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# Canada's Spatial Data Infrastructure

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# Geospatial Data in Information Era

- Geospatial data is essential for many issues at the national, regional and global scales. It is a fundamental tool for informed decision-making that has a high economic value.
  - Globally, geospatial services generated annual revenue of US\$400 billion and efficiency from time and fuel savings save the public over US\$550 billion per year (AlphaBeta 2016).
  - Geospatial information could potentially reduce global CO2 emissions by 5% per year.
  - In Canada, the use of geospatial information contributed \$20.7 billion – or 1.1% of national Gross Domestic Product (GDP), and generated approximately 19,000 jobs to the Canadian economy in 2013
- With the 4th revolution (fusion of technologies), the importance of geospatial data will still be crucial
  - Information is the oil of the 21st century, and analytics is the combustion engine (Gartner)

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# *What is a Spatial Data Infrastructure?*

- **SDI** is a mechanism for making data available and for sharing and exchanging it to help achieve social, environmental and economic goals of the participant organisations. The **key components of a SDI** include:
  - **Institutional arrangements** and **collaboration** between participating organisations for the planning and implementation of the SDI;
  - **Data** from various sources and types;
  - **Technologies** covering all aspects of the SDI, from distributed data storage to discovery, access, harmonization and dissemination
  - **Standards** allowing for diverse data sources, services, applications, and systems to operate with each other;
  - **Policies** covering the whole data lifecycle and enabling users to exchange data effectively and efficiently..
  - **Physical Infrastructure** allowing the acquisition, management, processing and dissemination of geospatial data and information (e.g. satellites and satellite ground stations)
- In each country, the implementation of each SDI component is context driven

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# Canada's Physical and Social Realities

- Canada Geography
  - The second largest country in the world (10 million sq.km)
  - The longest coastline of any country in the world (234,000 km)
  - More than a third of the territory is under water
- A large portion of the 36.7 million people inhabit the southern part of the country:
  - 72.0 percent of the population is concentrated within 150 km of the southern border with the US
  - One of the most sparsely populated countries (population density of 3.7 people per sq.km)



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# Canada's Political and Economical Realities

- Canada is a federal state and politically divided into 10 provinces and 3 territories
- Shared jurisdiction across different levels of government (federal, provincial, territorial, municipal and Indigenous):
  - E.g. navigable waters are a federal responsibility and cadaster is provincial and territorial responsibility (except federal lands)
  - Each level of government produces, uses and distributes geospatial data and information for decision making
- Modern economy with a strong natural resource sectors
  - Natural resources sectors accounted for 17% of nominal GDP in 2017
  - E.g. Geological Survey of Canada was established in 1842, 25 years before Canada becoming a nation (in 1867)



Wikipedia



# Geospatial Data in Canadian Society

- Geospatial data has government-wide impact
- Many applications ranging from emergency response and environmental assessments
- Geospatial data has a huge role in the Canadian economy and innovation
  - Geospatial data are leveraged for value-added products such as new applications, research, science
  - Geospatial technologies contribute some \$21 billion (1.1% GDP), and generate approximately 19,000 jobs. Open geospatial data adds \$650 million as a result of its use
- 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

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# The Focus of the Canada's SDI: Collaboration and Partnership

- Shared governance of geospatial information
  - Each level of government produces, uses and distributes geospatial data
  - Cooperative approach between the federal, provincial and territorial, municipal, indigenous governments, industry, academia and the public
- Four governance bodies lay the foundation for the collaborative governance:
  - Federal Committee on Geomatics and Earth Observation (FCGEO)
  - Canadian Council on Geomatics (CCOG)
  - Geographical Names Board of Canada (GNBC)
  - Arctic SDI

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# The Focus of the Canadian's SDI: Framework data and data integration

- The core data of the CGDI, framework data are the base mapping layers required to develop applications and are freely available for reuse. Framework data is the foundation upon which location-based information becomes spatially relevant to users. These data include:
  - Topographic layers (e.g. hydrographic feature, elevation)
  - Remote sensing data (e.g. High resolution optical imagery or Radar data)
- GeoBase: 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 Canada
- Framework data are integrated, managed and published by the Canada Centre for Mapping and Earth Observation (CCMEO), the Government of Canada's centre of excellence for geomatics, mapping and earth observation

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# The Focus of the Canadian's SDI: Earth Observation and Related Infrastructure

- Over the last 20 years, RADARSAT-1,2 have collected more than 500TB of EO data over Canada and the upcoming RCM is expected to collect the same data annually
- CSA is a founding member of the International Charter on Space and Major Disasters and provides data to countries in need
- To support Canada's EO activities, CCMEO develops remote sensing applications and operates satellites' ground stations



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# The Focus of the Canadian's SDI: Standards and Operational Policies

- Standards specify the content and structure of data and operational policies are practical instruments (e.g. guidelines, best practices, directives, procedures and manuals)
- Standards and operational policies are essential to:
  - Eliminating barriers
  - Enabling users to exchange data and information effectively and efficiently
- Through the CCMEQ, Canada collaborates with several geospatial standardization bodies: OGC (Open Geospatial Consortium), ISO, IHO

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# The Focus of the Canadian's SDI: Open Data

- Since 2000, Canada has pioneered Open Geospatial Data following a policy decision to make geospatial data and maps available at no cost
- Benefits of Open data:
  - Efficiency by avoiding duplication and facilitating reuse of existing data
  - Advancing the government's accountability and transparency;
  - Support innovation and the emergence of new technologies;
  - increases public confidence in decisions
- Open geospatial data contributed at least \$695 million (0.04%) to Canada's Gross Domestic Product in 2013
- Canadian framework data is published under the Open Government License - Canada

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# Example of Canadian's SDI: FGP-Federal Geospatial Platform

- The FGP brings together geospatial data from the 21 departments and agencies of FCGeo
  - Standards-based, searchable metadata catalogue.
  - Web service and application development environment.
  - Value-added visualization and analytical capabilities
- has two faces:
  - an internal site
  - and a public site entitled [Open Maps](#), on the Open Government Portal

**THE FEDERAL GEOSPATIAL PLATFORM**

The Government of Canada's source for geospatial data

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# Example of Canadian's SDI: Arctic SDI

- Arctic SDI consists of the Canadian and International regionalized components of the CGDI and Global Spatial Data Infrastructure, respectively
- The development of an international Arctic Spatial Data Infrastructure is supported by the seven national mapping agencies of Arctic countries



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# Conclusion

- Canada has a long history of creating, managing and disseminating geospatial data
  - The first GIS was invented in Canada
  - Canada is one of the first countries in the world adopting Open Geospatial Data policy
- Canada's SDI is distributed and requires collaboration and strong partnerships
- Canada participates in different international geospatial initiatives, including the creation of regional SDIs (e.g. Arctic SDI)
- Although each country is unique, the Canadian experience can inspire the implementation of new national and regional SDIs

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# Muchas Gracias

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