



Natural Resources
Canada

Ressources naturelles
Canada

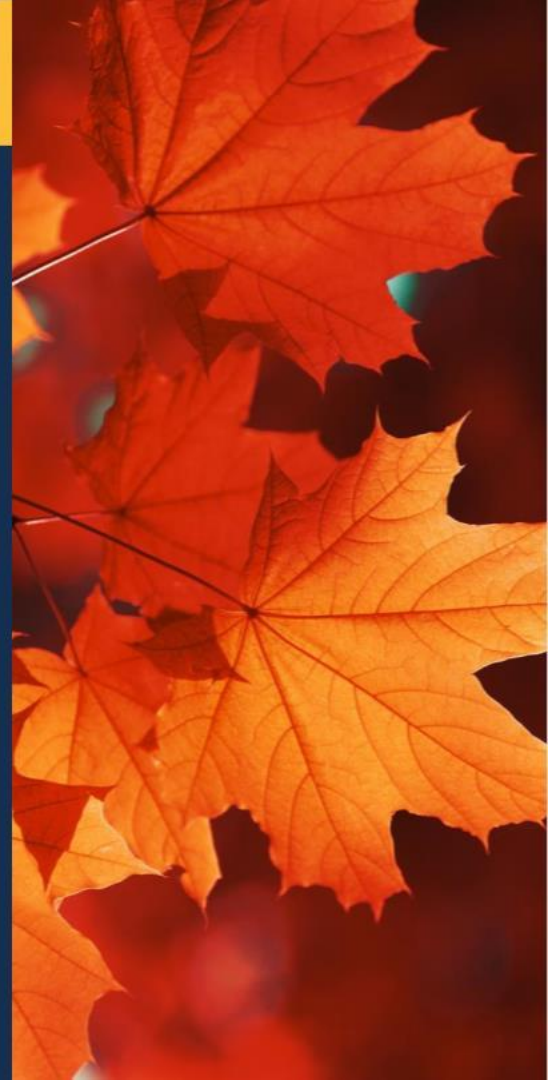
Value of National Geospatial Infrastructures in Multi-National Context

Eric Loubier

**Director General, Canada Centre for Mapping and
Earth Observation, Natural Resources Canada
eric.loubier@nrcan-rncan.gc.ca**

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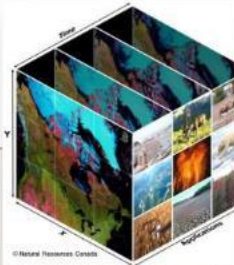
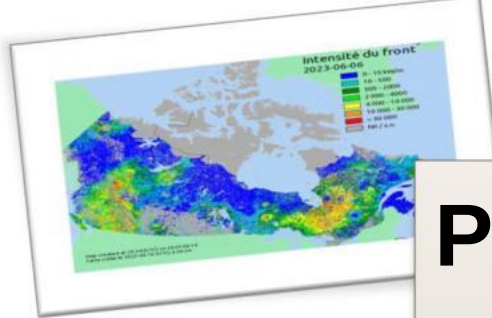
Canada



National Geospatial Infrastructures: A Global Partnership Framework

There is great truth in the adage “issues don’t respect borders”. The value of National Geospatial Infrastructures like the U.S. NSDI are incredibly significant in enabling cooperative partnerships across national boundaries on a range of challenges.

Canadian Context



Mapping Needs

- **Vast geography** and abundant natural resources vis-a-vis sparsely populated areas.
- **Densely populated areas** have greater need for near real-time data and analysis to:
 - Map, plan, develop and maintain critical infrastructure and support emergency management efforts.
- **Low density and Remote areas** require long term monitoring
 - Time-series products and trends for climate change impact monitoring on land.



