

Smart Cities Canada

Challenge Application
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Prepared in partnership by
the City of St. John's and Happy City St. John's
for Infrastructure Canada
2018 Smart Cities Canada Challenge

ST. JOHN'S



Question 1:

Please provide the following information on your community.

- Name of community: St. John's
- Province/Territory: Newfoundland and Labrador
- Population: 205,955
- Indigenous community: No

Question 2:

Please select a prize category.

- \$10 million (population under 500,000 residents)

Question 3:

Please define your Challenge Statement in a single sentence that guides your preliminary proposal. It should describe the outcome (or outcomes) you hope to achieve. (50 words max)

An integrated mobility network will get people of all ages and abilities moving more freely around rugged, wet, windy St. John's, shifting us away from the passive transportation culture that is making us sick and, by 2024, increasing the share of sustainable and active transportation commuter trips by 40%.

Question 4

Please describe the outcome (or outcomes) your proposal seeks to achieve by elaborating on your Challenge Statement. (2,500 words max)

Defining the Problem

The Census Metropolitan Area of St. John's has a population of 205,955 residents, over 40% of the population of Newfoundland and Labrador, 43% of whom are over 45 years old [1]. Dating back to the late 15th century, St. John's is one of the oldest cities in Canada with a road network that was originally designed for horses and buggies travelling on the left hand side of the road. The older, central metropolitan neighbourhoods of St. John's have a population density of 255.9 per square kilometre, similar to Calgary. [2] Despite this, the proportion of workers commuting to work by motor vehicle as a driver or passenger was 90%. [3] Sustainable modes of transportation including public transit, walking, and bicycling represent 3.1%, 4.6%, and 0.2% of work trips, respectively [3]. Among the 20 small and medium-sized Census Metropolitan Areas in Canada, St. John's has the 5th lowest use of sustainable transportation.

St. John's residents have many reasons for not using active and sustainable

transportation. Public transit in the St. John's region is stretched thin and disconnected. In addition to Metrobus, the conventional public transit service, the St. John's Transportation Commission has a para-transit system for persons with disabilities and residents who are unable to access conventional transit (GoBus). There are other community transportation services available for the Indigenous community (the St. John's Native Friendship Centre's transportation services), and for various seniors' communities, as well as Memorial University community buses. At the moment these services do not cooperate with each other.

The other infrastructure supporting active and sustainable transportation in St. John's is equally disconnected. St. John's has a world-class trail network, the Grand Concourse, which is closed to cyclists and closed at night. Bike St. John's, has developed independently of any public transit service and has an ambitious plan to promote cycling throughout the city. When a new subdivision or neighbourhood is approved, St. John's planning and development considers parking availability, but no other transportation options.

St. John's is also surrounded by and deeply connected to other suburban and exurban communities in the Northeast Avalon. There is no regional government, and municipal cooperation on transportation planning is a patchwork.

The final piece of the puzzle is the weather. St. John's is the windiest and cloudiest city in Canada and is one of the wettest, experiencing the most wet days. Uncomfortable as it is in the summer, it is deadly in the winter. St. John's does not require residents to shovel the often-heavy snow and slush. City sidewalk plows cover only a portion of the sidewalk network (147 km), and clearing is often delayed up to a week after snow falls. This means that sidewalks are often covered in snow or ice and rarely plowed, making mobility not only difficult, but dangerous.

Despite these unusual climate challenges, St. John's active and sustainable transit infrastructure takes little account of the weather. There are few sheltered bus stops or rest hubs. Sidewalk clearing and public transit are uncoordinated. There is little technology to warn residents of dangerous conditions: residents must guess whether the route will be clear or snowy, icy or safe.

The lack of attractive active and sustainable transportation options has many costs. It forces low-income residents to buy cars they cannot afford or to turn down jobs they cannot access. It discourages exercise, particularly for seniors and persons with disabilities. It undermines social inclusion and connectedness for all residents.

St. John's recognizes that the population is rapidly ageing and the chronic disease rates are among the highest in the country. More than 72% of the provincial population is overweight or obese, diabetes and high blood pressure rates are above the Canadian average, and leisure time physical activity is below the Canadian average. [4] In March 2018, the unemployment rate in the St. John's CMA was 8.6%, compared to 5.8% in Canada. Approximately 25% of St. John's CMA residents have an income of less than \$50,000 annually. [1] With increasingly ageing populations, designing systems to support residents using transit, walking, and cycling, to access employment and leisure options is paramount to a sustainable future in the capital city of Newfoundland and Labrador.

