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I. Introduction

Geography is important to Canada. Canada is the second largest country in the world by area, covering nearly 10 million square kilometres. Ninety-one percent (91%) of the area is land mass with widely different topography and geology; the remaining 9% is covered by water, of which 2% are glaciers and ice fields. Canada's shoreline is 234,000 kilometres – the longest of any country in the world.

Canada has enormous natural wealth, from huge reserves of energy to massive tracts of forest and an abundance of minerals and metals, making natural resources a significant important part of the nation's economy. Despite its size, Canada's population of approximately 34.5 million people primarily live within 200km of the border with the United States of America (USA).

Canada is a federal state governed as a parliamentary democracy, with ten provinces and three territories that each has powers similar in scope to that of the Canadian federal government within their respective jurisdictions. Governments at all levels - federal, provincial/territorial and municipal - actively produce, use and distribute geospatial data and information, posing both challenges and opportunities to the management of geospatial information in Canada.

At the federal level, the Earth Sciences Sector (ESS), Natural Resources Canada (NRCan) fulfills the role of Canada's national mapping agency. In July 2013, NRCan's Mapping Information Branch and Canada Centre for Remote Sensing were merged into a single branch, the Canada Centre for Mapping and Earth Observation (CCMEO), recognizing the significant and strategic inter-relationships between mapping and remote sensing technologies and service delivery. The newly merged Branch includes four business lines, which will become operational in 2014:

- The Canada Centre for Remote Sensing Innovation will be accountable for Earth observation and geomatics research and development, the development of Earth observations and geo-based optical, radar, satellite and other such methodologies and operations.
- The Canada Centre for Geospatial Data Management will be accountable for the management of all ESS-NRCan data, databases and archives, including Earth observation components and the production of energy, topographical and other specific mapping requests.
- The Canada Digital Map and Collections Access division will be accountable for web development and access, publications, collections management, geo analytics and client services.
- The GeoConnections division will be accountable for geo-strategy development, connections with our partners and stakeholders and the secretariat of several external committees (See Section II).

Also within ESS, the Surveyor-General Branch (SGB) ensures boundary certainty through: the proper maintenance of the Canada-United States international boundary for law enforcement, land administration, customs and immigration, and transboundary resource management; effective boundary surveys of Aboriginal settlement lands to meet Canada's obligations under land claim settlement legislation and treaties; and statutory registration of legal surveys on Canada Lands (the North, Canada's offshore area, Aboriginal Lands and National Parks), essential to the creation of property parcels.

SGB includes the Geodetic Survey Division, which is responsible for maintaining the Canadian Spatial Reference System (CSRS) that provides fundamental reference values for latitude, longitude, height and gravity, including earth's orientation parameters and rotation rate in space, as the foundation for the nation's evolving positioning and navigation activities.

In addition to NRCan, many other federal departments and agencies have responsibilities for the collection/production and/or use of geospatial data and information to support their respective mandates, including the following members of the Federal Committee on Geomatics and Earth Observations (FCGEO – See Section II): Agriculture and Agri-Food Canada; Aboriginal Affairs and Northern Development Canada; Canadian Food Inspection Agency; Canadian Northern Economic Development Agency; Canadian Space Agency; Department of Fisheries and Oceans (Coast Guard and Oceans Science); Department of National Defense; Department of Foreign Affairs, Trade and Development; Elections Canada; Environment Canada; Health Canada; Industry Canada; Parks Canada; Public Health Agency of Canada; Public Safety Canada; Royal Canadian Mounted Police; Shared Services Canada; Statistics Canada; Treasury Board Secretariat; and Transport Canada.

For more information:

- Natural Resources Canada, Earth Sciences Sector, Geography and boundaries: <http://www.nrcan.gc.ca/earth-sciences/geography-boundary/11612>

II. Institutional Arrangements and Governance

Governance of geospatial information management in Canada is based on a cooperative approach between the federal, provincial and territorial governments, industry, academia and the public. Strong partnerships and collaborative relationships facilitate the management of geospatial information in Canada, where government is decentralized and no legislative framework for spatial data infrastructure and related institutional arrangements exist. Four committees lay the foundation for collaborative governance in geomatics and Earth observations in Canada.

