EMGCP Meeting – Spring 2025

May 15, 2025 | 13:00 – 14:30 Emergency Management Geomatics Community of Practice (EMGCP)

Attendees	DFO, DND (CJOC), DND (MCE), ECCC (NEEC), ESDC, ISED (Tourism), NRCan (EGS), NRCan (GeoDiscovery), PS GOC (Government Operations Centre), PS REID (Resilience and Economic Integration Division), PSPC (Real Property Services), RCMP, StatCan (Strategic Data Management), TC EP (Emergency Preparedness), TC TDG (Transportation of Dangerous Goods), TC TEA (Transportation & Economic Analysis)
Location	Hybrid (580, Booth Street, Ottawa, ON and Microsoft Teams)

1. Welcome and Introduction 13:08-13:15

Presenter: Darlene Tran (PS GOC)

Description
Welcome and overview of today's meeting agenda.

1.1. Call to Order

Description
The attendance is captured by in-person attendees standing up and introducing themselves to the group, as well as compiling the list of attendees online.

2. Emergency Geomatics Services (EGS) 13:15-13:35

Presenter: Simon Tolszczuk-Leclerc (NRCan EGS)

What is the Canada Centre for Mapping and Earth Observation (CCMEO)?
- Mandate is to provide Canadian governments, researchers, businesses, communities, and individuals access to high quality, authoritative, and interoperable geospatial data and methods to meet a growing range of needs and applications.
- It is much more than just the EGS team
    - Includes Satellite Data Reception and Archiving on the Earth Observation Data Management System (EODMS), Core Foundational Data, Scientific Research, Artificial Intelligence, Policies, Standards and Program Integrity, Geo.ca, Open Geospatial Applications and Technologies, Geographical Names Board of Canada, Data onboarding and dissemination, National Air Photo Library and the Canada Map Office.

Emergency Geomatics Services (EGS)
- EGS is a critical service based in CCMEO providing satellite-based mapping and geospatial analysis to support emergency disaster response and monitoring
- EGS enhances situational awareness by providing accurate, near real-time, satellite-based geospatial information
- Several stakeholders can activate our emergency management plan to receive support
- Mandate is to support fellow Emergency Management (EM) partners
    - That support is mostly offered through the production of value-added products transformed using satellite imagery, with most of that imagery being radar
- Services can be activated by most stakeholder members of EMGCP
    - As much as we all know how important it is to action emergencies as quickly as possible, it's even more important to follow the proper chain of command in order to make sure there is no confusion and all necessary stakeholders are informed.

History of Activations
- More than 70 disasters since 2004, with the first activation of EGS being the 2004 tsunami in the Indian Ocean
- EGS became an official critical service in 2014
- Data shows that there are now more floods than there used to be
    - Estimated trend also shows that the insured losses due to extreme weather events in Canada between 1983 and 2021 has been trending upwards at an increasing pace

Satellite Usage
- While RCM is the most used satellite resource within the EGS team, other satellites and constellations such as Sentinel, Landsat, Capella, Planet, Maxar, Satellogic and BlackSky are also used
- The EGS team also has access to imagery provided by the International Charter on Space and Major Disasters as a value-added producer if the former is activated by the GOC

NRCan Satellite Ground Segment
- National ground segment for civilian RADARSAT data
- Three stations make up a network to support various satellite missions, including RCM and RADARSAT-2
    - Gatineau, Prince Albert and Inuvik
- Hosts the national Radarsat archive on the EODMS

End-to-End Workflow for Near Real-Time Emergency Mapping

- Objective is to push value-added products in under 4 hours if possible
- Two different streams
  - Open water flooding
  - Ice analysis
- Once the data has been converted to vector, it is pushed online and is available as a feed

External Stakeholders

- If stakeholders are interested in getting added to the distribution list when new products are added, reach out to the NRCan EGS team by email at EGS-SGU@nrcan-rncan.gc.ca
- EM Stakeholders are also encouraged to reach out to the EGS team if they have comments or suggestions

