Provisional agenda

Day #3 22 Feb

Morning

Joint Working Group/EuroGeographics workshop on policy and legal frameworks for geospatial information management (morning)

Afternoon

Second expert meeting of the Working Group (afternoon)

Provisional agenda

22 February 2024

- Introduction to authoritative geospatial data for crisis
- Breakout groups
- Perspectives and discussions on authoritative geospatial data for crisis
- Summary of discussions and close

Introduction to authoritative geospatial data for crisis and breakout groups

Purpose: Address policy and legal considerations of authoritative data by exploring applications of the fit-for-purpose frame in crisis use-case scenarios, authoritative data for crises as a follow-on activity from the paper "Authoritative data in an evolving geospatial landscape: an exploration of policy and legal challenges"

Introduction to authoritative geospatial data for crisis and breakout groups

Background:

Original tasking by the Committee of Experts:

- Explore and identify policy and legal challenges related to authoritative data, authority and custodianship, **including experiences and practices to address crisis** and based on one or several real-world problems; explain and develop practical solutions leveraging the IGIF and its implementation guide.
- Address issues identified in **making geospatial data available, accessible and integrated for crisis**, e.g. for the Covid-19 pandemic response and recovery."

Preliminary findings: Primary data sources, providers, roles/contributions

- During crises/disasters, various sources and providers contribute/share geospatial data and expertise to support response and recovery efforts:
  - Public sector (Member States including NGIAs, disaster management agencies, emergency response organizations, etc.), civil society, private sector, academia, Indigenous communities, international organizations
  - Roles/contributions include specific types of data (e.g., orthoimagery, buildings and settlements, other thematic areas and population data, crowdsourced data, ground-truthing data) and types of expertise or services (e.g., GIS, analytics, standards)
- Understanding these sources/providers and their respective roles/contributions is key to identifying the policy/legal and governance instruments that govern and enable the provision of fit for purpose geospatial data for crises/disasters

Preliminary findings: What makes data 'fit for purpose' for crises/disasters

… Desired data characteristics for crisis/disasters situation:

1. **Quality** of geospatial information is measured as the difference between the data and the world they represent; data quality is particularly important to ensure the "fitness for purpose" for crises/disasters, i.e., how well the data suits users' requirements. It includes:
    1. **Accuracy:** Data reliably and accurately reflects the **current conditions** or situation. Inaccurate data can lead to misguided decisions and ineffective response actions. Granular data allows for more precise analysis/decisions, especially in complex or **rapidly changing** situations.
        - **Temporal accuracy/data currency**: ensuring data is continuously updated and relevant to reflect the latest information available in times of crisis where situations evolve quickly.
    2. **Completeness**: Data covers all relevant aspects of the crisis or disaster, providing a comprehensive understanding of the situation. Incomplete data may result in gaps in knowledge, hindering effective response planning and execution.
    3. **Validity**: Data is collected using reliable methods and validated to ensure its quality. Valid data provides a solid foundation for decision-making and action, instilling trust

Preliminary findings: *Desired data characteristics for crisis/disasters situation:*

2. **Timeliness:** Near-real-time observations are required to address specific disaster needs (e.g. submarine seismic and volcanic activity and tsunami propagation) and other significant extreme events on land (e.g. fire).

- Consequently, some participating systems will need to provide **real- or near-real-time** monitoring, early detection, and globally integrated observations.

Preliminary findings: *Desired data characteristics for crisis/disasters situation:*

3. **Accessibility**: Data is easily accessible to all stakeholders involved in crisis management and response efforts; ensures that decision-makers, responders, and affected communities can access and use the data when needed

- Open access is often met with IP and Licensing challenges which can be barriers to data availability and accessibility during crisis
- From an end-user perspective, having open access to data can help make quick decisions in situations that are acute and require immediacy
- *Is there an alternate policy/legal mechanism to provide access to data that would normally be private/confidential but that is needed in a crisis situation, e.g., social-demographic data at the individual or individual dwelling level?*

4. **Interoperability:** compatibility with existing systems, formats, and tools used by different stakeholders involved in crisis management…. enables seamless integration of data from multiple sources and facilitates collaboration and information sharing

Preliminary findings: What makes data 'fit for purpose' for crises/disasters

Desired data characteristics for crisis/disasters situation – trade-offs:

- There are trade-offs between the cost to produce and maintain data, and the quantity and quality of the data needed to serve particular purposes (e.g., crisis/disaster)
- All data have strengths/weaknesses across the multiple data characteristics and specific dimensions of data quality…. These also typically involve trade-offs of:
  - Accuracy vs. completeness
  - Timeliness vs. quality (completeness, accuracy) and other qualities
  - Validation vs Privacy

