

APPENDICES

STRATEGIC PATHWAY 6: STANDARDS

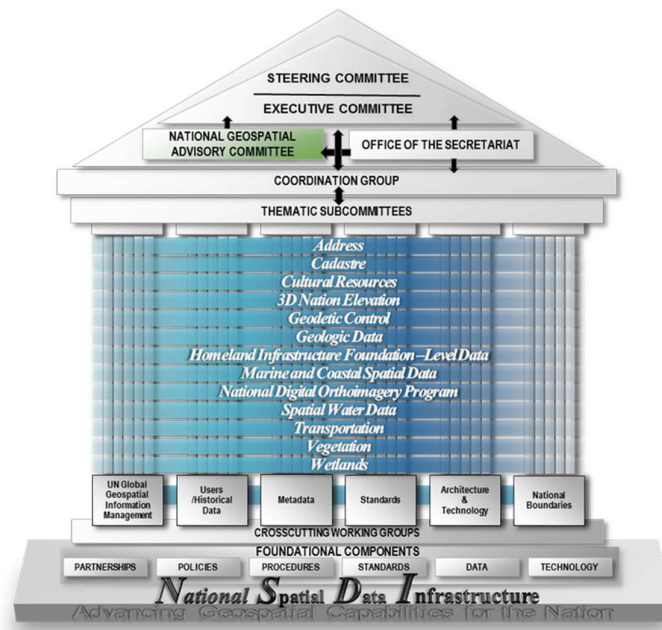
APPENDIX 6.1: National Governance Model Examples

The following examples are provided for guidance in setting up a leadership and governance model for Geospatial-related Information Standards.

US Federal Geographic Data Committee¹

The United States FGDC closely follows the Steering Committee, Coordination Unit, and specialized working group model described in section 6.6.2. The FGDC has representation from across the US federal government departments and agencies. In addition to these entities, a National Geospatial Advisory Committee comprised of leaders and experts from all levels of government, industry, academia and non-governmental organizations work to provide advice and recommendations on policy matters of interest to the government.

The FGDC Office of the Secretariat maintains a list of endorsed national standards for use by the federal government and its state, local, tribal government stakeholders. The Secretariat and member federal government departments / agencies participate directly in SDO activities to identify government requirements for standards, to interact broadly with industry regarding government standards requirements, and to understand and plan for the use of emerging standards.



Canadian Geospatial Data Infrastructure (CGDI)

The Canadian Geospatial Data Infrastructure (CGDI)² is a convergence of common standards, tools, operational policies and accessible framework and thematic data that result in the interoperability of

¹ US Federal Geographic Data Committee available at www.fgdc.gov

²

federal-provincial-territorial and regional SDIs. This convergence creates a navigable online system of information, data, services and applications that improves the sharing, access and use of Canadian geospatial information. Development of the CGDI is based on a cooperative approach between interested organizations and different levels of government. The CGDI governance model reflects Canada's governance structure, where decision-making and the information needed to support it are distributed across a federated structure.

The CGDI is best described as a system of systems. Standards and governance enable catalogues, data and processes to be shared between the following entities, among others:

- Federal Committee on Geomatics and Earth Observation (FCGEO) for federal interdepartmental coordination; and the Federal Geospatial Platform (FGP) for sharing of federal data;
- Canadian Council on Geomatics (CCOG) for Canadian inter-jurisdictional coordination and sharing of provincial and territorial data;
- Arctic Spatial Data Infrastructure (Arctic SDI) and liaison with the Arctic Council for a Canadian and Pan-Arctic view and analysis of data; and
- Marine Spatial Data Infrastructure (MSDI) for Canada and the World (International Hydrographic Organization).

