Government of Canada | Gouvernement du Canada

Climate Change AI Hackathon

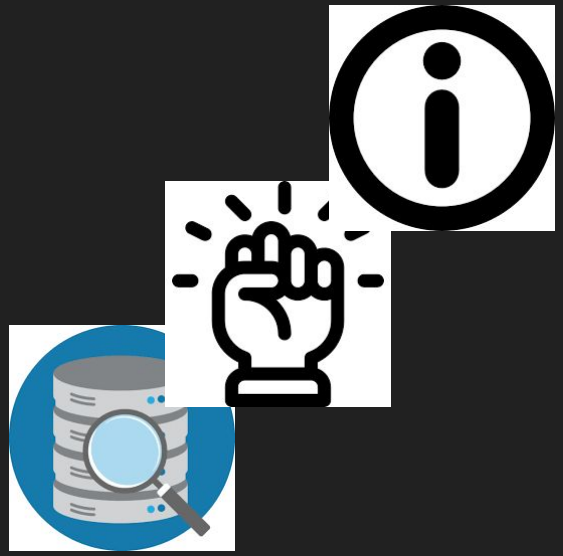
Generate a National Building Inventory

Challenge theme by

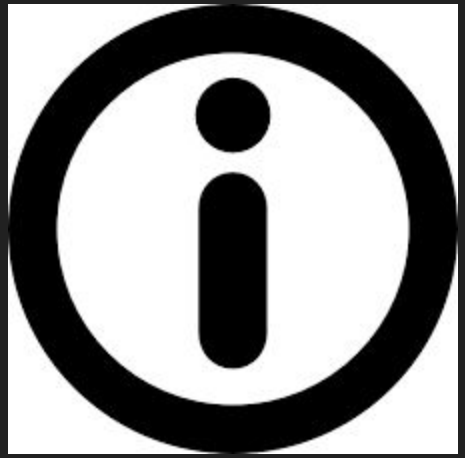
Statistics Canada and Natural Resources Canada