Preliminary findings: End-user perspective (e.g., government EMOs, civil society)

- Users and responders working on the ground, tasked with making rapid, real-time decisions during disasters, face several needs and challenges... end-users includes all consumers of products provided… such as data and services, products in the form of reports and statistics, policies and regulations… (OGC, 2018)
- Challenges include:
  1. **Timely and Accurate Information** to assess the situation, prioritize actions, and allocate resources effectively
  2. **Communication and Coordination** among all entities for ensuring cohesive, efficient response. Challenges may arise due to communication breakdowns, interoperability issues, or competing priorities among different entities involved in the response
  3. **Resource Constraints**: including limited personnel, equipment, and supplies, particularly in the early stages of a disaster

Preliminary findings: End-user perspective (e.g., government EMOs, civil society)

Challenges continued…

1. **Risk Assessment and Situational Awareness**: Responders need tools and methodologies for assessing risks, predicting the trajectory of the disaster, and maintaining situational awareness in dynamic and rapidly evolving environments.
2. **Infrastructure Damage and Access Constraints:** Disasters can damage critical infrastructure, including roads, bridges, and communication networks, restricting access to affected areas and hindering response operations

Preliminary findings: Policy and Legal considerations

- **Data Privacy and Security**: balancing the need for data sharing with protecting individuals' privacy and ensuring data security.
- **Intellectual Property (IP) Rights**: clarifying ownership of geospatial data and IP rights, particularly when it comes to data collected by private entities or through public-private partnerships
- **Licensing:** Clear licensing terms to govern the use of geospatial data, enabling users to share and integrate data openly while respecting copyright and usage rights
- **Interoperability Standards**: Establishing standards for data formats, metadata, and APIs facilitates seamless integration of geospatial data from diverse sources

Preliminary findings: Policy and Legal considerations

- **Open Data Initiatives:** Encouraging or mandating the release of government-held geospatial data under open licenses promotes accessibility and fosters innovation and collaboration
- **Data Quality Assurance:** Policies that outline standards and procedures for verifying the accuracy, reliability, and timeliness of geospatial data to ensure it is fit for purpose.
- **Collaboration/coordination/governance**: Addressing cross-border data sharing requires agreements and protocols to harmonize legal frameworks and facilitate interoperability among different jurisdictions. Partnerships among governments, private-sector companies, and NGOs can tackle some of these obstacles
- **Infrastructure and Technology:** Policies that support the development and maintenance of infrastructure and technologies for data collection, storage, processing, and dissemination – national spatial data infrastructures (NSDIs)

Preliminary findings: Institutional arrangements

- **Clear Mandates and Responsibilities:** Effective governance frameworks establish clear mandates and responsibilities for government agencies, emergency management organizations, and other entities involved in disaster response…. streamlines decision-making processes, ensures accountability for data collection, analysis, and dissemination
- **Interagency Coordination:** Mechanisms to facilitate collaboration, sharing of information, expertise and resources among different government agencies, departments, and organizations responsible for disaster management
- **Legal Frameworks for Data Sharing**: Robust legal frameworks govern data sharing and exchange among government agencies, private sector partners, and international organizations involved in disaster response. These frameworks clarify data ownership, usage rights, privacy protections, and liability considerations, fostering trust and collaboration among stakeholders/partners.

Preliminary findings: Institutional arrangements

- **Standardization and Interoperability:** Governance structures promote the adoption of standards and interoperability protocols for data collection, storage, and sharing across diverse systems and platforms
- **Capacity Building and Training**: Governance mechanisms support capacity building and training initiatives to enhance the technical skills and competencies of personnel involved in data management and analysis
- **Community Engagement and Participation**: Inclusive governance processes involve engaging with affected communities, civil society organizations, and grassroots stakeholders in disaster preparedness, response, and recovery activities. Participatory approaches ensure that local knowledge, needs, and priorities are incorporated into response plans and decision-making processes

Preliminary findings: Institutional arrangements

- **Monitoring and Evaluation:** Governance frameworks include mechanisms for monitoring and evaluating the performance of infrastructure and systems delivering fit-for-purpose data during disasters. Regular assessments, reviews, and exercises help identify gaps, strengths, and areas for improvement, informing policy adjustments and resource allocations to enhance response capabilities over time.

- **Adaptive Management and Learning:** Governance structures promote adaptive management and learning processes that allow stakeholders to respond dynamically to evolving challenges and emerging threats. Continuous feedback loops, after-action reviews, and knowledge sharing platforms enable responders to draw lessons from past experiences and adapt their strategies and approaches accordingly

Breakout Room 1 – Data characteristics and considerations:

Key Questions:

- When thinking about geospatial data for crises, what are the most important considerations?
- What are the key trade offs in terms of data characteristics? For example, timeliness vs. security/privacy considerations (e.g. VGI – OSM, social media)

Breakout Room 2 - Policy/Legal perspectives:

Key Questions:

- What are some examples of policy/legal instruments that have supported the timely delivery of geospatial data, fit for purpose for that crisis? Where/when have you seen these examples used effectively – real-life use cases?
- What are the key elements of these instruments that enable them to be effective?
- What policy/legal barriers may reduce the effectiveness of this data during a crisis?