More information about CGDI can be found at the following links:

- Overview of CGDI: <http://www.nrcan.gc.ca/earth-sciences/geomatics/canadas-spatial-data-infrastructure/10783>
- The CGDI Resource Centre provides access to operational policies and SDI assessments: <http://www.nrcan.gc.ca/earth-sciences/geomatics/canadas-spatial-data-infrastructure/8904>
- CGDI maintains a weekly list of Canadian geospatial web services. As of December 28, 2019 Canadian data providers have 3617 web services online that contain a total of 85,926 data layers. <http://www.nrcan.gc.ca/earth-sciences/geomatics/canadas-spatial-data-infrastructure/19359>

European Commission Infrastructure for spatial information in Europe ³(INSPIRE)

The INSPIRE Directive aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies and policies or activities which may have an impact on the environment. This European Spatial Data Infrastructure will enable the sharing of environmental spatial information among public sector organizations, facilitate public access to spatial information across Europe and assist in policy-making across boundaries.

³ European Commission Infrastructure for spatial information in Europe is available at <https://inspire.ec.europa.eu/>

INSPIRE is based on the infrastructures for spatial information established and operated by the Member States of the European Union. The Directive addresses 34 spatial data themes needed for environmental applications.

The Directive came into force on 15 May 2007 and will be implemented in various stages, with full implementation required by 2021.

South African Spatial Data Infrastructure

The Constitution of the Republic of South Africa (1996), the supreme law of the land, sets out basic values and principles of cooperative government and intergovernmental relations, which promote coordination, collaboration and cooperation amongst organs of state.

The Spatial Data Infrastructure (SDI) Act, No. 54 of 2003 (section 16) echoes the same principles, encouraging organs of state who are appointed as data custodians to exchange spatial information in terms of collaborative agreements and to support each towards achieving synchronized updates of spatial datasets.

The SDI Act establishes three main components:

- SASDI as a national technical, institutional and policy framework to coordinate the collection and management of spatial information. The objective of the SASDI is to promote the sharing and use of spatial information, and to provide for the avoidance of duplication of spatial data capture.
- The Electronic Metadata Catalogue (EMC) as a clearinghouse to promote the capturing and publishing of metadata.
- The Committee for Spatial Information (CSI) comprises of members from a predefined list of institutions appointed by the Minister with clear powers and functions to oversee the implementation of SASDI and the EMC, and to also advise the Minister, the Director-General or an organ of state dealing with spatial information on any matter the CSI considers necessary or expedient for achieving the objectives of the SASDI.

The Base Dataset Custodianship Policy makes provision for the CSI to appoint base dataset custodians and to hold them accountable for the spatial data they are entrusted with. To date, custodians have been identified for the following datasets: administrative boundaries (Chief Surveyor General and Municipal Demarcation Board); satellite imagery (South African National Space Agency); aerial photography, land cover and geodesy (National Geospatial Information); transport (National Department of Transport); Hydrology (Department of Water and Sanitation); Conservation (Department of Environmental Affairs) and cadastre (Chief Surveyor General). The policy explicitly embraces the concept of collaborative custodianship as it promotes cooperative relationships among base dataset custodians and other entities or organizations to ensure access to, and availability of, relevant base datasets.

Through the same policy and in support of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) Fundamental Dataset Framework (UN-GGIM n.d.), the CSI identified and appointed base dataset coordinators for ten themes.