Future Research and Development (R&D) Directions

- Development of a rapid damage assessment method from Synthetic Aperture Radar (SAR) imagery
  - Jasper in 2024: RCM's polarimetric capabilities allowed EGS to distinguish between destroyed and intact structures
  - Capella's high-resolution radar validated RCM's imagery interpretation
  - An optical image, captured 8 days post-wildfire, visually confirmed the results
  - The intent is to push this initiative further in the near future to increase quality
- GeoAI for flood Mapping
  - AI and machine learning are speeding up Earth observation data analysis, deep learning models can reduce the flood mapping processing time by 80%
  - This accelerates processes like flood forecasting and post-disaster assessments, reducing the time needed from weeks to hours or minutes, enabling quicker, more accurate decisions
  - EGS is aiming to increase speed and accuracy by leveraging GeoAI in their processes
- Flood Depth Mapping
  - Thanks to investments in Flood Hazard Identification and Mapping Program, it should be possible to map flood depth operationally across most of Canada
  - There is still a gap between the prototype and the operationalization of this initiative
  - This will help inform decision making for personnel on the ground

Final Thoughts

- The EGS team services can be requested via a request for federal assistance transmitted to a stakeholder's regional Public Safety Canada office
- CCMEO provides a wide range of expertise, from satellite receiving stations to near-real-time mapping, imagery archiving, on demand InSAR processing and GeoAI research and development capacity
- EGS continues to invest in the development of its monitoring capacities to better support its various clients in response to natural disasters

2.1. Q&A

Q: Is the rapid damage assessment method only used for structures and buildings?

A: One project was started under the name of "ScanFire". The goal is to use standard coverage imagery with compact polarization at a 30m resolution (30M CP) to track fires. There would be one background monitoring mode and one active mode for when a fire is near a community and becomes interface. As a fire moves in closer into a city, the focus would switch to spotlight with a higher resolution. The team is not there yet but it is a future development.

Q: What does an activation mean and entail?

A: Public Safety Canada is responsible for overseeing emergency management (EM) at a national level. Each department has their own plan based on that master plan. There is Canadian Forest Service (CFS) and Radiological teams for example. Whenever a new event occurs, the Government Operations Centre (GOC) reaches out to NRCan EGS to activate our emergency services in response to that specific event.

Q: Do departments have to pay for those services?

A: There are a couple of different aspects to consider. For the EGS mapping services, those are completely free. For an APL, it is more difficult to say. Some require payment for access, while some are accessible through EODMS. When people in the Federal Government buy imagery through NMSO, it becomes available to other stakeholders in the Government of Canada. You only need NMSO access, which is not obtained by default by creating your account, you simply have to request that access for commercial imagery.

Q: Is there an endpoint contact person if we need something during a surge operation?

A: When an event occurs, the GOC and the Public Safety Canada Regional Offices (ROs) will get involved and may reach out to EGS if it is flood related. The mapping ends when the incident is no longer critical or closed. An archive is available online, which includes analysis performed for the last year. The EGS team monitors the shared inbox as much as possible, but it is important to note that the EGS team doesn't have full 24/7/365 capabilities, and are normally active between 8:00-20:00.

Q: To ensure data interoperability, are there any APIs worth adopting?

A: If you run an operational dashboard, we have web services such as OGC and ESRI REST services available. Those can be used directly within a mapping dashboard. Layers available include the past 3 days, the past year and the whole archive.

3. UN-GGIM Paper – Authoritative Geospatial Data for Crises 13:35-13:50

Presenters: Kristine Hirschkorn and Madeleine Martin (NRCan)

Introduction

- Before, during and in the aftermath of a crisis, timely access to authoritative fit-for-purpose geospatial data is critical for coordinating an effective response.
    - We tend to think of crises in these three phases
- Reliable access to geospatial data throughout these crisis phases is enabled by targeted legislation, regulation and policies situated within a robust national policy and legal framework.
- When responding to a crisis response, trade-offs may arise as priorities are realigned to reflect the urgent need for timely and available data, particularly in jurisdictions lacking enabling laws and policies.
    - Characteristics that make data fit-for-purpose can shift as crisis evolves from one phase to the next.
- This paper serves as an unofficial follow-up to a previous paper, which provided a very high level look into authoritative data
- Data is considered authoritative when it is fit for the purpose that it is intended for
    - There's a notion of trust that a set of data is authoritative
- Control vs Trust spectrum/continuum
    - Control: Tightly controlled or formally codified instruments developed with government involvement or oversight
    - Trust: Less formalized

Exploring Trade-offs During the Response Phase

- Crisis scenarios often give rise to a need to reprioritize traits (characteristics) used to designate data as authoritative.
- During a crisis, authoritative data must above all be easily accessible and reliable, capable of supporting real-time decision-making, and adaptable to various scales and scenarios
    - Having access to data with these characteristics ensures data users (including responders) can effectively analyze the situation, plan interventions, and manage resources in a timely and informed manner.
- When data accessibility and timeliness become the preeminent considerations, users may need to adjust criteria used to identify data as fit-for-purpose.
- Prioritizing accessibility and timeliness may involve compromises in other data characteristics or principles, such as quality or privacy and security.