Breakout Room 3 - User perspectives:

Key questions:

- Who is the end user during a crisis?
- What types of data would they need the most?
- What current challenges might they face in accessing fit for purpose data during a crisis?
- How do they decide what data is “fit for purpose” during a crisis? What elements apply the most, and to whom/when – quality, trust, privacy/security, sources/providers and roles?

Authoritative geospatial data for crisis (Agenda #4)

Breakout groups and open discussion

Authoritative geospatial data for crisis (#4)

Biographie

Dr. Nathaniel K. Newlands is a Research Scientist with the Government of Canada (Agriculture and Agri-Food Canada) based at the Summerland Research and Development Centre in British Columbia, Canada, and an Adjunct Professor in Geography with the University of Victoria, Canada. His research work addresses public-good food-water-energy nexus issues and tackles broad, integrated, complex global problems to help support and advance global sustainable development.

He is the recipient of a prestigious Government of Canada national award, the Public Service Award of Excellence in Innovation. In 2018, he was an invited International Researcher in Residence with Deakin University's Centre for Regional and Rural Futures (CeRRF). In 2019, he was awarded a prestigious international fellowship from the Organization for Economic Co-operation and Development's (OECD's) Collaborative Research Program (CRP) to collaborate with the Australian Government's Bureau of Agriculture and Resource Economics (ABARES).

He is author of the book, "Future Sustainable Ecosystems: Complexity, Risk, Uncertainty" published by Taylor and Francis LCC in 2016, and a lead editor and author of "Evaluating Climate Change Impacts" CRC Press. Nathaniel is a deputy-chief of a Global Expert Working Group on Ecosystem/Nature-based solutions of the Food and Agriculture Organization of the United Nations (FAO). Co-chair of the Group on Earth Observations (GEO)'s Disaster Risk Reduction Working Group and Subgroup 2 Lead on UNDRR Sendai Framework Monitoring and Global Assessments. He is member (previously Vice-Chair) of the American Statistical Association (ASA)'s International Relations Committee, and President-Elect of the International Environmetrics Society (TIES).

UN-GGIM UNITED NATIONS COMMITTEE OF EXPERTS ON GLOBAL GEOSPATIAL INFORMATION MANAGEMENT

NGI Nationaal Geografisch Instituut — IGN Institut Géographique National

UN-GGIM EUROPE | UNITED NATIONS COMMITTEE OF EXPERTS ON GLOBAL GEOSPATIAL INFORMATION MANAGEMENT

eurogeographics

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Canada

Fit-for-purpose geospatial data for crises: integrating EO and AI

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(Summerland, British Columbia, Canada)

Contributors:
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(Pre-recorded virtual presentation):
2nd Expert WG on Policy and Legal Frameworks for Geospatial Information Management, United Nations Statistics Division (UNSD)

About me…

Sustainable Ecosystems (Food, Water, Energy)

Predictive Analytics, Data Science

- Research Scientist
  Summerland (British Columbia
  Agriculture and Agri-Food Canada)
- Adjunct Assoc. Professor 2014-
  (Geography, University of Victoria/UVic)
- Adjunct Professor 2008-2016
  (Statistics, University of British Columbia/UBC)

International Relations in Statistics,
American Statistical Association (ASA)

President-Elect, The International Environmetrics Society (TIES)

Deputy-Chair, UN-FAO Global Expert Working Group on Ecosystem/Nature-based Solutions

Co-chair of Group on Earth Observation (GEO)'s Disaster Risk Reduction (DDR) Working Group

Podcast: AI and agriculture:
https://trustmakers.ca/ownthescience/2021/11/05/ais-take-up-farming/