Canada

1. Background/Motivation
2. The Challenge
3. Data Sources



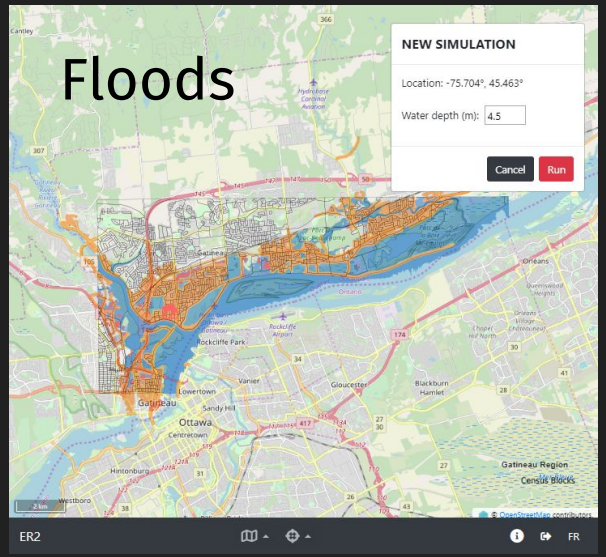
Background/Motivation

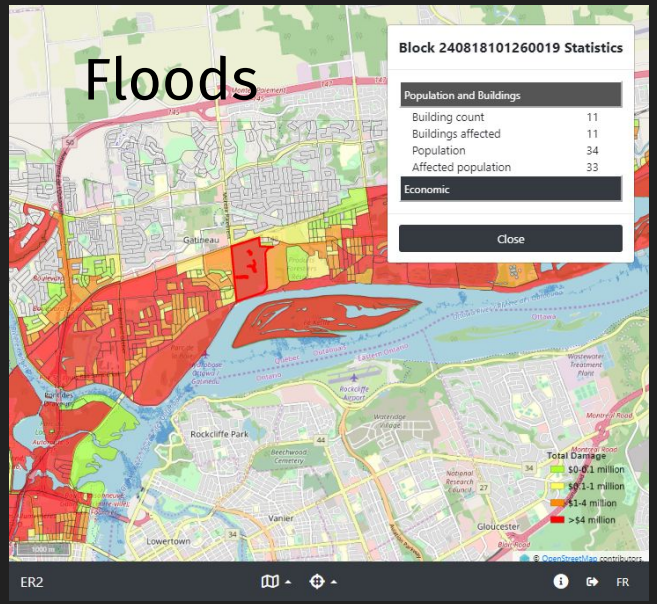


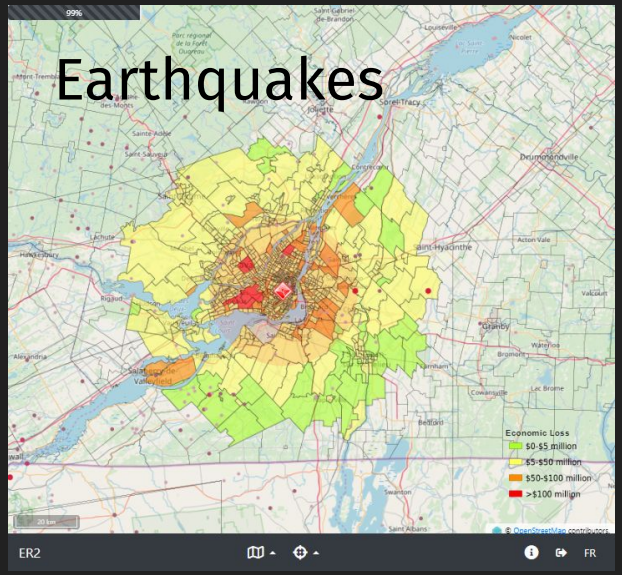
To respond to climate-change related hazards (e.g. floods, wildfires), the public safety community conducts:

1. Emergency management (real-time evaluation of negative impacts)
2. Mitigation planning (modelling and what-if scenarios)

To assist emergency managers, my team is developing a web platform for conducting rapid risk assessments