Federal Committee on Geomatics and Earth Observation (FCGEO)

At the federal level, there has been a recent move to strategically align departments and agencies that are producers and users of geomatics and Earth observation data through the formation of the Federal Committee on Geomatics and Earth Observation (FCGEO). FCGEO represents the renewal of senior level (Assistant Deputy Minister-ADM) engagement in federal geomatics and Earth observations in January 2012, through the consolidation of the Interagency Committee on Geomatics (IACG) and the Canadian Group on Earth Observations (CGEO), which focused respectively on traditional vector mapping and Earth observations. In addition to the ADM committee, the FCGEO governance model includes a Director General Shadow Committee and Director-level working groups.

Established from the ground up through the collaborative effort of federal departments, the FCGEO is providing proactive, whole-of-government leadership in establishing priorities for geomatics and Earth observations and their application to support of government priorities, decision-making, and Canada's competitive advantage. In addition, the FCGEO seeks to collectively enhance the responsiveness, efficiency and sustainability of the federal geomatics and Earth observations infrastructure.

Two initial priorities for the FCGEO include the collaborative development of a Federal Geospatial Platform (See Section VI) and a Strategic Approach and Protocol to better coordinate Canadian participation and positions in international fora and initiatives related to geomatics and Earth observations. The FCGEO is also increasingly looking at Earth observations issues including the use of long term satellite data records and space utilization to support government priorities.

For more information:

- GeoConnections – Geospatial Communities:
<http://geoconnections.nrcan.gc.ca/1054>

Canadian Council on Geomatics (CCOG)

The Canadian Council on Geomatics (CCOG) is a federal-provincial-territorial government cooperative body that advances geomatics activities of common interest, and facilitates data collection, interoperability and integration between jurisdictions. Since 1972, CCOG has worked to develop and endorse national data and data exchange standards that enable sharing of information and technical expertise between governments, and to advocate for the use of geospatial data and information in enhancing policy and decision making. Initiatives such as Canada's spatial data infrastructure, the Canadian Geospatial Data Infrastructure (CGDI – See Section III) and GeoBase (See Section VI) have been conceived at the CCOG table.

CCOG membership is comprised of 13 representatives from provincial/territorial mapping agencies, and one representative of the federal government (NRCan). Several members of the FCGEO are observers at the CCOG table, including Canadian Space Agency, Department of Fisheries and Oceans, Department of National Defense, and Statistics Canada. CCOG has three standing sub-committees: the Canadian Geodetic Reference System Committee; the Geobase Steering Committee and the Cadastral Sub-Committee, and establishes additional working groups as required.

For the past decade, the framework for federal-provincial-territorial collaboration and cooperation via CCOG has been provided by the ministerial level Canadian Geomatics Accord. A third iteration of the Geomatics Accord is presently in development and is expected to be ratified in 2014.

For more information:

- Canadian Council on Geomatics: <http://www.ccog-cocg.ca/>
- GeoBase: <http://www.geobase.ca/geobase/en/index.html>

Geographical Names Board of Canada (GNBC)

The Geographical Names Board of Canada (GNBC) is a national coordinating body that keeps official records and provides expert advice pertaining to decisions, standards, principles, procedures, and changes through time to Canada's place names. Established in 1897, the GNBC is comprised of 32 members, and presently operates under an Order-in-Council. Each of the provinces and territories are represented, as well as various federal departments concerned with mapping, archiving, defence, translation, Indian reserves, national parks, elections, postal service and statistics. The Board also includes representatives from the user community, and English and French academic communities. The Chair of the GNBC is appointed by the Minister of Natural Resources.

Under the direction of the Advisory Group on Delineation and Automation, and the Advisory Group on Nomenclature, Policy, and Research, the GNBC has several technical working groups that are tackling common challenges and exploring approaches to feature delineation and identification, cultural generics, Aboriginal toponymy, and marine and undersea features naming.