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https://profils-profiles.science.gc.ca/en/profile/dr-nathaniel-k-newlands
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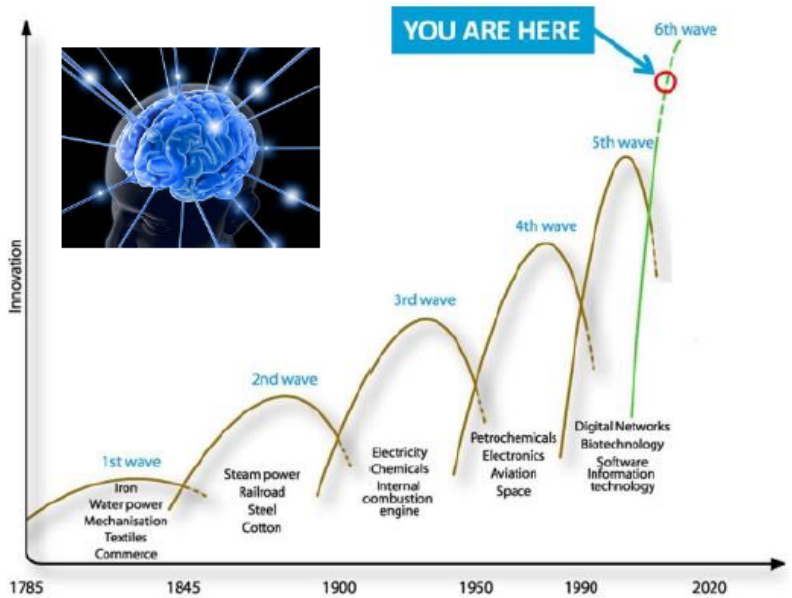
Harnessing the predictive power of information

"A transition from linear to exponential growth of human knowledge has taken place"

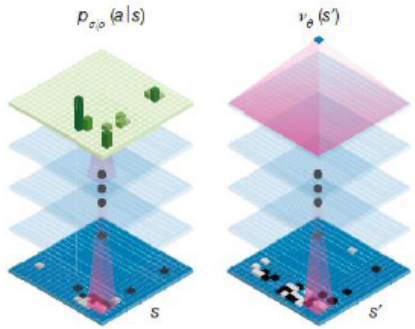


1940s, knowledge doubled every century
1990s, doubled every 25 yrs
Currently doubling every 13 months
Soon, every 12 hrs?

90% of the world's data today was generated during the past 2 years, with 2.5 quintillion bytes of data (10^{18}) added each day…