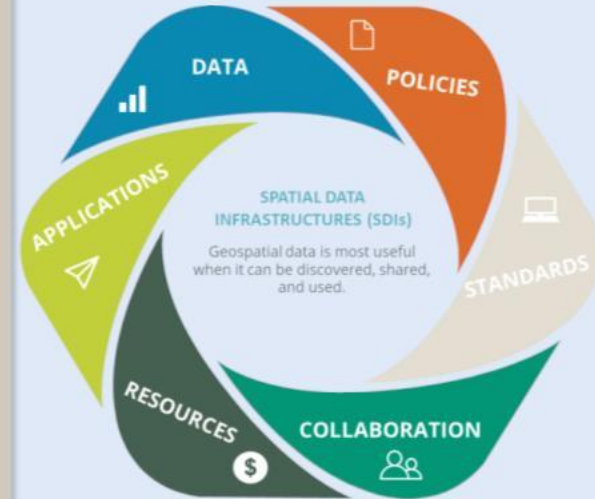
Policy Drivers

- **Emergency Management Strategy:** Whole-of-Canada approach to assess risks and to prevent/mitigate, prepare for, respond to, and recover from disasters.
- **Canadian Wildland Fire Strategy:** Delivering and operating a new wildfire monitoring satellite system.
- **Flood Hazard Identification and Mapping Program:** Collaboration with provinces and territories to advance flood mapping nationwide.
- **Strategy for Satellite Earth Observation:** EO for Cumulative Effects through multi-decadal records of environmental change.
- **United Nations Declaration on the Rights of Indigenous Peoples Act** became law on June 21, 2021, to work in consultation and cooperation with Indigenous peoples.
- **Federal Data Strategy:** To support government-wide priorities and align the landscape of federal, national and international digital and data-related initiatives.

Canadian Geospatial Data Infrastructure (CGDI)

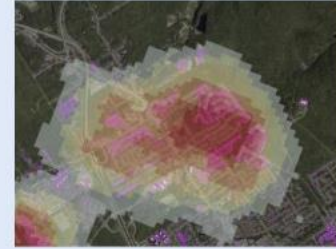
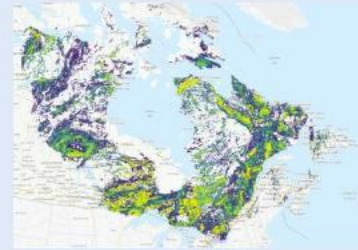
What is the CGDI?

- Digital infrastructure that enables **consistent** discovery, access, sharing, and use of geospatial information. Equivalent to US NSDI.
- Includes:
 - **Data** – all forms of geospatial data.
 - **Applications** - Technology and tools that use and help us work with geospatial data.
 - **Policies** – guidelines to help the infrastructure function.
 - **Standards** – rules that enable interoperability.
 - **Collaboration** – working together domestically and internationally to deliver and improve the infrastructure.
 - **Resources** – human and financial elements needed for everything to work.



CGDI Successes

- **Critical Minerals:** Identifying and analyzing potential sites for critical minerals across Canada, supporting the global energy transition.
- **EV Charging Stations:** Mapping current and planned electrical vehicle charging stations to support infrastructure planning and public accessibility.
- **Indigenous Place Names:** Highlighting the Indigenous origins of place names nationally to advance reconciliation.
- **Real-Time Radioactivity Monitoring:** Monitoring and providing real-time updates on environmental radioactivity to enhance public safety and environmental protection.
- **Emergency Management:** Geospatial analysis for emergencies like wildfires, floods and earthquake displacement helps save lives. Mapping risks prevent disasters from occurring, reducing costs.
- **Geospatial Artificial Intelligence (GeoAI):** AI techniques support rapid, lower cost mapping and change detection, supporting activities from creating foundational datasets to emergency management products.
- **Weather:** Integration and distribution of massive data volumes to support ongoing weather forecasting.
- **Marine:** Connecting data and enabling applications for marine operations and planning.
- **Return on Investment:** CGDI funding programs have realized \$3.90 for every \$1 of investment for SDI innovation.



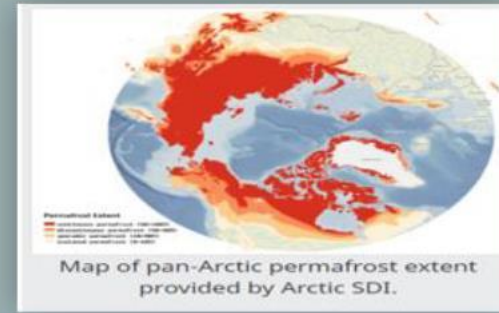
Evolving Canadian Geospatial Ecosystem

- **Integrated and complex network of players** with influx of geospatial information from many sources and available across myriad locations.
- The **surge brings challenges** related to data fragmentation, standardization, storage and analysis.
- Federal and provincial agencies are no longer sole providers & custodians of geospatial data, alluding to the **changing role of the federal government**.
- Increased **focus on issue-driven sunseting programs** causing funding limitations.
- **Absence of legislation** making governance, accountability and meeting differing priorities of government departments, Indigenous Peoples, and economic sectors difficult.