Minimizing Trade-Offs: Laws, Policies, Institutional Arrangements

- Pre-crisis, law and policymakers have the opportunity to establish robust governance frameworks, including enabling policy and legal tools and institutional arrangements, in preparation for worst-case scenarios.
    - Establishing robust governance frameworks before they are needed can help to minimize trade-offs in data characteristics when a crisis arises.
    - A "robust" governance framework includes provisions for intellectual property, data privacy and security, liability, legal interoperability, licensing, data quality and equity.
- In the response phase, these pre-established enabling legal and policy tools and institutional arrangements are "put to work", facilitating access to fit-for-purpose data in real time.
    - During this phase, it may be necessary to implement temporary emergency or non-standard laws and policies to expedite data sharing by providing targeted/limited access.
- Post-crisis, extraordinary legal and policy measures introduced to provide limited targeted access to data should be reversed, with steps taken to restore the rule of law to baseline "pre-crisis" status where necessary.
    - Policy makers can also conduct impact assessments of the response efforts. This can include an appraisal of impacts to humans, resources and infrastructure, with demographic data providing insight into response outcomes for the broader population as well as for marginalized groups.
    - There is also an opportunity to observe which types of laws and policies are produced an enabling versus hindering effect on facilitating timely data access and initiate any necessary adjustments.

Exploring User And Producer Perspectives Through Case Studies

- Part III includes 4 case studies of policy and legal instruments or institutional arrangements that facilitate timely data access in a crisis, highlighting the distinctive data producer and user roles
    - International Charter: Space and Major Disasters
    - Association of Southeast Asian Nations (ASEAN) Leaders' Declaration on Disaster Health Management
    - Humanitarian Data Exchange (HDX)
    - Flood Mapping in Canada

Guidance For Decision Makers, Providers and Users

- Pre-crisis
    - Data Sources and Providers
        - Have potential sources and providers of authoritative data during a crisis been identified?
        - Which categories do providers fall into? (i.e.: Government departments or agencies, bilateral/multilateral organizations, private sector, etc.)
    - Data Characteristics
        - Have data characteristics that make the data fit-for-purpose of responding to a crisis been identified?

    - Legal and Policy Considerations
        - How do existing laws define / affect the following data characteristics? Data privacy and security, intellectual property, licensing and legal interoperability, liability, demographic data
    - Institutional Arrangements
        - Which of the following have been or could be established to facilitate timely sharing of fit-for-purpose data during a crisis? Collaborative partnerships (inter-agency organization), international standards collaboration and validation frameworks for volunteered geographic information (VGI) sources
- Response
    - Considerations for Users
        - Are available fit-for-purpose data sources being successfully harnessed?
        - If critical data gaps emerge in real-time, are steps being taken to minimize trade-offs in data characteristics when seeking alternate data sources?
        - Do users have a framework for identifying alternative fit-for-purpose datasets when gaps in needed data emerge?
        - Are responders aware of any deficiencies in the quality of datasets they are using? Do they understand the margins of error and associated risks?
    - Considerations for Providers
        - Are data providers available to offer technical support and guidance to responders as needed?
        - Where applicable, are providers adhering to agreed upon terms for providing data that is timely, up-to-date, and adheres to established quality standards?
        - For government providers only: Have the legal criteria to activate emergency response measures granting special access to sensitive or protected data been met?
- Post-crisis
    - Winding Down Emergency Measures
        - Have emergency law and policy measures introduced or activated during the crisis been appropriately wound down?
        - Have rights, privileges or protections that were suspended to facilitate data access during crisis response been restored?
            - For example, if security and privacy protections were temporarily suspended to enable limited and targeted access to critical data under emergency conditions, have these measures since been restored?
    - Reviewing Lessons Learned
        - Did data providers and users adhere to applicable laws, regulations and policies in their handling of critical authoritative data harnessed for crisis response?
        - Did government providers and users fulfill their established roles and obligations during the response phase?
        - Did responders face barriers to accessing critical data during the response phase? How can gaps in data access be mitigated in future crises?
        - Did responders make any trade-offs in data characteristics during the response phase due to data availability/timeliness? If so, what was the nature of these trade-offs, and how can they be avoided or mitigated in future crises?