Google DeepMind

Policy network Value network



AlphaGo: value/policy networks

IBM Watson: Deep-learning cloud-based/cognitive apps/APIs

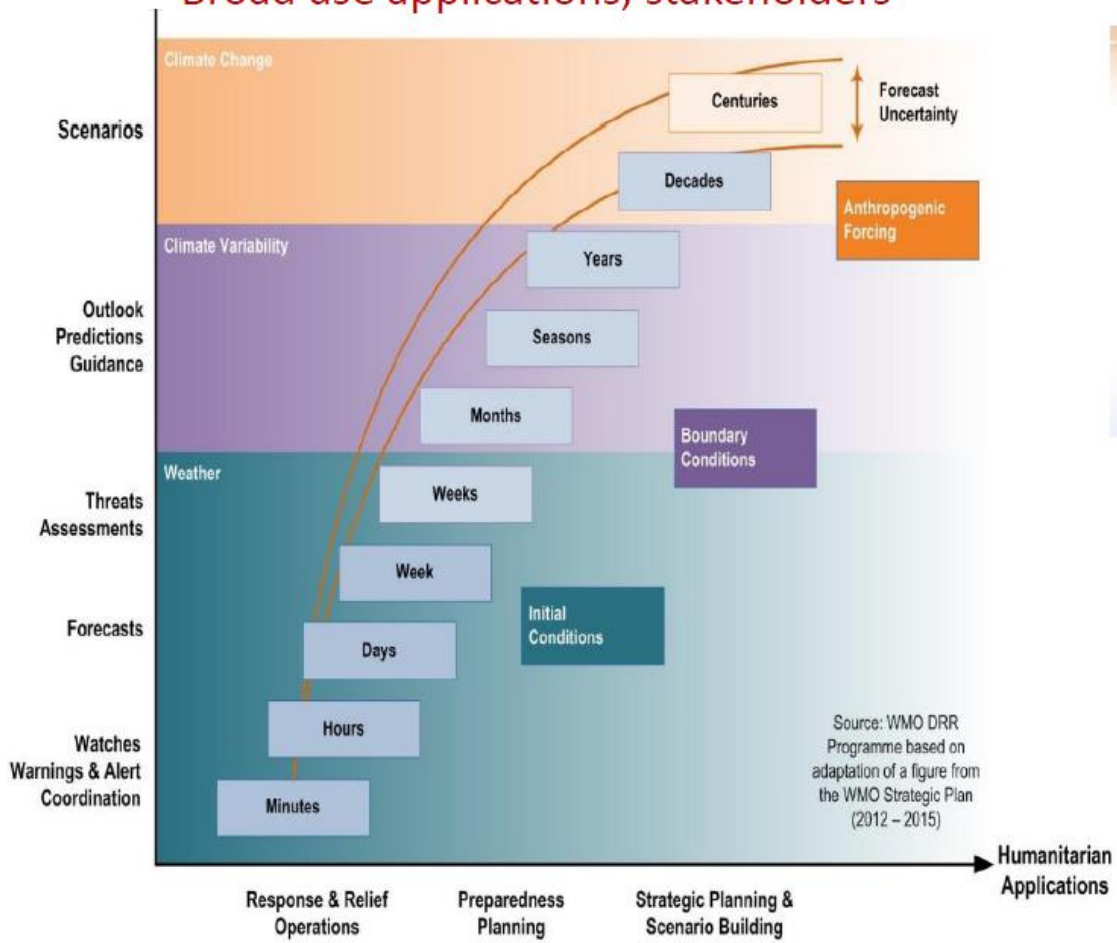
Open, geospatial data, infrastructure

Precision agriculture (automated data collection, analytics)

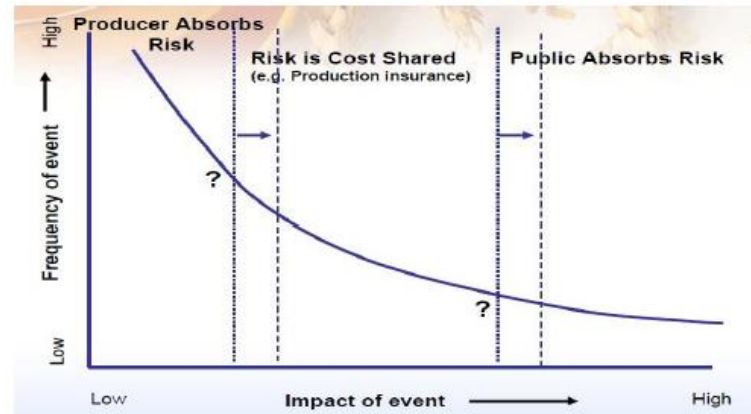
Enhanced decision making and foresight?

- Complex changes, difficult to anticipate, understand, or plan ahead (needs differ by immediacy and safety risk)
- Cascading, systemic risks: climate change, extreme weather events, disease and pest outbreaks, infrastructure, human health
- Early Warning for All (EW4All) of World Meteorological Organization (WMO); GEO is an implementing partner

Broad use applications, stakeholders



Private-public risk sharing



Multi-hazard, vulnerability, impact data

Fit-for-purpose

- designating data as authoritative (trusted, official) is strongly dependent on the intended use of the data and ; multiple purpose(s) may differ between users, with new use-cases evolving over time with technological, AI/ML innovations (training/validation), big data (machine-readable)

- difficult to identify EO authoritative data among the proliferation of data, and/or best integration for research vs. operational use

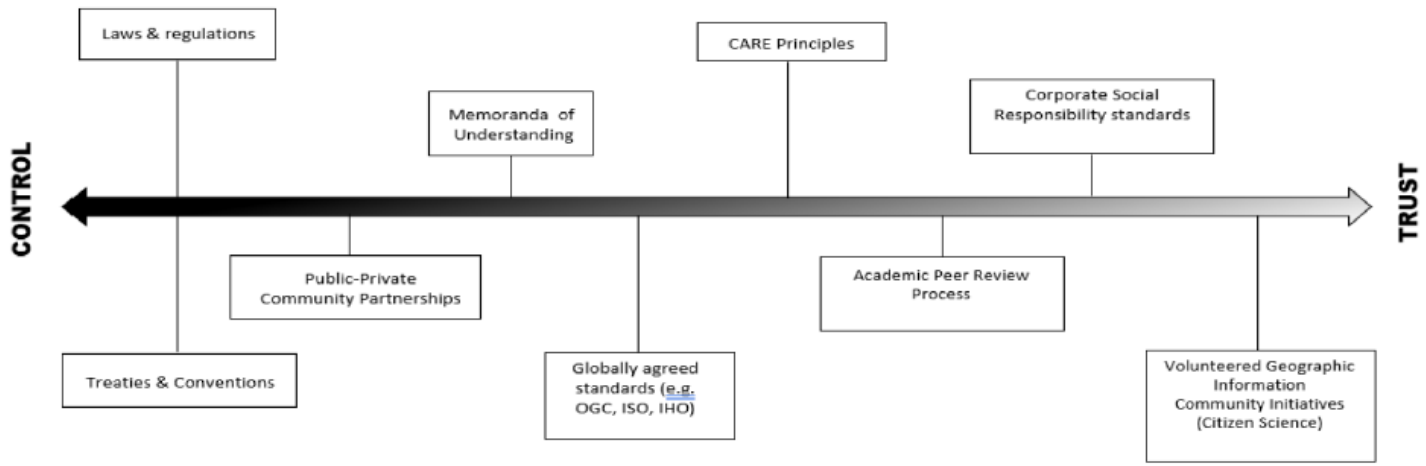


Figure 1. Continuum of control versus trust seen in authoritative data governance.