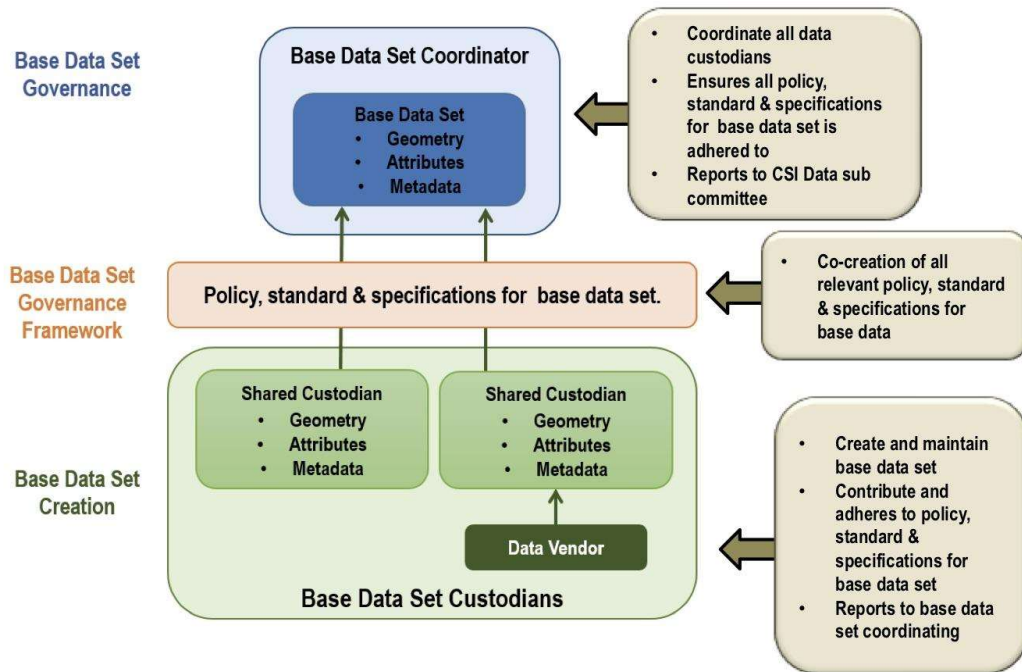


Figure App 6.1 Base Dataset Coordinator/Custodian Governance Model (Source: Coetzee et al. 2019)

To achieve optimal collaboration amongst coordinators and custodians, the CSI adopted the Base Dataset Coordinator/Custodian Governance Model illustrated in Figure 1. The model illustrates the respective roles of the coordinator and custodians in the creation and maintenance of a base dataset. The emphasis is on the co-creation of policies, standards and specifications by all parties involved. Partnership and teamwork are encouraged without elevating the coordinator into a superior role or undermining the role of the contributing custodians, hence base dataset governance is at the center of the model. The model also acknowledges the role of shared custodianship in circumstances where more than one organization is appointed as custodian for a single base dataset. For example, one organization could be the custodian for the spatial data and another organization for the attribute data.

This text is copied from Coetzee, S., Du Preez, J., Behr, F.-J., Cooper, A. K., Odijk, M., Vanlshout, S., Buyle, R., Jobst, M., Chauke, M., Fourie, N., Schmitz, P., and Erwee, F.: Collaborative Custodianship through Collaborative Cloud Mapping: Challenges and Opportunities, Proc. Int. Cartogr. Assoc., 2, 19, <https://doi.org/10.5194/ica-proc-2-19-2019>, 2019.

APPENDIX 6.2: Standards Baseline Survey

1	Is there a policy framework in place that promotes the use of and compliance with geospatial standards across the government sector? <input type="checkbox"/> Yes <input type="checkbox"/> No
2	Are there national standards in place for geospatial data, metadata and services? <input type="checkbox"/> Yes <input type="checkbox"/> No
3	Are standards and implementation experiences being documented and disseminated? <input type="checkbox"/> Yes <input type="checkbox"/> No <i>(Go to Question 5)</i>
4	Is there a mandated organisation responsible for the localization, adoption, publication and compliance monitoring of these standards? <input type="checkbox"/> Yes <input type="checkbox"/> No
5	Does a national law or regulation exist that mandates the use of geospatial standards? <input type="checkbox"/> Yes <input type="checkbox"/> No
6	Is the use of geospatial standards mandated in procurement of geospatial software and services? <input type="checkbox"/> Yes <input type="checkbox"/> No
7	Is there national representation in the international standards organisations? <input type="checkbox"/> Yes <input type="checkbox"/> No
8	What mechanisms exist for engagement across a range of domains that encourage adoption and use of geospatial standards? <input type="checkbox"/> Policy <input type="checkbox"/> Law/regulation <input type="checkbox"/> Mandates <input type="checkbox"/> Guidelines and work procedures <input type="checkbox"/> Other: _____
9	Are staff typically aware of the standards that their work needs to comply with? <input type="checkbox"/> Yes <input type="checkbox"/> No Other: _____

The following questions are designed to understand the data and ITC standards that are currently in place and the level of compliance for integrated geospatial information management.