The GNBC maintains the Canadian Geographical Names Data Base, Canada's official place names database built upon standard policies for the treatment of names and terminology shared by federal, provincial and territorial governments.

For more information:

- Geographical Names Board of Canada: <http://www.nrcan.gc.ca/earth-sciences/about/organization/organization-structure/geographical-names-board-of-canada/5743>
- Canadian Geographical Names Data Base (CGNDB): <http://www4.nrcan.gc.ca/search-place-names/name.php>

Canadian Geomatics Community Round Table (CGCRT)

The Canadian Geomatics Community Round Table is a multi-stakeholder forum for open dialogue and collaboration on issues, challenges and opportunities within

Canada's geospatial sector. It includes representative of organizations spanning the sector, including: federal, provincial, territorial governments, private sector companies, academic institutions, non-governmental organizations, professional associations, and users of geospatial information and services. Participation in the Round Table is voluntary, and the committee does not have or seek authority to make binding decisions for those individuals and organizations that participate.

Initially an informal gathering of geomatics community leaders at the June 2010 Canadian Geomatics Conference in Calgary, Alberta, Round Table members agreed in 2012 that if real progress was to be made to address the challenges facing the sector, that collaboration would have to be strengthened through a formal governance structure, and that a commonly understood and agreed upon community strategy with accountability for implementation shared across stakeholder groups should be articulated and broadly communicated.

To this end, the Round Table established an Interim Steering Committee in June 2012 to develop a Terms of Reference for the Round Table, which was accepted at a subsequent meeting in December 2012. At that time, a "permanent" Steering Committee with representation from the federal, provincial/territorial governments, private sector, academia, professional associations was elected, with a first mandate to pursue development of a Pan-Canadian Geomatics Strategy (See Section III).

For more information:

- Geospatial Communities: <http://geoconnections.nrcan.gc.ca/1054>

III. Legal and Policy Context

There is no federal legislation mandating spatial data infrastructure (SDI) development in Canada. Canada's commitments under the Open Government Action Plan and collaborative approach to Canada's national spatial data

infrastructure, the Canadian Geospatial Data Infrastructure (CGDI) provide the frame for geospatial information management in Canada.

Open Government

Canada's Open Government initiative aims to increase openness and accountability, strengthen democracy, and drive innovation and economic opportunities for Canadians through increased transparency. Canada joined the international Open Government Partnership (OGP) in April, 2012 and shortly thereafter produced Canada's Action Plan on Open Government consisting of 12 commitments in the areas of:

- Open Information: proactive release of information on government activities;
- Open Data (See Section VI): maximization of the release of government data in a useful format to enable citizens, the private sector and non-government organizations to leverage the data in innovative and value-added ways; and
- Open Dialogue: a stronger say for Canadians in policy and priority-setting, and engagement through Web 2.0 technologies.

Canada's commitment to OGP has recently been underscored by the recent commitment by the Honourable Stephen Harper, Prime Minister of Canada, to the Open Data Declaration signed at the G8 summit in Lough Erne, Northern Ireland, June 17-18, 2013. The Charter commits G8 governments to follow a set of principles that will be the foundation for access to, and the release and re-use of, data made available by G8 members, including: Open Data by Default; Quality and Quantity; Useable by All; Releasing Data for Improved Governance; Releasing Data for Innovation. Canada, together with other G8 governments, have committed to develop action plans by the end of 2013 with a view to implementation of the Charter and technical annex by the end of 2015.

For more information:

- Canada's Action Plan on Open Government: <http://www.open.gc.ca/open-ouvert/ap-patb-eng.asp>
- Canada - Open Data Portal: <http://www.data.gc.ca/default.asp?lang=En&n=F9B7A1E3-1>
- G8 Open Data Charter: http://www.international.gc.ca/g8/open_data-donnees_ouvertes.aspx?lang=eng

Canadian Geospatial Data Infrastructure (CGDI)

The Government of Canada recognizes the importance of a national spatial data infrastructure (SDI) in spurring innovation, contributing to economic growth and facilitating decision-making by governments, industry and the public. Since 1999, Canada has funded the GeoConnections program, a national initiative led by NRCan, to support the development, integration and use of the Canadian Geospatial Data Infrastructure (CGDI), Canada's spatial data infrastructure.