Source: Authoritative Data in an Evolving Geospatial Landscape: An Exploration of Policy and Legal Challenges
United Nations Committee of Experts on Global Geospatial Information Management Working Group on Policy and Legal Frameworks for Geospatial Information Management, E/C.20/2023/16/Add.2 August, 2023 (page 34)

Additional: Newlands, N.K. 2022. Big Data Governance, Technology, and Implementation in Climate-Resilient Societies | SpringerLink

Key operational rules

Safeguards to data access?

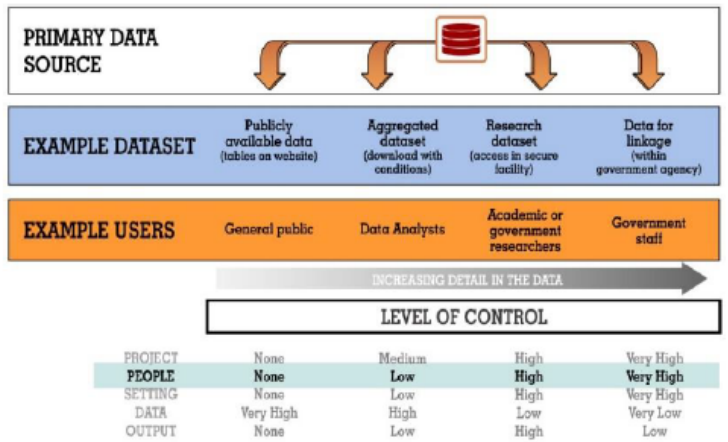
Data custodians: maintain responsibility for the data they collect

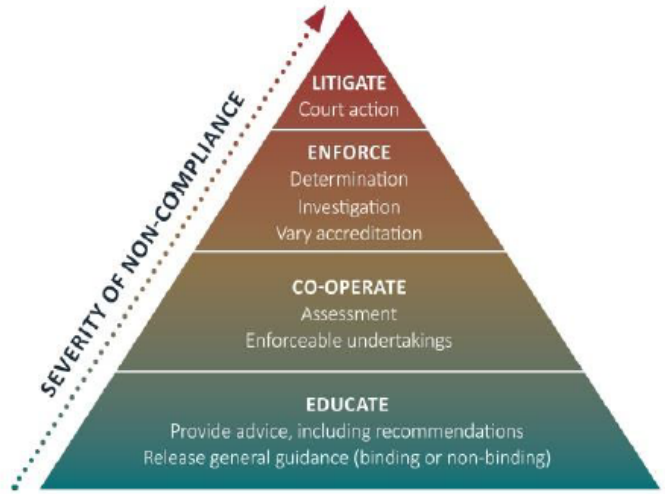
Accredited Data Authorities: technical expertise which could assist data custodians

Trusted users: accredited after demonstrating safeguards for data handling

Streamlined (mandatory) data sharing and release agreements:

(Projects, People, Settings, Data, Output)