APPENDIX 6.3: Needs Assessment and Gap Analysis Template

Goals	Needs	Gaps in Capability	Standards Required	Actions
<p><u>Tier 1</u> Sharing Maps over the web – achieving more effective internal operations and data sharing.</p>	<ul style="list-style-type: none"> • To visually overlay geospatial information as maps from different sources; • The ability to visualize digital geospatial information as maps over the Web; • Clear description of geospatial information (metadata); • Discovery of geospatial information via on-line catalogs, and; • To support interoperability of internal and disconnected operations. 		<p>The ‘Standards Guide’ and ‘Companion Document’ gives recommendations on specific recommended standards for each tier.</p>	
<p><u>Tier 2</u> Partnerships – share, integrate and use geospatial data from different providers</p>	<ul style="list-style-type: none"> • Ability to share detailed geospatial information within and with other organizations; • Enhanced ability to apply geospatial data for enhanced situational awareness, analysis, and decision support; • Ability to maintain and improve the quality of common geospatial information between cooperating organizations, and; • Organization agreements to share data using agreed upon standards-based data models. 			

<p><u>Tier 3</u></p> <p>Spatially Enabling the Nation – large scale (typically national) efforts to develop a ‘full-size’ geospatial information management framework that provides access to multiple themes of information, applications for using the shared information, and access via a variety of environments: mobile, desktop, etc.</p>	<ul style="list-style-type: none"> • Delivery of “foundation” or “framework” geospatial information, This means an accurate set of key geospatial data layers needed most by different users (e.g. imagery, elevation, administrative boundaries, transportation, land use, and water features) via on-line access and download; • Geoprocessing to perform spatial analysis and modeling; • Mobile applications; • Integration of real time sensor feeds, and; • Customized products and applications. 			
<p><u>Tier 4</u></p> <p>Spatial Data integrated with Global Ecosystem. This tier includes current and future capabilities to spatially enabling the web of data – bridging between SDI and a broader ecosystem of information systems.</p>	<ul style="list-style-type: none"> • Establishment and implementation of standards for the global geospatial information community; • Emerging Standards, Best Practices and Trends. 			

APPENDIX 6.4: Roles and Responsibilities for National Standards Governance

The table below summarizes the key roles and responsibilities associated with the national assessment, planning, coordination, and implementation of integrated geospatial information management standards discussed throughout this document and Standards Guide. The table is not aimed at being exhaustive or final, but rather indicative and as a discussion starting point.

Table 1 Suggested roles and responsibilities associated with geospatial information management

Strategic Pathway 6 Elements	Required level of understanding standards	Roles	Activities
Governance & Policy	Can recognize the benefits of standards, in reaching long-term goals	Decision makers: Ministers Director generals, agency board and management	<ul style="list-style-type: none"> Set government policy framework Allocate funding and resources Take initiative on following up ROI Set directives to support the use of standards for improved efficiency and effectiveness in data acquisition, processing and sharing
Technology & Data Interoperability	Can create & revise standards	Developers: Architects Data content & model developers IT developers ISO, OGC, IHO experts	<ul style="list-style-type: none"> Ensure design that meets national needs and challenges Participate in the development of standards drafts and final international standards, Are also users
Compliance	Can interpret & use standards and guidelines	Standard users: Policy officers Procurement officers IT developers	<ul style="list-style-type: none"> Participate by expressing needs, giving feedback on standards to the SDOs, keeping updated on standards development, voting, and evaluating standards Implement internal policy to align on endorsed standards Establish agreements with providers, partners, customers, and assure that procurements consider preferring or mandating endorsed standards Implement relevant standards, and consider participation in standards development Share use cases and own experience

Community of Practice	Can discover & get an overview, and use standards as good practice	Civil society: government, officers, private sector, partnerships, academics	<p>Identify needs for standards contributing to the SDGs</p> <p>Implement Public Private Partnerships, formal and informal agreements to advance objectives unachievable by government alone</p> <p>Share use cases</p> <p>Participate in and develop training and education</p>
All			<p>Become aware of the SDO's contribution to SDGs, and disseminate this information, and the Standards Guide, in their circles</p>

APPENDIX 6.5: Standards Training, Tools and Related Resources

The following is a listing of freely available on-line training / educational resources and related resources to aid in understanding and implementing geospatial information management standards.