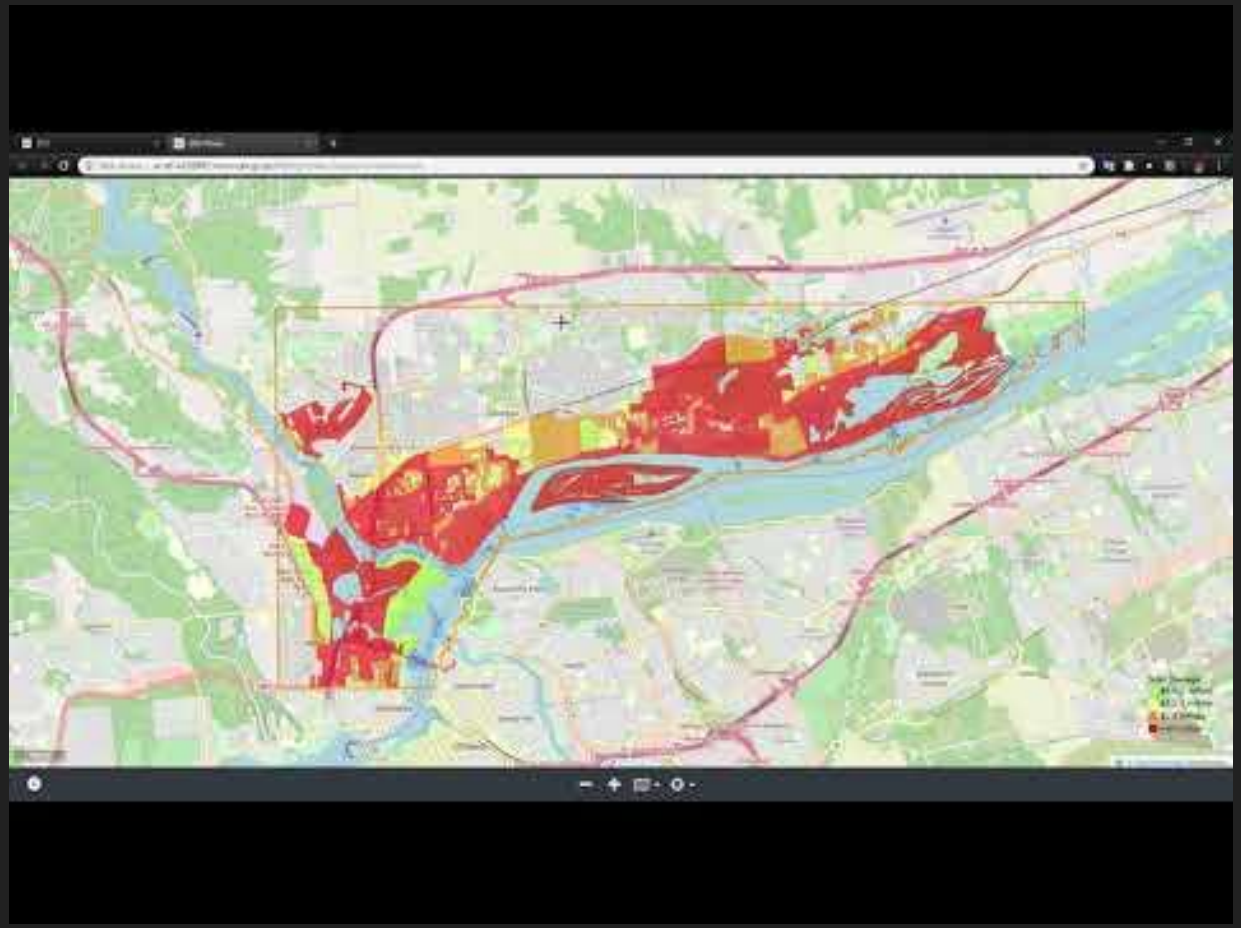




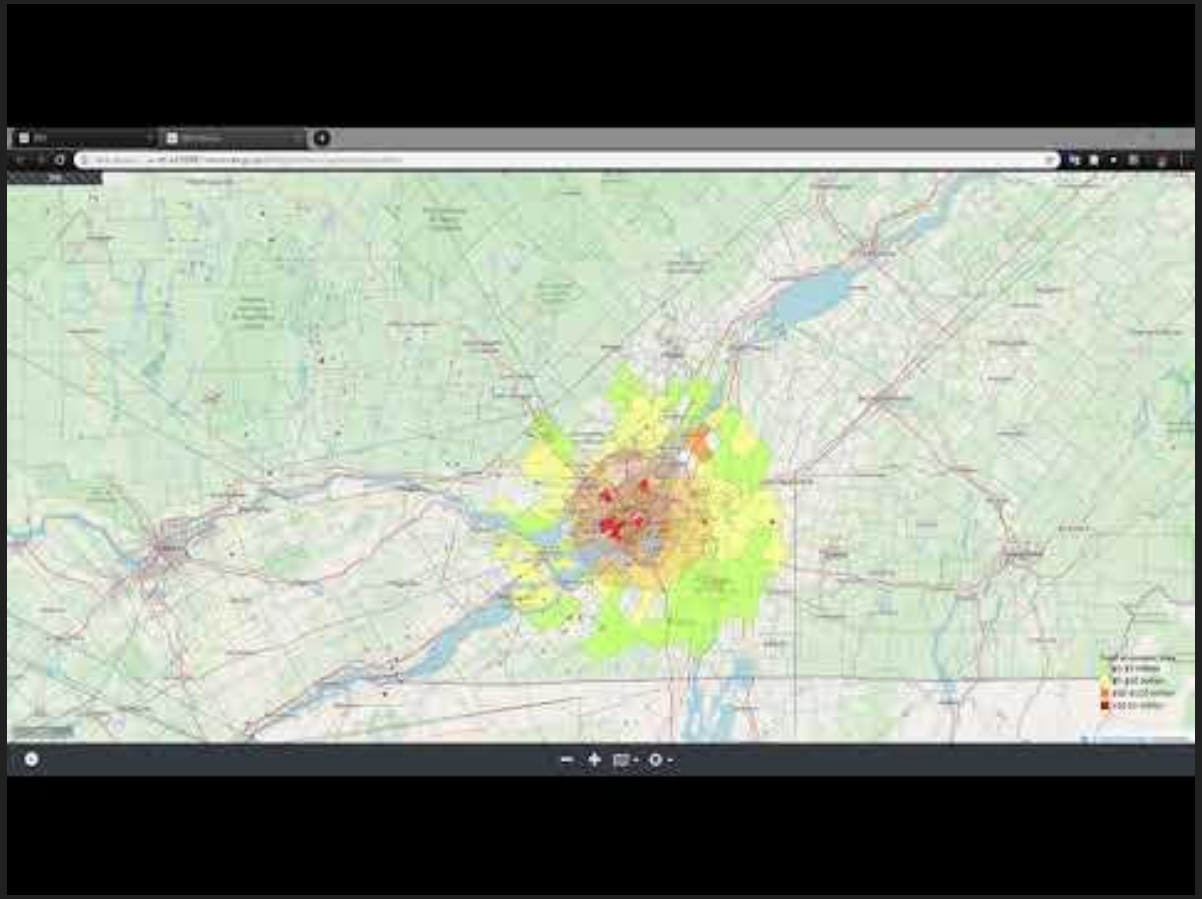


Freely accessible, easy to use, scientifically validated

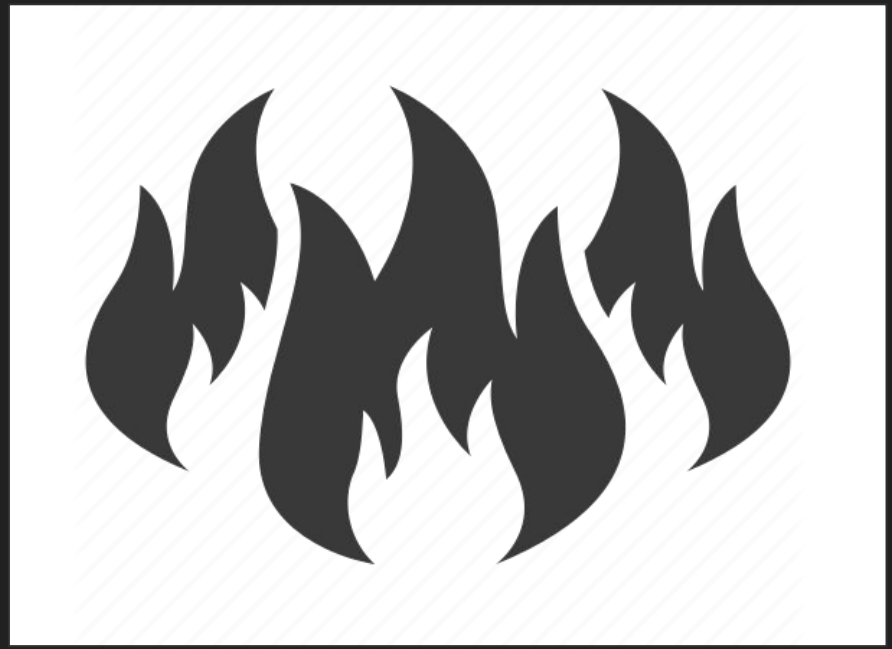
ER2 Flood



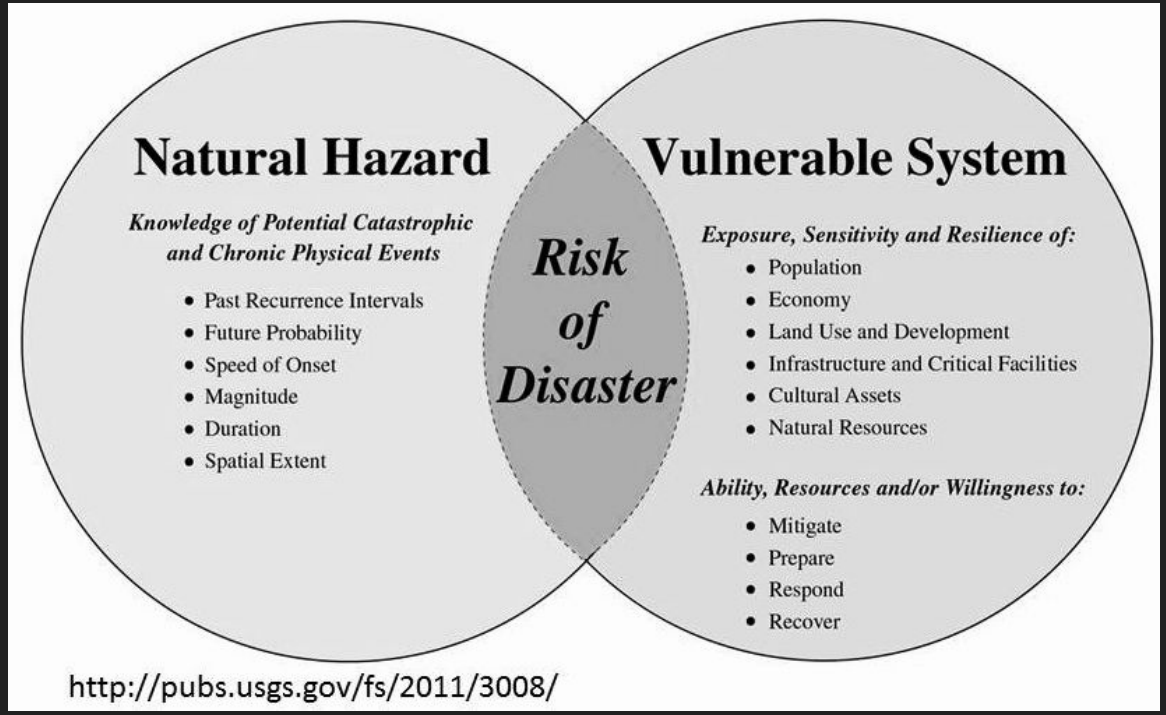
ER2 Earthquake



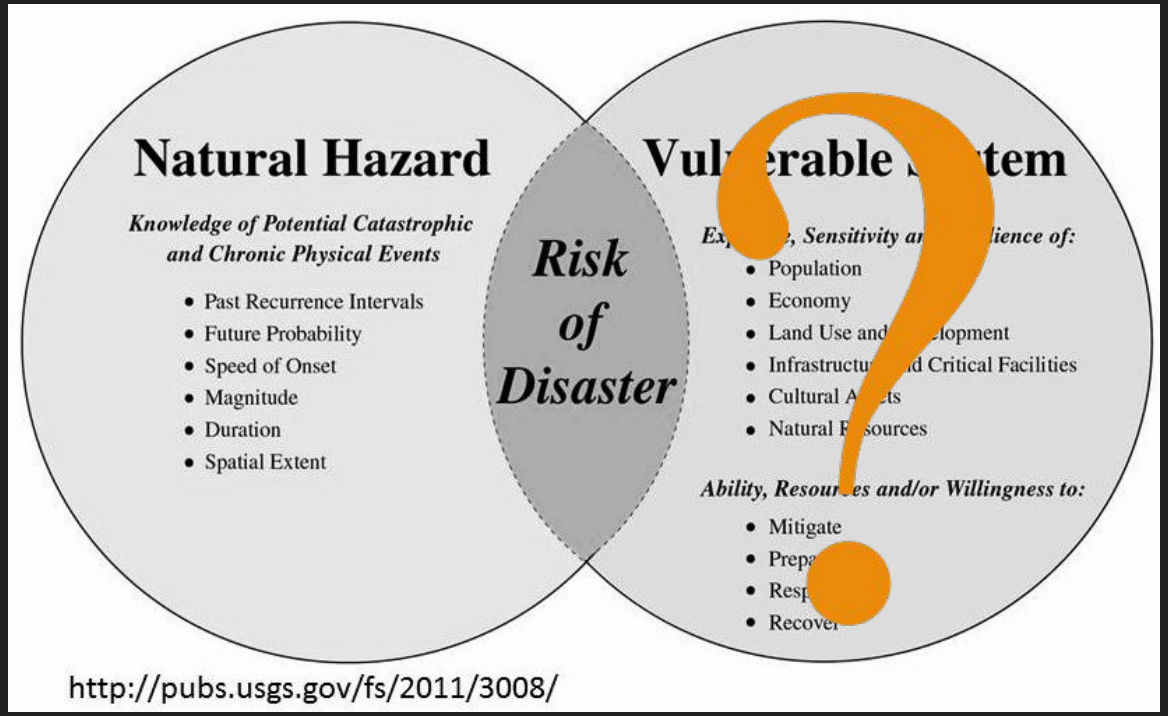
ER2 Wildfire - Under Development



To assess potential negative impacts, we need reliable building exposure data



However, there is insufficient data on Canadian buildings — limited number of attributes, incomplete spatial coverage, aggregated data



Beyond risk assessment, a national building inventory could be used in many other domains

- CanmetENERGY (NRCan) seeks a national building layer to to map housing energy end-use and to identify efficiency opportunities

The Challenge

1. Start with Canadian building footprint database (StatsCan/Microsoft; 12.5 million buildings)