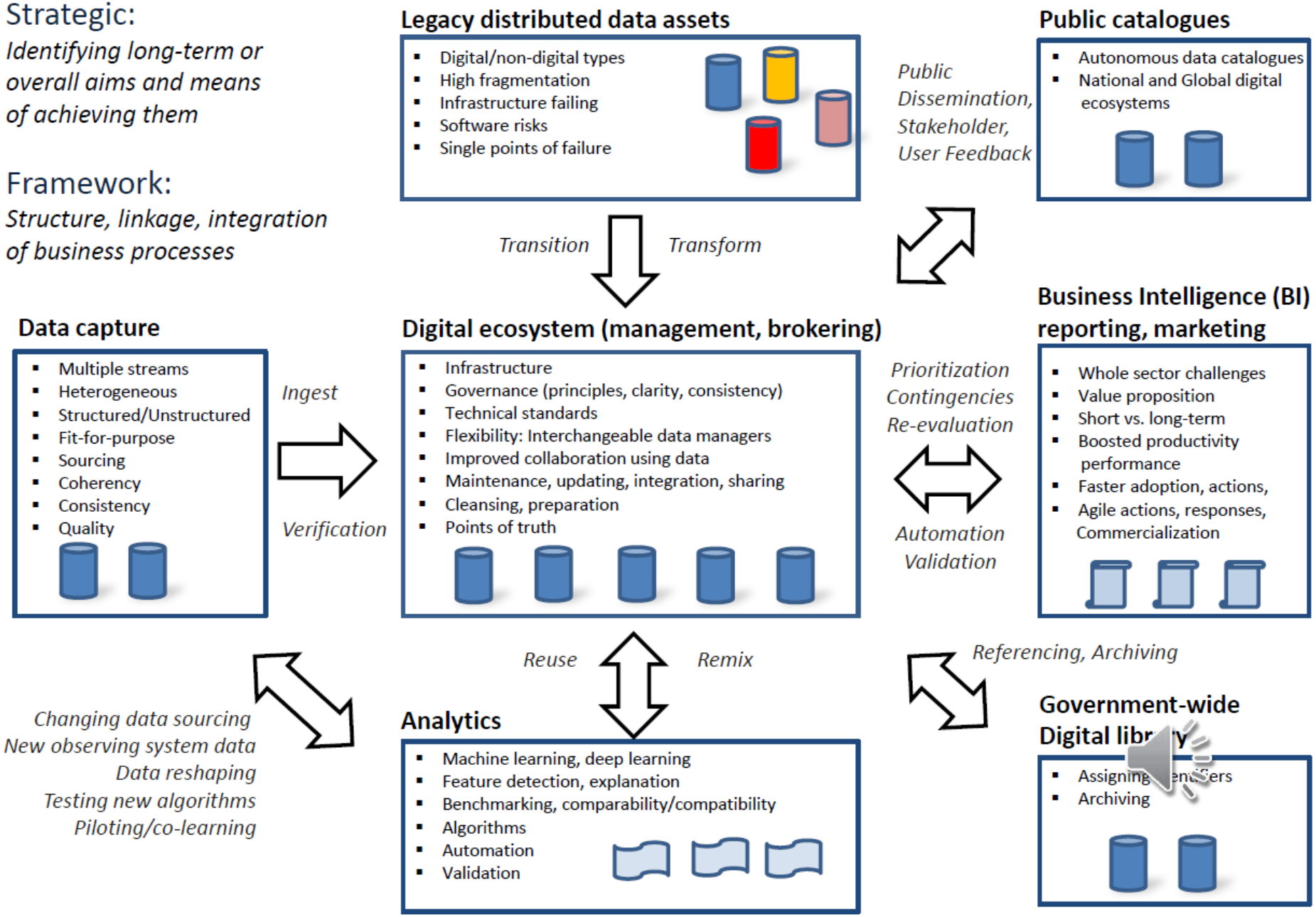


Directive on Automated Decision-Making (April 2019): to ensure that Automated Decision Systems are deployed in a manner that reduces risks to Canadians and federal institutions, and leads to more efficient, accurate, consistent, and interpretable decisions made pursuant to Canadian law

Conceptual 'big data' framework

Strategic:
Identifying long-term or overall aims and means of achieving them

Framework:
Structure, linkage, integration of business processes



Group on Earth Observation (GEO)

- **Intergovernmental partnership** (hosted by WMO): 114 governments, 140 inter-governmental, international and regional organizations, 19 private sector and civil society organizations and thousands of world-leading scientists
- promotes **open, coordinated, sustained data sharing and infrastructure** for better research, policy making, decisions, actions
- **GEO Disaster Risk Reduction WG** created to develop and implement a coherent and cross-cutting approach to advance use of EO data in support of national DRR and resilience efforts
- **engaging and collaborating** with all stakeholders, processes, identifying resources to support EO DRR initiatives
- **GEO post-2025 Strategy (Earth Intelligence) – fit-for-purpose operating model:**

  global partnership where data providers and users from all communities work together, leading to better coordination, greater inclusion, reduced duplication, and faster action

Addressing EO Data licensing …

- **Data licensing** has emerged as a factor that is holding back data sharing - complex End User License Agreements, include restrictions on use and require close legal review

- **2013 G8 Open Data Charter (ODC)** (170 governments, organizations) - policies and practices that enable governments and central statistical offices (CSO)s to collect, share, and use well-governed data, to respond effectively, accountably

  Open by Default;
  Timely and Comprehensive;
  Accessible and Useable;
  Comparable and Interoperable;
  For Improved Governance and Citizen Engagement
  For Inclusive Development and Innovation

- **EO data licensing guidance** (GEO Data WG, 2023) promoting the use of standard open data licenses to tackle legal barriers and uncertainty currently inhibiting open data usage (based on FAIR Principles, Open Science initiatives, and the GEO Statement on Open Knowledge).