The CGDI is a convergence of common standards, tools, operational policies and accessible framework data layers that result in the interoperability of federal, provincial, territorial and regional SDI's, creating a navigable online system of information, data, services and applications that improves the sharing, access and use of Canadian geospatial information. With no legislative framework in place in Canada, the development of the CGDI is based upon a cooperative approach between interested organizations and different levels of government. The CGDI governance model reflects Canada's geospatial governance structure, where decision-making and the information needed to support it are distributed across a federated structure.

In 2011, to position GeoConnections for a successful third phase of the program, GeoConnections developed an SDI assessment framework and, conducted a formal, third-party assessment of the CGDI to assess progress in its development and performance. As a result of the assessment, the CGDI vision, mission and roadmap have been renewed to reflect current and projected requirements in the

areas of technology, standards, operational and strategic policy, data, and collaboration. In addition, a strategic framework for geospatial standards has been developed providing a strategy and roadmap to and to identify actions intended to better coordinate and integrate geospatial standards in Canada, inform investments and ensure that standards activities support program priorities.

For more information:

- GeoConnections: <http://geoconnections.nrcan.gc.ca/>

IV. Strategic Plan

Two complementary initiatives presently underway – the Geomatics Environmental Scan and Economic Value Study and the Pan-Canadian Geomatics Strategy - will establish future directions and lay the groundwork for action plans that will see Canada’s geospatial sector through to 2020.

Canadian Geomatics Environmental Scan and Economic Value Study

The use of information and data for product and process innovation across all sectors, including the public sector, has emerged as the primary engine of productivity and growth for the national economies, rendering information and data - 80% of which has a spatial component - the new global currency. Canada uses geospatial data for a wide range of issues of importance to Canadians including national security, environmental protection, and public health management with significant economic, environmental and social benefits accruing to the Canadian public. The impacts of geospatial information are increasingly well documented as countries undertake studies to quantify tangible and intangible benefits to the economy and society.

To substantiate and quantify these impacts within the Canadian context, and to better understand the Canadian sector at this point in time as a baseline for future

growth, NRCan launched the two-part Canadian Geomatics Environmental Sector Scan and Economic Study, in Spring 2013:

- The Environmental Scan will provide a snapshot of the current geospatial information market in Canada and profile the Canadian geomatics sector; examining current participation in international markets and evaluating the importance of the sector to Canada's domestic market. The scan will also identify technological, economic, social and demographic trends; examine the contributions and roles of government, industry and academia and the challenges and opportunities for each within the geospatial sector; and provide an analysis of the labour market, education and training currently available.
- The Economic Study will: quantify the economic value (impact) of open geospatial information within the Canadian economy and its contribution to competitiveness and innovation in Canada; evaluate geospatial information as a 'public good' in the Canadian context; and make recommendations on the future strategic direction for geospatial information in Canada with an emphasis on the roles that can be played by the government, industry and academia.

Results of the combined Study are anticipated for mid-year, 2014.

For more information:

- Canadian Geomatics Environmental Scan and Economic Value Study Background: <http://geoconnections.nrcan.gc.ca/1066>
- Canadian Geomatics Study: <http://geomatics.hal.ca/>

Pan-Canadian Geomatics Strategy

While the Canadian Geomatics Environmental Scan and Economic Value Study will provide a snapshot of the current context, sector status, and value of Canada's

geospatial sector, the Pan-Canadian Geomatics Strategy will establish a shared future vision, goals and objectives for the geomatics sector in Canada to 2020.

The Pan-Canadian Geomatics Strategy is a collaborative, open effort by the Canadian Geomatics Community Round Table (See Section II) to take a collective and inclusive approach to identifying a desired future for Canada's geospatial sector. By identifying and engaging an ever-widening range of stakeholders in Canada in the planning process, including industry, academia, governments, non-governmental organizations, geospatial data and service companies, professional associations, individual Canadian citizens, as well as new and emerging players in the geomatics and Earth observations sector, the initiative responds to the Open Dialogue stream of Open Government (See Section III).