Invitation for Feedback

- Feedback is encouraged, but as soon as possible
- Participants are asked to consider:
    - The paper's representation of trade-offs in data characteristics that responders face during a crisis
    - The inclusion of relevant legal and policy considerations and tools for geospatial data producers and users across all crisis phases
    - The applicability of guidance included in the "Checklist for Data Providers and Users" to a variety of national contexts and crisis scenarios
    - The paper's overarching consideration of both the data user and data provider perspectives, as well the perspectives of both state and non-state entities involved in crisis response, in addition to pre and post-crisis activities.
- Feedback can be provided to nrcan.un-ggimsecretariat-secretariatun-ggim.rncan@canada.ca no later than 7 May 2025.

3.1. Q&A

Q: Where can we find the paper?

A: Please reach out to the team as the paper is still currently in draft, using the following email address: nrcan.un-ggimsecretariat-secretariatun-ggim.rncan@canada.ca

4. Canadian Geospatial Interoperability Framework for EM 13:50-14:10

Presenter: Ryan Ahola (NRCan)

Context

- Primarily interested with standards and interoperability
- Work is done in the background, but aims to support a lot of the work that is done at the federal level in EM
- Collaboration with MB that is mostly interoperability focused

- Geospatial is critical for emergency management and effective coordination
- Emergency managers have a critical dependency on data from partners (e.g.: government, non-governmental organizations, etc.). Inconsistencies with multiple aspects of data provision make it difficult to make decisions during emergencies**.**
- Goal of providing partners with options to implement interoperable approaches to simplify use of geospatial data during emergencies.

Examples of challenges

- Diverse data formats
- Definitions/Semantics/Jargon
- Assessing data quality
- Data timeliness
- Authoritative data
- Data sharing/distribution limitations
- Interoperability capacity

Framework

- Framework to act as reference material for emergency management partners. Will provide options, not requirements
- Supports:
    - Understanding of what interoperability means
    - Options for the standards-based techniques that can be used to support consistent use of geospatial information
    - An ongoing Canadian approach to developing interoperability guidance for emergency management
- Leadership from NRCan with Public Safety Canada endorsement. Requirements from provincial/territorial emergency management organizations will be incorporated as necessary.
- Hoping to have a fairly complete draft to present to the community.

Envisioned Contents

- Vision and Purpose: High-level objectives
- Context: Background on the concepts of geospatial, interoperability, and why this is important for emergency management. Describe the problems that exist today with effectively using geospatial for emergency management.
- Benefiting Organizations: Identifying groups that the Framework aims to serve.
- Interoperability Concepts: Overview of concepts that are core for the Framework (e.g.: geospatial, interoperability, files, services, data quality, etc.). Focusing on how these ideas will be used.
- Review and Maintenance: Timeline for reviews of the Framework and publication of updates.
- Glossary: Definitions for terms used in the Framework. More concise than the “Interoperability Concepts” section
- References: List of references used in the Framework
- Theme-Based Reference Materials: Options-focused content that will make up the Framework. Complete structure will evolve.
- Aiming to achieve minimum viable interoperability, which is the minimum level of interoperability that emergency managers should strive for, for a particular theme.

Feedback

- Hoping that this initiative benefits everyone in this community and ensuring it makes sense for everyone
- Fairly early draft at the current moment. Once an initial set is available, would be ready to obtain more feedback from external sources.

4.1. Q&A

Q: Have there been any thoughts into the integration of AI in this initiative?

A: What interoperability considerations should be made regarding AI. Haven’t thought about it just yet.

Q: In terms of interoperability, is there any way CRC could position itself to open itself to open themselves up for collaboration?

A: It’s very helpful to understand the requirements. We also have participation in ISO (international standard). Happy to have conversations with groups who are happy to collaborate. Work with OGC as well when new standards are being conceptualized.