OGC

A series of tutorials that provide background on the Open Geospatial Consortium, an overview of OGC web services and associated standards, and a series of standards specific tutorials. See: <http://cite.opengeospatial.org/pub/cite/files/edu/index.html>.

IHO

The International Hydrographic Organization (IHO) offers training in Marine Spatial Data Infrastructures (MSDI) that has recently been set up at (<http://www.iho-ohi.net/MSDI/>). This includes slides, booklets and an eLearning Course.

More information is found on the IHO website (www.iho.int) relating to training, under the "Inter-Regional Coordination" menu, and the "Publications" menu.

European INSPIRE training

<https://inspire.ec.europa.eu/portfolio/training-library>. The INSPIRE programme provides a variety of on-line training resources covering metadata, standards, data harmonization, development of data specifications, data quality linked data and other topics. These training modules are specific to the implementation of the INSPIRE Directive, which leverages ISO/TC 211 and OGC standards.

CGDI Resource Centre

The Canadian Geospatial Data Infrastructure (CGDI) Resource Centre provides numerous resources related to standards, spatial data infrastructures, and other concepts related to geospatial interoperability in the Canadian context. All information is available in English and French. <https://www.nrcan.gc.ca/earth-sciences/geomatics/canadas-spatial-data-infrastructure/8904>

Standards Wiki

The Home page provides background information on geospatial standardization: a standard and different types of standards are defined; the development and implementation of standards are described; and key standards bodies for fundamental geospatial datasets are introduced. Standards relevant for the acquisition and maintenance of fundamental geospatial datasets are listed with links to implementation benefits and guidelines of individual standards used in the collection, maintenance and dissemination of geospatial data.

The wiki was created by the Commission on SDI and Standards of the International Cartographic Association (ICA) and is maintained by Commission members, ISO/TC 211, Geographic information/Geomatics and other volunteers.

<https://wiki.icaci.org/index.php?title=Standards>

US Federal Geographic Data Committee Endorsed Standards

To promote more efficient and effective geospatial information sharing, processing and application across federal agencies and with public and private sector stakeholders, the US FGDC periodically reviews, endorses, and recommends the use of key standards. Visit <https://www.fgdc.gov/standards> for additional background and links to FGDC endorsed standards Geospatial Metadata

This section includes a list of on-line resources that provide insight into implementation of the metadata standard. Included as part of the links below are:

- Background on ISO 19115 (geospatial) and ISO 19115-2 (Imagery) metadata standards
- Metadata Standard Profiles for nations and various Communities of Practice
- Fact Sheets
- Business Cases / Benefits of metadata
- Training

US Federal Geographic Data Committee (FGDC) Metadata Resources available at www.fgdc.gov/metadata

LandMap Geoknowledge: Geospatial Metadata Standards available at (<http://learningzone.rpsoc.org.uk/index.php/Learning-Materials/Introduction-to-OGC-Standards/4.2-Geospatial-metadata-standards>)

European INSPIRE Metadata Resources

EuroGeographics is an organization of national mapping and cadastral agencies in Europe. Surveys distributed to its members, in 2004, 2011, and 2017 with respect to the use of ISO/TC 211's Data Quality and Metadata standards, found that the majority of the 28 organizations use one or more ISO/TC 211 standards to help manage the quality of their data. This use increased from 2011 to 2017.

Almost all of the national mapping and cadastral agencies use the ISO/TC 211 metadata standard, amongst others, because this standard was adopted by INSPIRE, where ISO 19115/19139 compliant metadata records power the INSPIRE GeoPortal, at <http://inspire-geoportal.ec.europa.eu/>. The portal contains approx. 240,000 ISO 19115:2003 records describing geographic information datasets or services. It also has a machine-readable

interface. Similarly INSPIRE implemented and widely spread the use of the ISO/TC 211 standards for information modelling (ISO 19103/19109).

