CANDEV 2020

Excel file
Slides

Teammates:

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Business Case
Title: Uncovering Canada's Smart City Potential (C427), Team 2105.

Statement
Assess the state of smart technology and infrastructure capacity of municipalities across Canada. Infrastructure Canada would like your team to develop a tool that characterizes and identifies common features of 'smart city early adopters' in Canada.

Potential Datasets Data Resources to Consider

- Open Governments Across Canada: https://open.canada.ca/en/maps/open-data-canada
- Open Government Portal: https://open.canada.ca/en
- CIHR Funding Decision Database: http://webapps.cihr-irsc.gc.ca/decisions/p/main.html?lang=en&sort=namesort%20asc&start=0&rows=20&wbdisable=true#sort=namesort%20asc&start=0&rows=20
- SSHRC Awards Search Engine: https://www.sshrc-crsh.gc.ca/results-resultats/award_search-recherche_attributions/index-eng.aspx
- NSERC Awards Database: https://www.nserc-crsng.gc.ca/ase-oro/index_eng.asp
- Community Data Program: https://communitydata.ca/
- OECD Key STI statistics, databases and publications: https://www.oecd.org/innovation/stistatistics.htm
- UrbanSim Data Science Tool Kit: https://urbansim.com/udst
- StatCan datasets: https://www144.statcan.gc.ca/sdg-odd/goal-objectif11-eng.htm
    - Contains several datasets that

Other Resources to Consider

- OpenNorth: https://www.opennorth.ca/
- Open Smart Cities Guide: https://www.opennorth.ca/publications/#open-smart-cities-guide
- State of Open Smart Cities in Canada: https://www.opennorth.ca/publications/#the-state-of-open-smart-communities-2019
- Future Cities Canada: https://futurecitiescanada.ca/
- How to be Smart[er] in Mid-Sized Cities in Ontario: HOW TO BE SMART(ER)
- OECD/Bloomberg Philanthropies: Enhancing Innovation Capacity in City Government
- OECD/Bloomberg City Innovation Map
- OECD Going Digital Toolkit: https://goingdigital.oecd.org/en/ and https://www.oecd.org/going-digital/
- World Council on City Data (WCCD): https://www.dataforcities.org/
- McMaster University Smart City Technologies in Canada: https://mcmaster.maps.arcgis.com/apps/MapSeries/index.html?appid=e785bc894ee94ccebf31feda573b35e4
- Canada's Core Public Infrastructure Survey: https://www.infrastructure.gc.ca/plan/ccpi-ipec-eng.html

Organisation name: Infrastructure Canada
Mentor: Natalie Frank, Jacqueline Ha

Factors to consider

- Diversity of origin
- Age distribution
- Education level (bradley) Canadian 2016 census VBA code (or other) needs to be written to mine this data from all of the census files.
    - CMA (census municipality
- Average internet speed
- (?) Entrepreneurial spirit: numbers of small businesses CFIB per capital (Frank)
- Median income (carter)
- How does the city communicate\how much info is there
- Municipal funding per capita
- Employee per sector (Dan)
- Sate of infrastructure
- Tweet analysis/facebook
- Electoral involvement/voter turnout (bradley)

Questions for Mentor

- Dynamic analysis of data
- Visually represent these trends
- Represent non-relationships, to breakdown assumptions and risks (eg it might not all be money)
- Data on applicants on infrastructure canada, all 130 applicants
- ISO has smart cities indicators, list of headlines of indicators of what they measure/metrics
    - Bloomberg
    - OECD
    - McMaster map for smart tech (imp element)
- **Visual rep of coloration to guide funding streams.**

Workshops (link)

Workshop (1)	Names	Workshop (2)	Names
14:00 – 15:00 C308, CRX GitHub Crash Course	Everyone	---	---
15:00 – 16:00 C407, CRX FastText: Text Classification Speedrun	Bradley (leave early) Frank (leave early) Dan (leave early)	15:00 – 16:00 C308, CRX Developing a Dashboard using R-Shiny	Carter (leave early)
15:45 C427, **group mentor meeting**	Everyone	---	---
16:00 – 17:00 C407, CRX Intro to RegEx: String searching for data extraction and cleaning	Dan	16:00 – 17:00 C308, CRX PowerBI Building Blocks	Carter Frank
17:00 – 18:00 C407, CRX Topic Modelling: Latent Dirichlet Allocation in R	Frank	17:00 – 18:00 C308, CRX Getting Data from the Internet with Python: APIs, Requests, and HTML Parsing	Carter Dan

Roles

- Graphics/Visual
- Data acquisition
- Output: how to measure how smart a city is
- Input: which data will we be using (which data is available, which should we prioritise?)