- Three types of standard open data license (if no restrictions exist, CARE Indigenous Data Governance) should be one of:

  Creative Commons Zero 1.0 Universal Public Domain Dedication (CC0)
  Open Data Commons Public Domain Dedication and License (PDDL) v1.0
  Creative Commons Attribution 4.0 International (CC BY 4.0)

Policy and legal barriers, enablers

- Data quality management – governance strategies, operational systems (long vs. short-term)
- Limited access to free/affordable, historical / near-real time (NRT) “high-resolution” data
- Use-case uncertainty and data limitations (e.g. spatial resolution, dense vegetation, coastal areas, topography)
- Innovation/IT infrastructure (automation vs. humans-in-the-loop; AI and Quantum-ready)
- Lack of personnel, technical capacity to use and process EO data (reliability, privacy)
- Users expect access to a ready-to-use product, transformed from the raw EO data into usable information (inclusive/equitable, participatory co-design for verification)
- Tools and infrastructure needed to process and handle such data can be beyond the capacity of some government entities
- Political and economic context, bureaucracy

Cerbaro M, Morse S, Murphy R, Lynch J, Griffiths G. Challenges in Using Earth Observation (EO) Data to Support Environmental Management in Brazil. *Sustainability*. 2020; 12(24):10411. https://doi.org/10.3390/su122410411

INTERNATIONAL CHARTER SPACE & MAJOR DISASTERS

A worldwide collaboration through which satellite data are made available for the benefit of disaster management

- *initiated by ESA and Centre National d'Etudes Spatiales (CNES)*
- *operational since November 2000*
- *17 members include Canadian Space Agency (CSA)*

Mechanism to make critical space assets available to communities affected by disasters, with EO data free of charge enabling coordination of relief efforts

- Provides critical assistance and intervention to national emergency government agencies by external parties

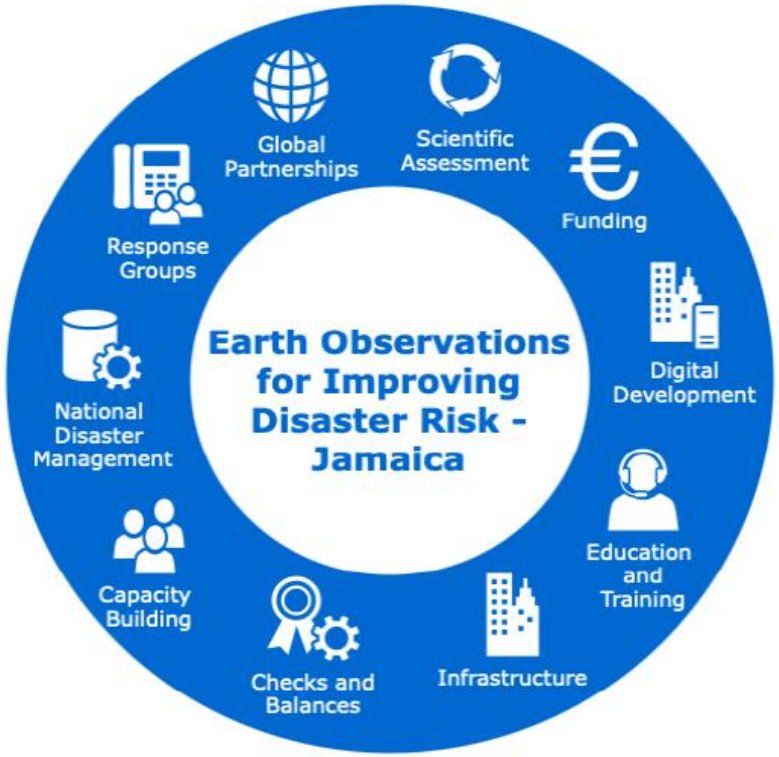
- Sovereignty, autonomy – users initiate requests, not data providers (automated AI algorithms?)

- Partners, associated bodies, experts could serve as a decision-making body where operations are severely impacted (will and consent)

- Activation is limited to the urgent disaster situation (< 10 d)
- Response phase only (not mitigation, preparedness, recovery)

- Storms, floods, landslides, wildfires and more…
- Policy-linked intervention: systemic vs. sector-specific impact assessment (context relevant) (e.g., agriculture) (privacy safeguards, verification for law enforcement)

From Big Data to Better Decisions: *DRR and Climate Resilience for Small Island Developing States (SIDS)*



Virtually no contribution to climate change, but highly vulnerable (65 million people, < 1% GHG's)

challenges with regards to equity and inclusion of vulnerable communities

need for bottom-up community engagement, addressing knowledge gaps, data needs empowering youth, capacity-building, co-learning

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UN Office for Disaster Risk Reductions (UNDRR) has been calling for integrated approach to address increasingly **systemic nature of disaster risk where events overlap and interplay with multiple risk drivers**

GEO DDR WG is teaming up with stakeholders in Jamaica / Barbados / Caribbean to pilot DRR EO initiatives

fit-for-purpose needs, address multi-sectoral systemic/cascading risks, future scale-up

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Thank you!

For more information, please contact:

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Canada

Summary of discussions and close

THANK YOU