The traditional role of mapping agencies

- **Provide reliable topographic data on the territory**

- **Historically, this role has not always been the same:**

  - They addressed the needs of specific domains such as: military, land administration, geology, etc.

  - Over time, some agencies have evolved to address broader needs by creating authoritative data in the form of topographic maps

- **Examples of Canada**

  - 1883 - Water maps

  - 1904 - Department of Militia and Defence

  - 1908 - Geological Survey of Canada establishes its topographic division

  - 1920 - Department of the Interior

  - 1922 - Creation of a single topographic system

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Context

- **Geospatial is becoming more and more important in our daily lives**

- **More than 80% of the information around us is geo-localized**

- **The fourth industrial revolution**

  - A multitude of interconnected sensors that accumulate more and more spatially referenced data

  - The importance of data in our societies: it has become the basis of the economy

  - The interaction between systems (physical and virtual) and humans (e.g. robot-human interactions)

- **The demand for accurate and up-to-date geospatial data is increasing**

- **Growing need for real time information, not data alone, for quick decision making**

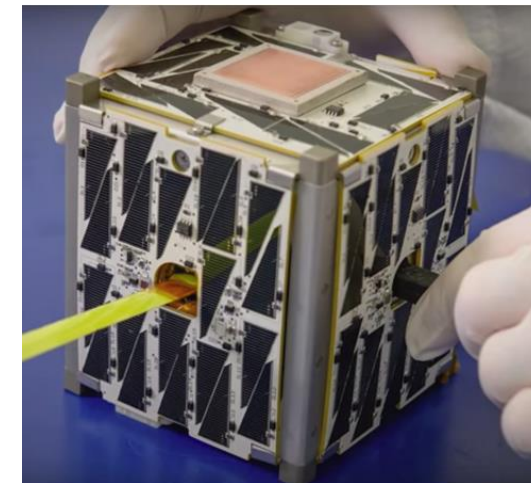Natural Resources Canada   Ressources naturelles Canada

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What has changed?

- **Increasingly precise data**

  - Imagery: from a few meters to a few centimeters (satellite) and a few millimeters (drones)

  - Lidar: from less than 1pt/m2 to more than 100 pts/m2

 - Increasing use of drones and high-density Lidar

What has changed?

- **Increasingly accessible, varied and frequent data thanks to micro and nano satellites**

  - Increased acquisition frequency and lower cost

    - More than 100 satellites per launch (cubesat)

    - Cost per satellite: construction and launch

  - Thousands of mini satellites in the next few years

- **Integration of these data in the form of Data Cube**

  - Ready to use data

  - Minimize processing time (post-processing)

  - Integration and cross-referencing of multiple data to create value-added products (e.g. erosion map)

  - Multi-temporal data (historical)

Source: NASA

Source: ESDC

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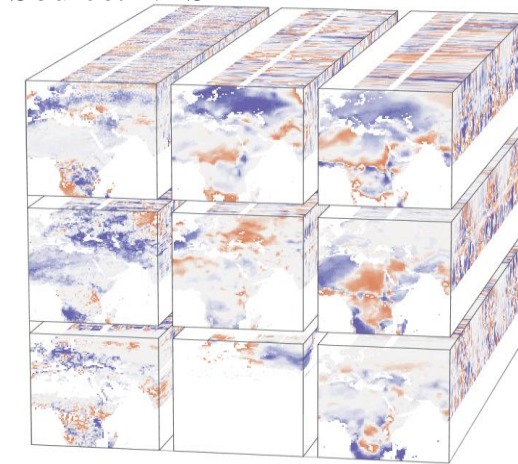
What has changed?

- **A sea of data collection sensors**

  - Smart cities and the Internet of Things

  - 150 billion objects are expected to connect to each other by 2025. A large part of these objects are geo-localized

  - On average, each person interacts with 1000 to 5000 objects in a day

- **Autonomous cars**

  - Different types of sensors: radar, sonar, imaging, Lidar, microphones, GPS, etc...

  - GB of data per second per car

  - Will be both the main sources of acquisition and also users of urban data

Source: readwrite (John Horn)

Source: Uber

What has changed?

- **Collaborative Mapping**

  - Traditional mapping (e.g. OpenStreetMap)

  - Humanitarian (ex. Haiti, Nepal)

- **Citizen sensor**

  - Smartphone to capture the road network (ex. Waze)

  - Next generation GPS smartphones will have centimeter accuracy

  - Social media (reporting events)

Source: OSM

How agencies have adapted

- **Mapping agencies like many organizations are used to transformations:**
  - Military Needs - Land Administration - Geology - Generic Civilians - Paper/Digital - Open Data - ....
- **Modernizing tools to facilitate and accelerate the creation of increasingly accurate and diverse data**
- **Building R&D capacity and collaborations**
- **Facilitating access to these data through web services**
- **In general, this transformation is still data-driven**
  - In the past, the gap between the data and the user was very thin, because the users were experts
  - Today, with democratization, the gap between data and user is widening and agencies must bridge it

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Is a new transition necessary?

- **Bridging the gap between data and users**
  - By listening to users' needs
  - By creating value-added data and services to meet the needs: Which ones?
  - Generic and national approach vs. mixed approach where specific issues are addressed

- **Improve the model where agencies are not the only players**
  - Expand partnerships
  - Take advantage of diversified expertise and innovation
  - Set up hubs for processing (processing close to the data)

- **Modernize the role of the producer of trustworthy data**
  - Standards and interoperability (e.g. diversity of clouds), SATIFYD
  - Guarantee quality vs. authenticity of trustworthy data
    - Is Blockchain a solution

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What are the changed policy drivers?

- Climate change and sustainable development driven needs

- Green and economic recovery from COVID-19

- Digitalization needing geo-statistical integration and coordinated data stewardship

- Need for interoperability among domains – land, marine, space …

- Changing geopolitical landscape

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What are the new roles that mapping agencies must play?

While taking into account the new paradigms:

- Abundance and diversity of data and uses

- Diversity of actors

- New technologies

- New societal and policy issues

- …

Challenges and questions

- How can the needs of base mapping, policy issues, and emerging needs such as near-real-time data for rapid decision making be met?

- What would be the new role of mapping agencies vis-à-vis the national and international geospatial community, and other non-governmental actors?

- With new technologies (e.g., AI) facilitating rapid data creation and increasing demand for geospatial data, how do we ensure data quality, reliability, and ethical use? Can the repeatability of data from these technologies compensate?

- Is the role of interoperability and real-time information even more important? How to ensure a smooth transition from the passive role of authoritative data creator to the active role of decision support?

- Can AI decomplex our products, processes in order to go fast even if it means updating more often? Has data become an instant consumption product, almost disposable?

We prefer more and more an imperfect but recent data and to be able to redo it more often

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THANK YOU

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