At <https://inspire.ec.europa.eu/document-tags/metadata> the metadata regulation and technical guidance is found.

Geographic Information Metadata - An Outlook from the International Standardization Perspective

A recent published paper in the ISPRS Journal (<https://doi.org/10.3390/ijgi8060280>), gives an overview of standardization and standards in the field of geographic metadata, and addresses the application of international geographic metadata standards, in terms of metadata profiles, use cases and metadata software.

A standard defines international rules that apply to all use cases, whereas a profile adds additional rules to a set of standards used in a specific context. A profile is needed when a community wants to impose a set of practices while still being able to exchange their data with other communities using the base standards. Examples of profiles are the North American profile (NAP), the Defence Geospatial Information Working Group (DGIWG) profile, and the INSPIRE profile.

The paper also describes software, such as OGC Catalogue Web Services (CSW) and software supporting international standards. Furthermore, metadata tools help users to maintain data. One example is GeoNetwork <https://geonetwork-opensource.org/>, an open-source metadata cataloguing tool, which is part of the Open Source Geospatial Foundation (OSGeo). The GeoNetwork project was developed by the Food and Agriculture Organization of the United Nations (UN-FAO), in order to archive and publish the geographic datasets produced within the organization.

APPENDIX 6.6: User Community Case Studies and Statements of Benefit

Standards in Sustainable Development

In the book published in 2019 *“Sustainable Development Goals Connectivity Dilemma: Land and Geospatial Information for Urban and Rural Resilience”*, Rajabifard, Abbas, chapter 14 “The Role of Geospatial Information Standards for Sustainable Development” describes case studies from various parts of the world, supporting sustainable development goals.

[Sustainable Development Goals Connectivity Dilemma: Land and Geospatial Information for Urban and Rural Resilience](#)

The following summary is extracted from chapter 14.4.1 and 14.5.1 of the above noted reference:

Addressing in Australia

Addresses in Australia are managed under the National Address Management Framework underpinned by two standards: the Australian/ New Zealand Standard (AS/NZS) 4819 Geographic information – Rural and Urban Addressing for address creation, and the Australian Standard (AS) 4590 Interchange of client information. AS 4590 contains the data element requirements for digital address collection, interchange and storage. This standard references ISO 19160-1. Both standards are published through the Standards Australia IT-004 Committee, which mirrors the ISO/TC 211.

Addresses in Australia are first created by the (537) local governments in Australia using AS/NZS 4819, which are maintained by a cross-jurisdictional Permanent Committee on Addressing 1. This address information is aggregated by each state and territory governments and then contributed to a standardized, authoritative, national product - the Geocoded National Address File, or G-NAF, which is made publicly available through the Commonwealth Government's open data portal 2 . G-NAF is produced and maintained by PSMA Australia Ltd, an independent and self-funded company that is owned by the nine governments of Australia.

Standardized address data underpins Australian governments' services to its citizens.

New Zealand: Leveraging Open Standards to create a nation-wide water resource system

The OGC WaterML 2.0 standard, was developed in a working group organized jointly between OGC and the World Meteorological Organization (WMO). WaterML was implemented to support the integration of a multitude of hydrologic surface and groundwater observations to improve local to global water resource monitoring. For New Zealand, the standard helped to support meeting the requirements laid out in the New Zealand Resource Management Act 1991.

To address the requirements of the Act, WaterML along with other OGC web services standards were jointly implemented across multiple regional and national New Zealand agencies managing water observations across the nation. Today the compilation and reporting of water quality data across New Zealand is underpinned by the WaterML 2.0 and unifies data across regional and central government agencies.

European INSPIRE legislation

The INSPIRE Directive aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies and policies or activities which may have an impact on the environment. This European Spatial Data Infrastructure will enable the sharing of environmental spatial information among public sector organisations, facilitate public access to spatial information across Europe and assist in policy-making across boundaries. INSPIRE is based on the infrastructure for spatial information established and operated by the Member States of the European Union. The Directive addresses 34 spatial data themes needed for environmental applications. <https://inspire.ec.europa.eu/>.