GitHub, Inc. (US) | https://github.com/Microsoft/CanadianBuildingFootprints

Province/Territory	Number of Buildings	Unzipped MB
Alberta	1,777,439	389
British Columbia	1,359,628	301
Manitoba	632,982	135
New Brunswick	350,989	71
Newfoundland and Labrador	255,568	51
Northwest Territories	13,161	3
Nova Scotia	402,358	81
Nunavut	2,875	1
Ontario	3,781,847	808
Prince Edward Island	76,590	16
Quebec	2,495,801	512
Saskatchewan	681,553	146
Yukon	11,395	3

1. Start with Canadian building footprint database (StatsCan/Microsoft; 12.5 million buildings)
2. Assign building attributes by leveraging other data sources and machine learning

Example building attributes:

- Floor area
- Number of stories
- Height
- Building type
- Construction date
- Facade type
- Window-to-wall ratio
- Replacement cost

A complete building inventory database is envisioned

Building ID	Geom	Occupants	Construction material	Construction date	Basement	Garage	Floor area	Storeys	...

Ideally, the generated dataset should have the capacity to self-update over time as the built environment changes over time and underlying datasets improve

Potential Data Sources

Building footprints are available from StatsCan and Microsoft

Open Database of Buildings

Catalogue number: 34-26-0001
Issue number: 2018001

The Open Database of Buildings (ODB) is a collection of open data on buildings, primarily building footprints, and is made available under the Open Government License - Canada.

The ODB brings together 65 datasets originating from various government sources of open data. The database aims to enhance access to a harmonized collection of building footprints across Canada.

