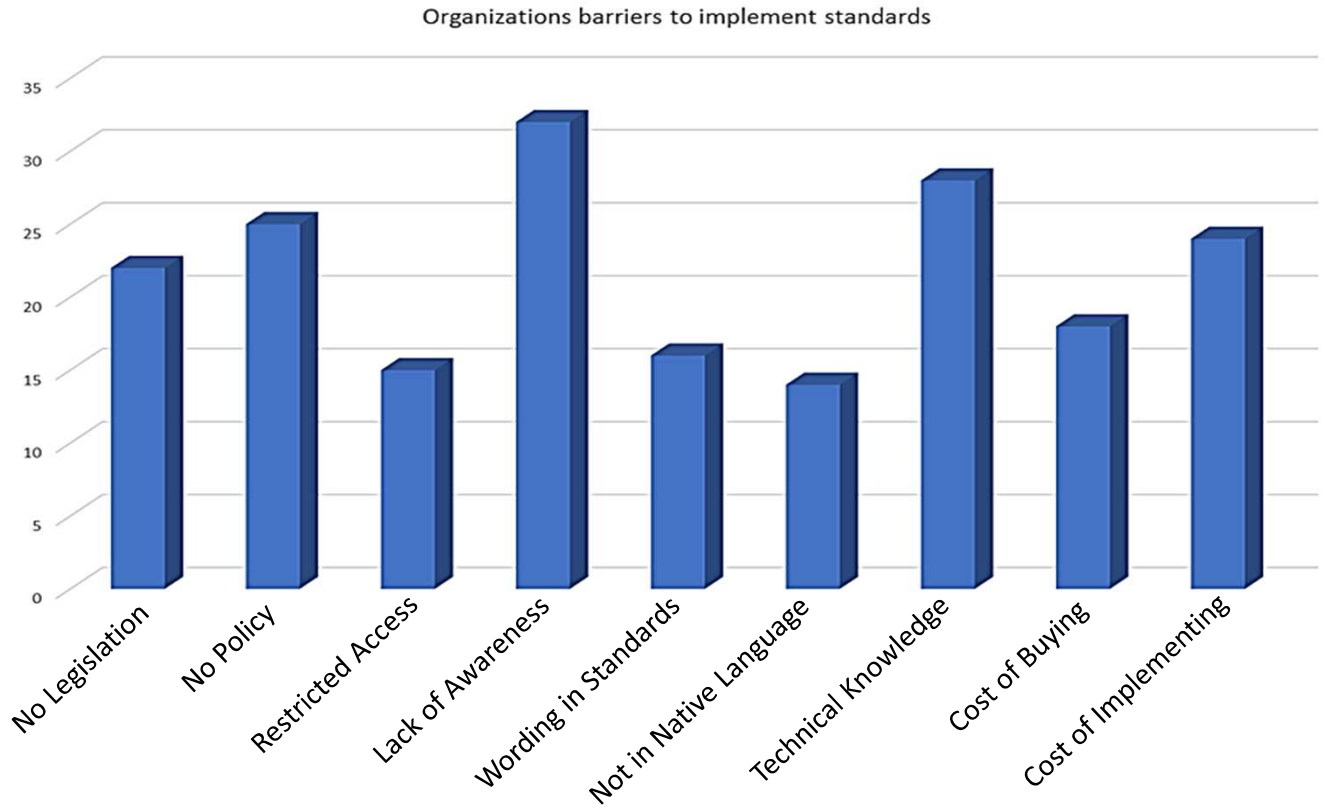

**The Companion Document**



# Strategic Pathway 6: Standards


## Barriers

**Survey by ISO, OGC and IHO**

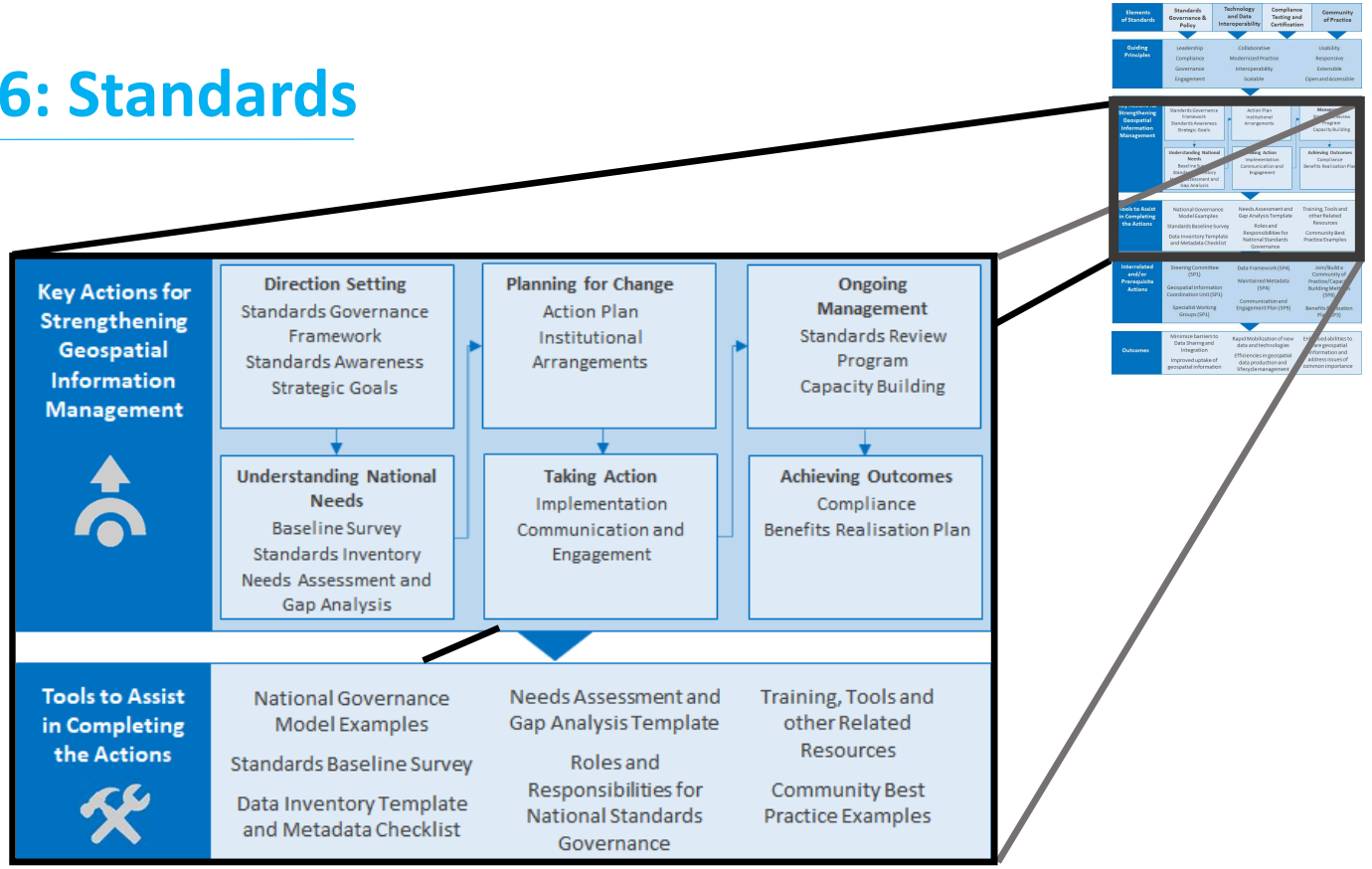


# Strategic Pathway 6: Standards

## Actions and Tools

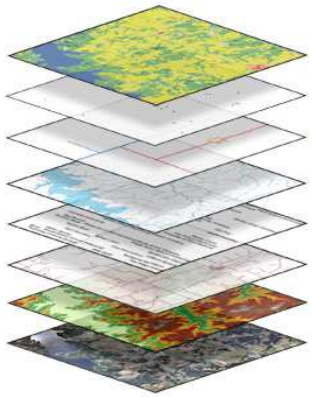
**Standards Framework**

- Governance
- Raising awareness and setting strategic gaols
- Gathering evidence
  - Needs
  - Identify gaps
- Action Plan
- Management
  - Review Program
  - Capacity Building
  - Compliance



# Technology Pillar

## Data - Innovation - Standards



**Outcomes**

- Increased range and scope of integrated data
- Data and technology interoperability
- Information discoverable and reusable
- Enabling Innovation
- Productivity improvements
- Robust data governance

**Benefits**

- Decision-making for national development imperatives
- New products and services
- Economic growth and improved quality of life for citizens
- Monitor and measuring progress towards SDGs

Thank you