The scope of the Geomatics Strategy is broad, encompassing seven (7) strategic dimensions with associated goals and objectives to which members of the geospatial community are called to respond, namely: geomatics sector identity; governance and leadership; data sources; business model; markets; human resource capacity; and legal and policy framework. The need to address and to act on each of these areas is recognized by the Round Table as key to ensure that Canada has a healthy geospatial sector that is productive, competitive and sustainable well into the future.

The anticipated result of this engagement process is a non-binding, voluntary strategy that can be achieved by the combined efforts of stakeholders within the Canadian geomatics community and within the mandate and sphere of influence of each community member through the development of action plans that respond to the overarching goals and objectives identified within the strategy. Key to the strategy's success is shared ownership and accountability for implementation by all members of the community. A draft of the strategy is anticipated for Winter 2013-14.

For more information:

- Pan-Canadian Geomatics Strategy:
<http://geoconnections.nrcan.gc.ca/1068>

V. Data Collection, Generation and Production

Canada continues to make investments in critical infrastructure and system improvements that support data collection, generation and production activities.

Revitalizing Canada's Satellite Station Facilities

Canada uses leading-edge satellite technology to provide real-time scientific information on its landmass in order to address a wide array of topics that are important to Canadians — environmental monitoring, stewardship, resource exploration and development, emergency response, navigation, sovereignty and security. The Government of Canada is revitalizing Natural Resources Canada's satellite station facilities with the installation of four antennas: two in Prince Albert, Saskatchewan, one in Gatineau, Quebec and one in Inuvik, Northwest Territories. These three satellite station facilities are strategically located across Canada to provide full coverage of Canada's landmass. The revitalization also includes a data management system to house and safeguard satellite information and to ensure the data received by these facilities are accessible to the users.

The first antenna has been installed in Prince Albert in June 2013. The other three antennas and the data management system will be operational in 2014.

Height Reference System Modernization

A consistent reference system for height determination at the national scale is an essential component of the basic infrastructure that enables good governance of our natural resources. Accessed by stakeholders in the field of surveying, engineering, mapping and earth sciences, the height reference system maintains compatibility among all types of geo-referenced information so that it can be interrelated and exploited reliably. While the height reference system supports

numerous applications, from highway engineering to monitoring water resources, it is also referred to in many legal documents related to land and water management and safety such as easement, flood control and boundary demarcation.

Height Reference System Modernization (Height Modernization) is a project at NRCan for the development, implementation and promotion of a gravity-based height reference system for Canada. In other words, it is the realization of a new vertical datum for Canada by geoid modelling, rather than by geodetic levelling. It will enable measurements of elevations with respect to a consistent vertical datum everywhere across the country using the Global Positioning System (GPS) and emerging Global Navigation satellite System (GNSS) technologies. This new approach will allow reduction dependency on monumented networks for height determination. It will reduce the physical maintenance from some 80,000 federal benchmarks to some 250 stations making the Canadian Active Control System (CACs) and Canadian Base Network (CBN). These networks will be augmented by the provincial High Precision Networks (HPN). The implementation of the new vertical datum for Canada is expected within this calendar year.

For more information:

- Height Reference System Modernization: <http://www.nrcan.gc.ca/earth-sciences/geography-boundary/spatial-referencing/height-reference-system/modernization/5664>

Renewed System for National Digital Elevation in Canada

Digital Elevation Models (DEM) represent convenient ways of storing elevation information, and of making this information available to applications for a wide range of disciplines including cartography, geomorphology, security and defense, geology and energy exploration, civil engineering, geographic information systems, satellite image processing and analysis, among others.

In response to user needs and the increasing availability of new data sources, NRCan undertook a project to define and implement an altimetry strategy that would enable the provision of up-to-date relevant elevation data for Canada, available on the Internet. The result is a new system of interaction and access for National Elevation in Canada, which was made public in April 2013. Two data sources are now available for the creation of elevation products: the Canadian Digital Elevation Model (CDEM) and the Canadian Digital Surface Model (CDSM).