Data sources and methodology

The inputs for the ODB are datasets provided by municipal, regional or provincial sources available to the general public through open government portals under various types of open data licenses. The current version of the database (version 2.0) contains approximately 4.4 million records and includes provinces and territories where open building footprints were found during the collection period (from January to August 2018 for version 1.0, and February 2019 for additions made in version 2.0).

Individual datasets sourced from their respective open data portals were processed and harmonized into the ODB. Within the original datasets, each data provider attached a different set of variables to their building footprints. Only variables that could be calculated and standardized for each building footprint across all data providers were retained. To see the full list of variables provided by a given data provider, please visit their open data portals which are linked in the metadata document that accompanies the ODB.

The variables included in the ODB are as follows:

- Latitude
- Longitude
- Area
- Perimeter
- Data provider
- Census subdivision unique identifier
- Census subdivision name
- Unique building ID

For more information on how the footprints and variables were compiled, see the metadata document that accompanies the ODB.

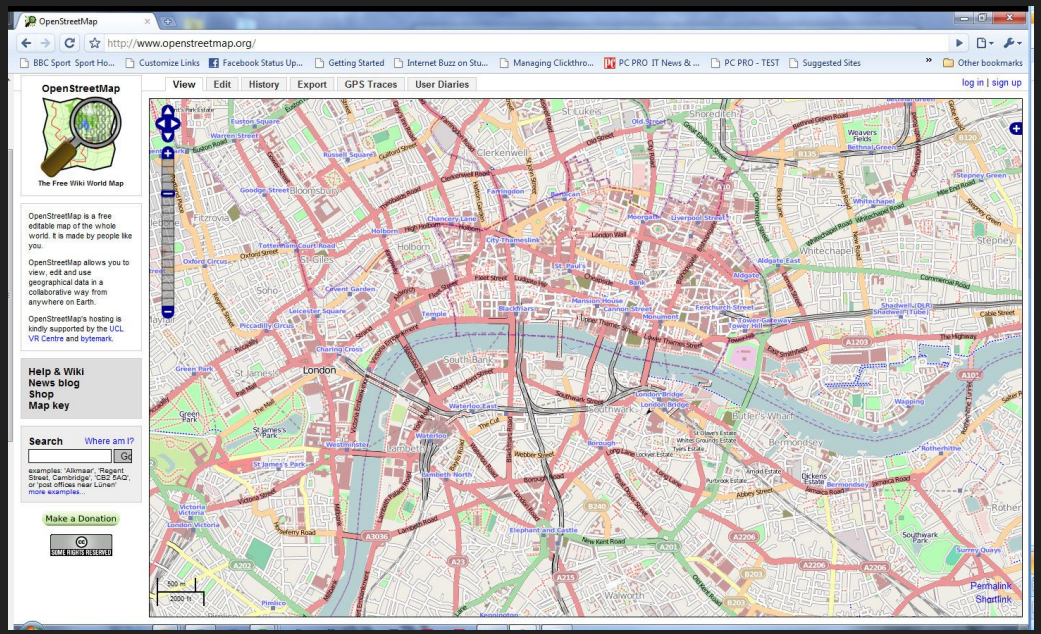
Downloading the ODB

For ease of download, the ODB and accompanying metadata document is provided by province and territory as a zipped shapefile.