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Guiding questions

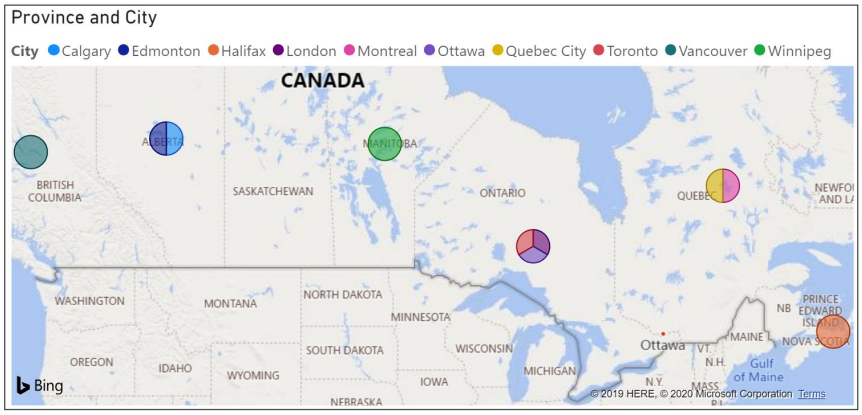
A. What are factors that determine a municipality's propensity to be an early adopter of smart technology and infrastructure?
B. Are there interesting patterns that can be observed? For example: Geospatial? Partnerships? Citizen engagement?
C. Could these factors be used to model whether a community has the capacity to implement smart city approaches? Or is it possible to model how a change in one factor would affect the outcome of another?

Census Results: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/dt-td/Index-eng.cfm
https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/dt-td/Rp-eng.cfm?TABID=4&LANG=E&A=R&APATH=3&DETAIL=0&DIM=0&FL=A&FREE=0&GC=01&GL=-1&GID=1235625&GK=1&GRP=1&O=D&PID=110191&PRID=10&PTYP

E=109445&S=0&SHOWALL=0&SUB=999&Temporal=2016&THEME=119&VID=0&VNAMEE=&VNAMEF=&D1=0&D2=0&D3=0&D4=0&D5=0&D6=0

Major Cities

City
London, Ontario
Toronto, Ontario
Calgary, Alberta
Ottawa, Ontario
Québec City, Québec
Edmonton, Alberta
Halifax, Nova Scotia
Vancouver, British Columbia
Winnipeg, Manitoba
Montreal, Québec



What makes a city smart? - Metrics

Factor	Possible source(s) +hyperlink(s)	Importance	Weight
(1) Percentage of population that takes public transit to work	Census	High	15
(2) Internet speed in city		High	23
(3) Percentage of population in education, R&D[1], or IT[2]	NO DATA FOUND	Med	-
(4) Electric car charging stations per capita		Low	7
(5) City-wide transit score from Walk Score ®		Med	25
(6) Percentage of population with door to door solid waste removal	NO DATA FOUND	Low	-
(7) Percentage of municipal budget spent on parks and recreation		Med	15
(8) Percentage of population living in high density area	NO DATA FOUND	High	-
(9) Cities with Lyft/Uber		Low	5

[1] Research and development
[2] Information Technology

Evaluations

1. We only looked at Canadian cities. Populations 400k-2.9M.
2. We picked 10 smart cities (in our opinion), and used six categories and a matrix grid scoring system to:
    a. Define how well each city is doing in each category
    b. Give an overall percentage score for how “smart” each city was. This was used to rank them
3. For each category, a score between 0 and 4.5 out of 5 was given. With 0 being set to zero on the metric, and 4.5 being set to the max in the category in our cities. We chose a 4.5/5 (90%) as a maximum score per category because we felt that there is always room for improvement – even for the best city in said category
4. A weight was given to each category, as follows:
    a. Transit to work (15)
    b. Internet speed (23)
    c. Electric car chargers (7)
    d. Transit score (25)
    e. Portion of budget for Parks & rec (15)
        i. * where no data was available, category did not count towards final score
        ii. A
    f. Rideshare available (5)
        i. A zero was given if not available, five if it was. Only one city did not have Uber.
        ii. A municipality with Uber is perhaps one that has relevant law makers and is open to innovation

How *Smart* is each city

CITY	SMART SCORE
London, Ontario	49.34%
Toronto, Ontario	72.98%
Calgary, Alberta	51.56%
Ottawa, Ontario	63.04%
Québec City, Québec	62.51%
Edmonton, Alberta	49.96%
Halifax, Nova Scotia	52.47%
Vancouver, British Columbia	81.63%
Winnipeg, Manitoba	45.30%
Montreal, Québec	61.56%

Predictors

What factors could correlate with a smart city?

Factor	Possible source(s) +hyperlink(s)		
(1) Median age			
(2) Number of public libraries per 100,000			
(3) Median family income after-tax			
(4) Average number of City’s monthly tweets			
(5) Municipal election turnout			

(6) Number of DLI[3] in city			

[3] Designated learning institutions list, Certified by IRCC.