Besides digital elevation models, other derived products such as slope maps, shaded relief maps, color relief maps, color shaded relief maps, aspect maps, and elevation points can be extracted. Parameters allow users to personalize their products. The web interface offers a dynamic map for pre-visualizing the information and to locate the area of interest.

Current efforts are underway to add capability to the system for the acquisition, quality control, storage, management and distribution of LiDAR (Light Detection and Ranging) data and derived elevation models.

For more information:

- Web tool for dynamic creation of elevation products and the extraction of vector data using National Elevation data:
<http://geogratis.gc.ca/site/eng/extraction/>

VI. Data Publishing and Sharing

Geospatial standards and operational policies facilitate the development, sharing and use of geospatial data by eliminating barriers and enabling users to exchange geospatial information effectively and efficiently. New standards, access mechanisms and services are making it easier for Canadians to find, mine and use authoritative and accurate Government of Canada data.

For more information:

- Geospatial Standards and Operational Policies: <http://geoconnections.nrcan.gc.ca/1017>

Treasury Board Standard on Geospatial Data

This standard, mandated by Canada's central agency Treasury Board, supports stewardship and interoperability of information by ensuring that departments manage, access, use and share geospatial data efficiently and effectively to support program and service delivery through the use of common, interoperable standards for data discovery and data visualization. Specifically, Canadian federal departments must comply with the North American Profile for ISO 19115 – Metadata, and must use ISO 19128 for online data visualizations using the Web Map Service specification, when making geospatial data available online. This standard represents a first step in normalizing the access, use and dissemination of federal geospatial data in Canada; it is anticipated that the Standard on Geospatial Data will be expanded to include other common geospatial standards that promote interoperability in a distributed online environment.

For more information:

- Treasury Board Standard on Geospatial Data: <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=16553§ion=text>

Government of Canada Open Government License and Open Data Portal

Canada's commitment to Open Data enables citizens, the private sector, and non-government organizations to leverage and build upon government data in innovative and value-added ways. The new Open Government Licence (OGL) will remove restrictions on the reuse of all types of published Government of Canada information (data - including geospatial data - information, websites, and publications) and align with international best practices to promote the re-use of

federal information as widely as possible. The OGL is based on the United Kingdom's Open Government Licence for Public Sector Information.

Canada's Open Data portal offers data from 25 federal departments and agencies in machine readable formats, available for download and re-use under the open terms and conditions of the Open Government Licence. Approximately 260,000 datasets found on Canada's Open Data portal are geospatial data - maps, imagery products, and other location-based data.

The Open Data Portal Metadata Element Set is based on the Dublin Core metadata properties as recommended by the Dublin Core Metadata Initiative (DCMI) Usage Board. It also incorporates metadata elements selected from the North American Profile of ISO: 19115 2003 and international alignment is also achieved through a common core that matches the United States Government's Common Core Metadata Schema for data.gov.

For more information:

- Open Data Portal: <http://data.gc.ca/>
- Open Government License: <http://data.gc.ca/eng/open-government-licence-canada>

Evolution of GeoBase (GeoBase 2.0)

GeoBase is a federal, provincial and territorial government initiative to ensure the provision of, and access to, a common, up-to-date and maintained base of quality geospatial data for all of Canada. Overseen by the Canadian Council on Geomatics (CCOG), the initiative provides access through the GeoBase portal to quality geospatial information at no cost and with unrestricted use under the GeoBase Unrestricted Use Licence Agreement.

Building upon the success of GeoBase, the GeoBase 2.0 initiative aims to develop new strategies and approaches for collecting and managing topographic data and building a data repository that will continue to provide high quality demand-

driven geospatial information on the Internet. A report with recommendations for building GeoBase 2.0 was completed in 2012 by the CCOG GeoBase Steering Committee in consultation with stakeholders, which explored issues pertinent to the evolution of GeoBase including: data content and maintenance; licensing and access; standardization and interoperability; roles of contributing organizations; funding; data provision and services; and data quality, validation and liability. The GeoBase Steering Committee is presently updating the GeoBase Principles, Policies and Procedures manual to reflect some of these recommendations; a new iteration of which is expected in Fall 2013.