- Alberta
- British Columbia

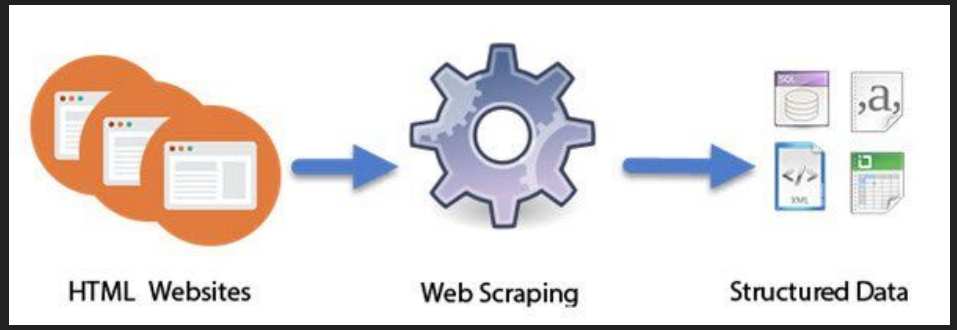
Canada: 12.5 million buildings

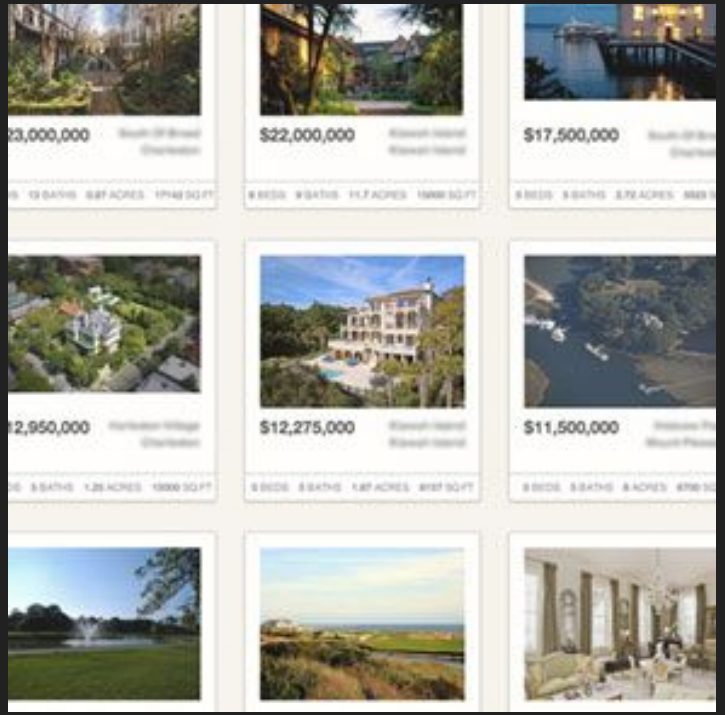
Web mapping services (OpenStreetMap, Google)



Occupancy type (residential, commercial, etc.), ...

Scraping real estate listings



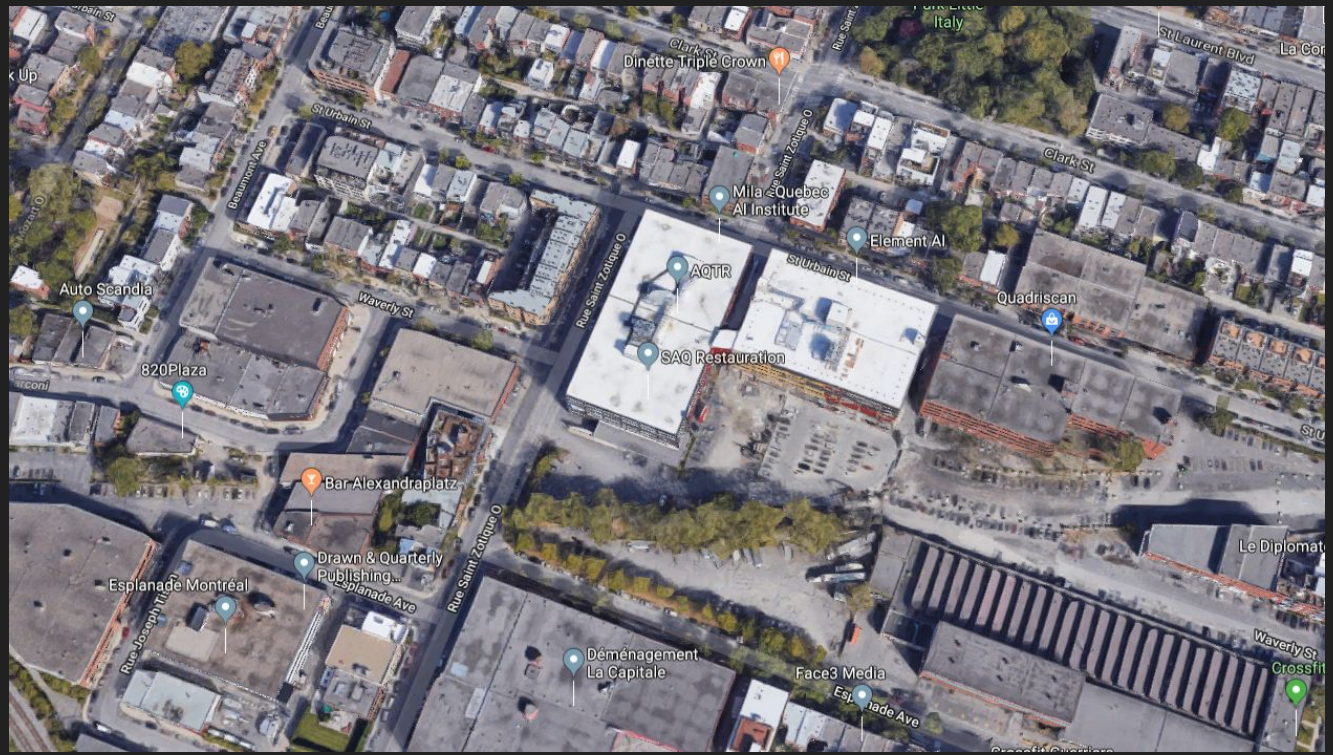


Building valuation, size, construction date, construction materials...