The INSPIRE Directive and its implementation across Europe can be seen as a major use case for geospatial standards. Many of these standards are directly or indirectly referenced to, either in the Directive or its supporting documents and guidelines.

The message is geospatial standards support legislation, which support fundamental data (such as INSPIRE data themes), and eventually support SDGs.

Table [SP6:A6.1] 1 *The use of geospatial standards in European INSPIRE legislation. Some 15 ISO standards are directly referenced to different parts of the regulation and implementing rules. OGC standards also play an important role in INSPIRE implementation. (Source: ISO/TC 211 report to INSPIRE MIG-T, M. Borrebaek, June 2019.)*

ISO-standards:	19101	19103	19106	19107	19108	19111	19118	19115	19119	19123	19125- 1	19127	19128	19135	19139
INSPIRE Metadata Regulation v03.12.2008	x							x	x						
Draft COMMISSION REGULATION implementing Directive 2007/2/EC of the European Parliament and of the Council as regarding interoperability of spatial data sets and services 14.12.2009		x		x	x	x	x	x			x	x	x	x	x
Draft COMMISSION REGULATION amending Regulation (EC) No 976/2009 as regarding download services and transformation services 14.12.2009															
Draft Implementing Rules for Download Services (Version 3.0) 25/09/2009	x							x	x						
Draft Implementing Rules for INSPIRE Transformation Services (Version 3.0) 07/09/2009	x		x				x	x	x						
INSPIRE Draft Download Services Implementing Rule (Version 2.0) 14/02/2009	x								x	x					
INSPIRE Draft Transformation Implementing Rule (Version 2.0) 10/02/2009	x		x				x		x						

Addressing in South Africa

Addressing in South Africa is in a dynamic developmental phase. The divide between urbanized formal addressing and informal rural addressing is closing rapidly. The mandate for address assignment lies with Local Government from where aggregation to a national level is done, to ultimately be made available for consumption by the various entities and public.

South Africa adheres to the recommendations of SANS 1883-1(2009) to assign and manage addresses. This mirrors ISO 19160-1.

South Africa is, during this growth stage, acknowledging both formal and informal address types, there are currently 12 address types in use.

Table [SP6:A6.6] 2 Address usage and SANS 1883 address types, mirroring the ISO address standard.

Address type	Address usage																							
	Accident scenes	Billing	Courier delivery	Crime scenes	Electricity	Emergency response	Goods delivery	Household surveys	Land registration	Obtain employment	Obtain identity document or passport	Open spaces (e.g. parks)	Opening a bank account (FICA)	Postal delivery	Rates & taxes	Refuse collection	Serving summonses	Sewerage	Social status	Telecommunications	Undeveloped erven	Visiting	Voting	Water
Street address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Intersection address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Landmark address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Building address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Site address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Farm address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Informal address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
SAPO Box address		✓								✓			✓	✓										
SAPO street address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAPO poste restante address		✓										✓	✓											
SAPO-type rural village address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Government is actively putting measures in place to ensure the alignment of addressing standards with taxation and other administrative functions, see for example, <https://www.afrigis.co.za/sabs-compliant-addresses-for-sars-pay-submissions/>

For more information about addressing standards in South Africa please refer to:

Coetzee S and Cooper AK, 2007. What is an address in South Africa? South African Journal of Science (SAJS), 103(11/12):449-458

http://www.scielo.org.za/scielo.php?pid=S0038-23532007000600006&script=sci_arttext&lng=en

<http://www.scielo.org.za/pdf/sajs/v103n11-12/a0610312.pdf>

SANS 1883-1:2009, Geographic information – Addressing, Part 1: Data format of addresses.

https://store.sabs.co.za/catalog/product/view/?ignore_category/1/id/211512/s/sans-1883-1-2009-ed-1-00/

Arctic SDI: Enabling International Collaboration through Standards

The Arctic Spatial Data Infrastructure (Arctic SDI) provides politicians, governments, policy makers, scientists, private enterprises and citizens in the Arctic with access to geographically related Arctic data, digital maps and tools. Through these services, Arctic SDI aims to facilitate monitoring, decision-making and policy development related to responsible resource development, emergency management, and environmental issues in the Arctic. The national mapping agencies (NMAs) of Canada, the Kingdom of Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden and the United States of America support the development of Arctic SDI. The SDI, in turn, is backed by a Memorandum of Understanding signed by all member countries, and is endorsed by the Arctic Council.