For more information:

- GeoBase: <http://www.geobase.ca/>

New GeoGratis Website

GeoGratis is a web portal that provides access to a wide collection of Canadian geospatial data, maps, images, and publications in a several different popular formats, at no cost and without restrictions under an Unrestricted Use Licence Agreement. In 2013, NRCan launched a new update to the GeoGratis website, which consolidates several location-based services including the Canadian Geographical Names Database (CGNDB), Atlas Gazetteer, Postal Codes and National Topographic System (NTS) Map search. The new GeoGratis service is compatible with OpenGIS® Consortium (OGC), and provides a better one stop site for people to obtain Canadian geospatial data, maps, images and publications.

For more information:

- Geogratias: <http://www.geogratias.gc.ca/>

Federal Geospatial Platform

Geospatial data are widely used across the federal government for numerous applications such as weather, resource development, endangered species, census data, and oceans management, to name a few. As such, geospatial data is

acquired and managed by multiple departments and agencies to meet their respective mandates. The challenge is to enable easy discovery and access of federal government data holdings for use by government departments and agencies at all levels, the public, academic institutions, and the private sector.

The Federal Geospatial Platform (FGP) is an initiative of the Federal Committee on Geomatics and Earth Observations (FCGEO – See Section II), which as a community recognized an opportunity for federal departments and agencies to manage geospatial information assets in a more efficient and coordinated way by using a common “platform” of technical infrastructure, policies, standards and governance. The objectives of the FGP are: to eliminate redundancy (of data, services, and application); greatly improve access to “AAA” (accessible, accurate and authoritative) data by everyone; assure this data is interoperable among layers; with the ends of better enabling rapid and excellent policy development and innovation.

Presently, the FCGEO is developing a project charter for the development of the FGP as a collaborative online environment consisting of authoritative geospatial data, services, and applications, built on a shared infrastructure that will enable the government’s most relevant information to be managed spatially, analyzed, and displayed in a visual context to enhance decision-making support of government priorities.

For more information:

- Federal Geospatial Platform: <https://geoconnections.nrcan.gc.ca/1064>

VII. Use of Geospatial Data, Information and Applications

The Government of Canada’s key priorities in 2013 include responsible resource development, national security, jobs, economic growth and competitiveness, public safety and development of the North. Geomatics, Earth observations, surveying and geodesy play a critical role in the fulfillment of these Government

of Canada priorities. Following are a just a few examples of how geospatial information is being used to deliver on these priorities:

Geo-mapping for Energy and Minerals (GEM)

Geo-mapping for Energy and Minerals (GEM) activities provide industry with modern geological information, facilitating industry's ability to identify areas with potential sources of energy and mineral resources. The activities are focused on updating the geological framework, which identifies the potential areas where certain mineral and energy types could be located, and disseminating this knowledge to all involved stakeholders. This fills the critical information gap in the knowledge base needed to increase exploration investment and facilitate land-use decisions in the territories.

For more information:

- Geo-mapping for Energy and Minerals: <http://www.nrcan.gc.ca/earth-sciences/about/current-program/geomapping/7131>

Multi-Agency Situational Awareness System (MASAS)

Situational awareness (SA) is essential to the planning and execution of emergency response efforts. Those working in critical environments, like first responders, incident commanders, or emergency managers, are highly dependent on SA information to make decisions and perform their duties. Several different SA tools are used across Canada and the ability to connect these different tools for shared SA is a critical capability that is needed in order to improve interoperability and ensure a more efficient and effective response.

The Multi-Agency Situational Awareness System (MASAS) applies open data standards and architecture to connect different systems and allow them to exchange real-time information such as weather alerts and the location of road closures, fires, earthquakes and floods. This information, which is published by the users or pulled from open government data sources, is displayed in a map format to provide a clear picture of activity on the ground. Emergency responders

can use these maps to plan a more effective and efficient response to crisis situations.