- **2012:** Completion of National Topographic System for Canada.
- **2017:** Open Maps is launched: providing Canadians access to the Government of Canada's geospatial information.
- **2019:** GeoConnections program applies geospatial standards to climate change, disasters, marine, and Indigenous priorities. The RADARSAT Constellation Mission is launched.
- **2021:** The Canada Centre for Remote Sensing celebrates its 50th anniversary.
- **2022:** Geo.ca is live, representing the definitive source for Canada's open geospatial resources.

International Synergies

Enhancing CGDI



- **The Arctic:**

- Arctic Spatial Data Infrastructure, making geospatial data accessible for informed decision-making and administration in the Arctic.
- Inuvik Satellite Station Facility for near real-time data access from polar-orbiting satellites, meeting global needs.

- **Standards Development:**

- Open Geospatial Consortium pilots to develop global geospatial solutions for disaster, marine and climate resilience.
- International Organization for Standardization, supporting the Canadian Mirror Committee and Imagery Working Group.
- World Wide Web Consortium for establishing standards for publishing maps on the web.

- **Earth Observation:**

- Earth Observation Data Management System supports downstream users and services, with near real-time satellite data.
- North American landcover via the Commission for Environmental Cooperation.
- Canada's Emergency Geomatics Service (EGS) provides operational planning centres and responders with map products through the International Disaster Charter and cross border collaborations

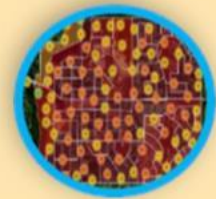
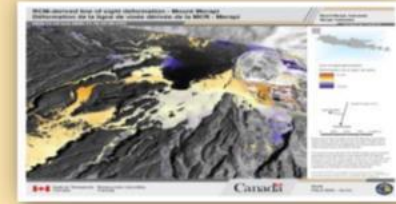
CGDI Challenges

- **Data Fragmentation, Proliferation and Interoperability**
 - Geospatial data collected and managed by various federal, provincial, territorial, and municipal governments, private sector NGOs.
 - Data available not always aligned with international geospatial standards.
 - Proliferation of geospatial data and portals for broad range of purposes.
- **Inconsistency in Access to Geospatial Data:** Access not uniform across Canada. Rural and remote areas, Indigenous communities, have limited access.
- **Privacy, Security, and Ethical concerns:** Sensitive location-based information faces security risks and usage concerns with data proliferation and AI.
- **Ambiguity in changing role of government:** Differing priorities amongst level of governments, stakeholders are exacerbated by lack of formal governance



More CGDI Challenges

- **New Technology:** AI, machine learning, sensors, quantum computing, etc. require new, agile approaches. In AI, there is a lot and not enough being done.
- **Complexity:** Volume and sources of data increasingly rapidly. Need to improve openness, accessibility, discovery, integration and management while keeping costs under control.
- **Policy:** Changing policy environment. Considerations of Indigenous reconciliation, climate change and disasters, health, critical minerals, etc. shifting priorities from traditional uses.
- **Securing appropriate funding:** With the increasing “spotlight” on knowledge creation, Value added product and services, decision making systems, it is becoming more and more challenging to support the underlining geo-infrastructure.
- **Leveraging the entire community:** Connecting geo-assets from no-traditional partners, private, NGO, Crowdsourcing.



Partnerships and Collaboration

Insights

- **US NSDI:** Seamlessly interconnected national geospatial ecosystem, connected to global geospatial ecosystem to address local, regional, national, global challenges.
- **Future Geospatial Information Ecosystem:** From SDI to SoS and on to the Geoverse. Jointly develop solutions to global issues.
- **Geospatial Knowledge Infrastructure:** Bridge the gap between the geospatial, digital, and user communities to make fit-for-purpose dynamic geospatial data and knowledge easily accessible.



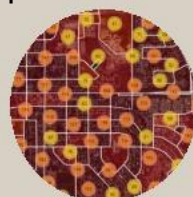
Core Data



Emergency Management



Adaptation and Resilience



Sustainable Development

Looking Ahead

- How to address **common border-less challenges and leverage opportunities** for national development?
- With increasing volume of data, should we **simplify standards** and data models?
- Changing the paradigm by need-based "**Re-producing information**" vs curating for non-prohibitive IT costs .
- **Joint solutions** with number of "players" is increasing exponentially.
- **AI for mapping** is transformative and most effective when the ecosystem participates.



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