Q: When will the draft be available?

A: It should be available soon, but we are willing to share to stakeholders who may be interested. It’s just not ready to share broadly just yet.

5. Canada Structures Dataset Overview 14:10-14:30

Presenter: Mike Ballard (PS)

Opening Remarks
- Part of the Resilience team within Public Safety Canada
- It is important to note that there is a distinction between flood models and flood maps
- Focus of the team has been on building a national dataset

Introduction
- Goal of this project was to create an open dataset to be shared on Geo.ca and available for use by everyone
- The dataset is made up of three separate datasets, who all have their own specific limitations
    - OpenStreetMap (OSM) is one of the three foundational datasets, and is actually really good even as a VGI platform
    - StatCan (ODB) data is a snapshot in time from data received directly from municipalities, but some gaps remain
    - Microsoft (MSB) generated a dataset using rudimentary AI, but polygons are the least precise of the three
- Combining datasets to ensure gaps are covered by another dataset

Combining Sources
- Points are attributed for polygons and assess which ones are the highest scoring for that specific one to be kept in the resulting dataset.
- Where there are overlaps of building polygons across datasets it will result in only one of the provided building polygons being preserved.

Initial Canada Structures Set
- Esri has a nice community map of Canada, but it can only be viewed as a basemap, meaning buildings cannot be interacted with.
- The Initial Canada Structures dataset is made up of just over 14 million building footprints across the country
    - 6.5 million of those are from the Microsoft Buildings Footprints layer
    - 6.2 million are from the OpenStreetMap dataset
    - 1.3 million are from the Open Database of Buildings created by StatCan

Adding Building Height
- Where available, 3D data was added using LiDAR
    - This helped identify buildings where 1 floor could flood, but the 27 floors above would not be at risk
    - Most polygons have a height, but some don’t

Quality Control Analysis
- Many problems were encountered as the dataset was being developed, such as buildings showing up in water, in the middle of farm fields or on top of mountains.
- Their shape was also a good indicator that those were not real structures and just errors

Steps
- Attaching Key Features
    - Distance was measured using Hausdorff distance
    - Every shape was scored to compare them to residential buildings
    - Random Forest decision tree on whether a building is positively identified as an accurate building or not
- Classifying Errors
    - In total, over 68,000 errors were identified
        - Very small portion of the total dataset
        - Lots of errors were found in Winnipeg and the surrounding areas
    - Each building has metadata regarding where the info was pulled from

Conclusion
- This dataset is currently available for consultation and use on the GOC Geomatics webmap

5.1. Q&A

Q: Is there any way data for Newfoundland and Labrador to be added to the dataset?

A: Currently hoping to further collaborate with the Federal Government to establish a community in order to encourage data additions.

Q: What are challenges linked to interoperability?

A: The main challenge is the Canadian Government open data license.

Q: What about indigenous communities?

A: Microsoft did a full collection of buildings in Canada, but there has not been any specific coordination with First Nations directly as of yet.

Q: How many attributes are available?

A: There are a few attributes, such as building number, what dataset the structure was pulled from, its height (if available) and two more. There are no street addresses included. We are currently hoping to tag if a building is residential, commercial or industrial, which would help increase the usefulness of the dataset. We also have a similar desire to add the year the structure was built as well.

Q: When doing damage assessments, this type of product is greatly needed due to municipalities having different capabilities. Will there be ongoing development of this initiative?

A: Yes. We have a decision tree algorithm with 3 inputs that we can use to create a model that can look at weird polygons and assess what they are. Looking at proximity to other buildings is also a helpful metric. There is a long list of other things that can be done to improve the accuracy of the dataset going forward. We will be looking at ways of predicting what the buildings are using AI.

Q: How does this dataset compare to DMTI?

A: We believe this dataset to be the most accurate. The most consulted dataset was the community basemap of Canada, which is essentially Esri republishing data from many communities across the country.

6. Adjournment 14:30-14:32

Presenter: Darlene Tran (PS GOC)

Thank you to everyone who were able to make it to this meeting in person and to everyone who joined online!

The next meeting is scheduled to take place on August 20th, 2025 at 1pm virtually on Microsoft Teams.

Feel free to reach out to Darlene Tran if you have any topics you would like to present at the next meeting.

Wishing everyone a great summer!