MASAS was first conceived as an innovation of the GeoConnections Program, led by NRCan, as a means to create a national geographic information system for the public safety and security community based on the CGDI. In 2010, Defence Research and Development Canada's Centre for Security Science (DRDC CSS) took the leadership role in partnership with NRCan and Public Safety Canada, to further develop and operationalize MASAS as a national capability that enables agile and authoritative information sharing between public safety practitioners from all levels of government and key supporting agencies/organizations (utilities, military, etc). It serves a diverse community of users and potential users at all levels of government, as well as entrusted industry stakeholders.

For more information:

- Multi-Agency Situational Awareness Systems: <http://www.masas-x.ca/en/about-masas>

Arctic Spatial Data Infrastructure (ASDI)

The Arctic Spatial Data Infrastructure (ASDI) consists of the Canadian and International regionalized components of the CGDI and Global Spatial Data Infrastructure, respectively. Canada's ASDI contributes to development in the North by providing a geographic reference foundation to help inform sound decision making and policy development related to responsible resource development, emergency management, and environmental issues.

The development of an international Arctic Spatial Data Infrastructure is supported by the national mapping agencies of Canada, Denmark, the Faroe Islands, Greenland, Finland, Iceland, Norway, the Russian Federation, Sweden and the United States and has been endorsed by the Arctic Council. The ASDI is envisioned to be an on-line suite of resources that improves sharing, access and use of geospatial information spanning the entire circumpolar region. Presently in

the conceptualization phase, the project will be enter the operational phase in 2014.

For more information:

- Arctic Spatial Data Infrastructure (International): <http://arctic-sdi.org/>

VIII. Capacity Development and International Engagement

Ensuring the usability of Canada's geospatial information to better support decision-making as well as access to timely and accurate mission critical data and information requires inter-jurisdictional collaboration, co-operation and innovation. Participation in international fora and initiatives provides the opportunity for Canada not only to share expertise and experience to facilitate capacity development in other countries, but likewise, provides the opportunity for Canada to harness international expertise, standards, and science and technology.

To this end, Canada participates in and contributes to a number of geospatial information management and related organizations. Following is a partial list of key engagements:

- Permanent Committee on Spatial Data Infrastructure for Americas (PC-IDEA) - Member and Working Group Co-Chair (NRCan - 2010-13)
- United Nations Committee of Experts on Global Geospatial Information Management (UNCE-GGIM) – Member (NRCan)
- United Nations Group of Experts on Geographical Names (UNGEGN) – Member; past-Chair (2011-12) (NRCan)
- United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOUS) – Member (CSA)

- Group on Earth Observations (GEO) – Member of the Executive Committee (Environment Canada)
- World Meteorological Organization (WMO) – President (Environment Canada)
- International Organization for Standardization (ISO) – Member and Chair, ISO/TC211 Canada (NRCan)
- Open Geospatial Consortium (OGC) – Member (NRCan)
- Centre for Spatial Policy and Law – Member (NRCan)
- Global Spatial Data Infrastructure Association (GSDI) – President (University of New Brunswick); Member (NRCan)

Canada also works closely with other national and regional SDI initiatives, including, Arctic Spatial Data Infrastructure (ASDI) (NRCan – Board Member), the United States Federal Geographic Data Committee (FGDC), and the Infrastructure for Spatial Information in the European Community (INSPIRE).

IX. Conclusion

In moving forward, the use of geospatial information needs to be maximized for better decision-making, and to meet broad national and international objectives such as economic growth, emergency preparedness and response, social cohesion and well-being, and responsible resource management. To this end, Canada will continue to evolve the CGDI based on the convergence of geospatial policies, standards, legal and administrative issues, and continue to respond to change brought on by evolving technologies. Canada will continue to support Canadian geomatics initiatives and international collaborations to ensure effective management of Canadian geospatial information in an interoperable environment that is well aligned with international standards and policies.