Street-level imagery

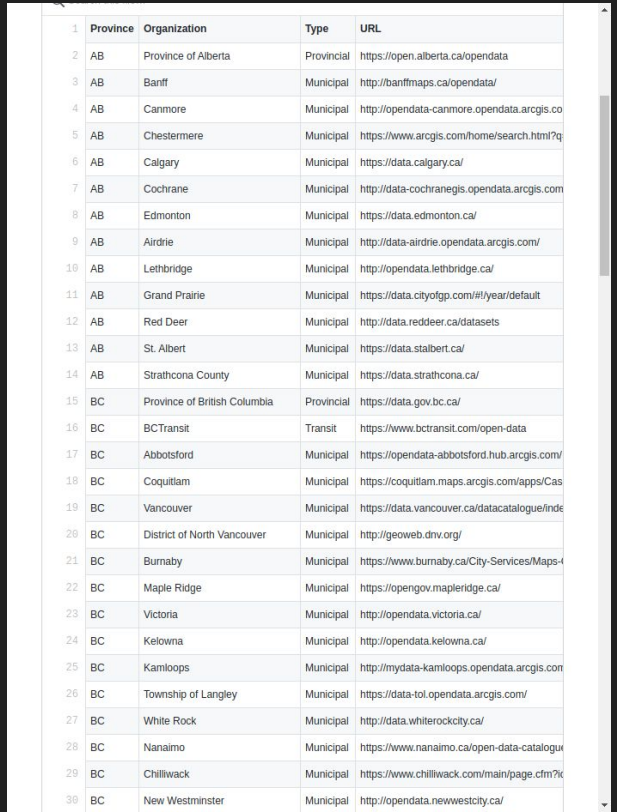
Number of stories, building height, occupancy type, ...

Satellite imagery and aerial photography



Census data aggregated at different spatial scales

Over 112 Canadian municipalities have open data portals, often through convenient APIs



	Province	Organization	Type	URL
2	AB	Province of Alberta	Provincial	https://open.alberta.ca/opendata
3	AB	Banff	Municipal	http://banffmaps.ca/opendata/
4	AB	Canmore	Municipal	http://opendata-canmore.opendata.arcgis.co
5	AB	Chestermere	Municipal	https://www.arcgis.com/home/search.html?q
6	AB	Calgary	Municipal	https://data.calgary.ca/
7	AB	Cochrane	Municipal	http://data-cochranegis.opendata.arcgis.com
8	AB	Edmonton	Municipal	https://data.edmonton.ca/
9	AB	Airdrie	Municipal	http://data-airdrie.opendata.arcgis.com/
10	AB	Lethbridge	Municipal	http://opendata.lethbridge.ca/
11	AB	Grand Prairie	Municipal	https://data.cityofgp.com/#!/year/default
12	AB	Red Deer	Municipal	http://data.reddeer.ca/datasets
13	AB	St. Albert	Municipal	https://data.stalbert.ca/
14	AB	Strathcona County	Municipal	https://data.strathcona.ca/
15	BC	Province of British Columbia	Provincial	https://data.gov.bc.ca/
16	BC	BCTransit	Transit	https://www.bctransit.com/open-data
17	BC	Abbotsford	Municipal	https://opendata-abbotsford.hub.arcgis.com/
18	BC	Coquitlam	Municipal	https://coquitlam.maps.arcgis.com/apps/Cas
19	BC	Vancouver	Municipal	https://data.vancouver.ca/datacatalogue/inde
20	BC	District of North Vancouver	Municipal	http://geoweb.dnv.org/
21	BC	Burnaby	Municipal	https://www.burnaby.ca/City-Services/Maps-
22	BC	Maple Ridge	Municipal	https://opengov.mapleridge.ca/
23	BC	Victoria	Municipal	http://opendata.victoria.ca/
24	BC	Kelowna	Municipal	http://opendata.kelowna.ca/
25	BC	Kamloops	Municipal	http://mydata-kamloops.opendata.arcgis.com
26	BC	Township of Langley	Municipal	https://data-tol.opendata.arcgis.com/
27	BC	White Rock	Municipal	http://data.whiterockcity.ca/
28	BC	Nanaimo	Municipal	https://www.nanaimo.ca/open-data-catalogue
29	BC	Chilliwack	Municipal	https://www.chilliwack.com/main/page.cfm?id
30	BC	New Westminster	Municipal	http://opendata.newwestcity.ca/

If you find any other useful dataset, feel free to use it!

Good luck!

Contact: gibbnick@gmail.com