The Arctic Council - the intergovernmental forum for Arctic governments and peoples - leverages Arctic SDI through the Conservation of Arctic Flora and Fauna (CAFF) Working Group as a common information management methodology for the Council. Arctic SDI and the Arctic Council work together to publish and share interoperable data through standards. This includes topographic, marine, biodiversity, elevation and Earth observation data.

In 2015, a strategic plan was written to expand the scope of Arctic SDI to improve sharing, access and use of other location-based information spanning the Arctic. In 2016 Canada led, with contributions from the other Arctic NMAs, the development of an SDI Manual for the Arctic and an authoritative circumpolar Glossary of Terms to provide guidance and information management good practices on commonly accepted SDI operational policies and standards.

More information about Arctic SDI can be found through the following links:

- Arctic Spatial Data Infrastructure (International): <http://arctic-sdi.org/>
- SDI Manual for the Arctic and Glossary of Terms: <http://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulle.web&search1=R=305329>
- Arctic Spatial Data Infrastructure Strategic Plan 2015-2020: http://arctic-sdi.org/wp-content/uploads/2014/08/20151119-Arctic-SDI-Strategic-Plan-2015-2020_FINAL.pdf
- Arctic Council: <http://www.arctic-council.org/index.php/en/>
- Introduction to Arctic SDI video: <https://www.youtube.com/watch?v=tGS1rcaJRug>
- Evaluation of the Arctic SDI: <https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulle.web&search1=R=305895>

Canada's Federal Geospatial Platform and Open Maps

Twenty-one of Canada's federal departments and agencies worked together to develop the Federal Geospatial Platform (FGP). The platform is a collaborative online environment where a collection of

the government’s most relevant geospatial information can be found easily and viewed on maps to support evidence-based decision-making, foster innovation, and provide better service for Canadians. The FGP shares tools and best practices through Open Data and open platforms and applications.

The FGP’s open access version is Open Maps—part of the Government of Canada’s broader Open Government initiative to make information more readily available to Canadians. It was demonstrated at a side meeting of the United Nations General Assembly in September 2016, where Canada also endorsed a Joint Declaration on Harnessing the Data Revolution for Climate Resilience—an initiative to integrate government data and make it publicly available.

Since 1999, GeoGratis has provided free access to a wide collection of geospatial data, maps, remote sensing imagery, and publications in different popular formats, under the Government of Canada Open Data License. The geospatial data discovery of GeoGratis is being migrated to the Canadian Government’s Open Data/Open Maps to provide a ‘single-search and discovery’ to the Government’s entire Open Data holdings. Other services offered by the GeoGratis portal (Application Programming Interfaces (API) and services, data extraction services, interactive mapping applications) will remain available for the foreseeable future.

More information about FGP and Open Maps can be found through the following links:

- FGP: <http://www.nrcan.gc.ca/earth-sciences/geomatics/canadas-spatial-data-infrastructure/geospatial-communities/federal>
- Web Mapping Services: Best Practices and Implementation Guide for the Federal Geospatial Platform <https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earth-sciences/files/pdf/geomatics/FGPWebServicesBestPracticesGuide.pdf>
- Open Maps: <http://open.canada.ca/en/open-maps>
- Open Government License - Canada: <https://open.canada.ca/en/open-government-licence-canada>
- GeoGratis: <https://www.nrcan.gc.ca/science-and-data/science-and-research/earth-sciences/geography/topographic-information/10785>

APPENDIX 6.7: Community Best Practice Examples

Examples of community best practices are to be provided.