The Solution: An Integrated Mobility Network

The City of St. John's Smart Cities Challenge will create an integrated data-driven mobility network. It will collect data about how people get around, what services they use and what services they don't, and what roadblocks prevent them from using active and sustainable transit. It will bring together the siloed public bodies and community organizations that provide active and sustainable transportation infrastructure and services. And it will use the data to coordinate efforts, so that each service complements each other.

An integrated mobility network is a big idea with transformative potential. The initial investment in new technologies will increase the efficiency and usefulness of all existing and future transportation infrastructure. St. John's will become both a leader in and a model for best practices around integrated mobility, one that will be replicable for small cities across Canada and around the world.

The unique opportunity in St. John's is that existing transportation systems are under-utilized, providing an opportunity to create a fundamental shift in the way lifelong residents, newcomers, and visitors interact and get around the city. Improve the placement of bus routes and the allocation of snow-clearing resources, add strategic trails and rest stops, connect existing services, simplify route planning, and it is possible to start a virtuous cycle where the number of users and service levels grow together.

The transportation culture in St. John's has changed before and can change again. At Confederation in 1949 active and sustainable transportation were dominant in St. John's; in the following decades they became a mark of poverty or low status. Today the more than 50 community organizations supporting this application represent a critical mass of support for active and sustainable transportation in St. John's. The community is ready for a snowballing cycle of improvement.

The integrated mobility network, developed for the Smart Cities contest, will allow St. John's to consider data-driven, people-centric urban planning to increase sustainable transportation in our city. We propose a mix of technology and a participatory approach that will inspire confidence in St. John's residents as we embrace an open and inclusive city.

Primary Outcome 1: Increase Sustainable Transportation Use

We aim to bring St. John's above the national average for commute trips made by transit, and active transportation. At present, in the St. John's census subdivision, 12.8% (6,465/50,565) commute trips were made sustainably, when the national average is 16.8%. [5]

This target is both feasible and visionary. Halifax is at 21%. Ottawa is 30.6%. Toronto is 48.4%. Vancouver is 49.5%. [5] If we meet our target of increasing commute trips by 40%, this would result in a sustainable transportation trip share of 17.9%. These outcomes will focus on the entire population while engaging specific members of the community who can be more vulnerable to social exclusion and isolation due to a lack of access to equitable transportation options.

We define sustainable transportation as any form of transportation that has minimal impact on the environment. This includes public transportation, walking, and cycling.

To achieve this primary outcome, we have three secondary outcomes:

Secondary Outcome 1A: Make Transportation Options Legible

In order to increase sustainable transportation use we must first understand what services are being provided, at what locations, and by whom. To do so, we will develop a geographic database identifying sustainable transportation services of all kinds (including those run by private, public and community-sector organizations). This database will contribute to determining where services could be delivered more effectively, while bringing together various community organizations with the goal of building partnerships and streamlining services to a diverse cross-section of the community.

Our goal will be developing methods to help residents understand the availability, cost, and trip durations for sustainable transportation options. The data collected through this database will provide St. John's with valuable information to influence community

development and design, while supporting healthier urban environments, both built and ecological.

Likewise, developing active transportation mapping whereby the City synthesizes all the different information available for walking and cycling into a single portal would make these modes legible to residents. This system could connect into transit to facilitate sustainable multi-modal trips. It could also be linked to some of the other smart phone-based ideas. In the end, residents will be able to more easily understand the options available to them.

Secondary Outcome 1B: Make Transportation Options Seamless

Making transportation options legible has benefits beyond trip-planning. It will also enable decision-makers in public bodies and community organizations to identify and eliminate the obstacles that prevent residents from accessing active and sustainable transportation options. The goal here is for transportation services to form a seamless whole, so that each service fills in the gaps left by the others.

Secondary Outcome 1C: Make Active and Sustainable Transportation Times Shorter And More Predictable

Today, travel times for sustainable transportation are not competitive with the use of personal vehicles. They are both too long and too unpredictable. This is because our transit system has not been able to collect sufficient data usage and routes. Moreover, the transit system is not integrated with other private transit systems, nor does it integrate well with sustainable modes like walking and cycling.

Our transit network database (proposed in secondary outcome 1A) combined with smart technologies like trip-planning apps, passenger information systems, electronic payment with smartphones, and offering reliable WiFi on public transit can shift the culture of public transportation in St. John's. These systems will truly be embraced when residents can get from one place to another, while getting other responsibilities accomplished, and still arriving quickly and predictably enough to meet their needs.

We will make sustainable transportation time competitive with private vehicles and reduce the need for privately-owned vehicles by connecting all areas of St. John's with a reliable mobility network with multiple options for getting from place to place efficiently. To do this, we can use smart technology to provide public transit with the ability to prolong green or shorten red traffic lights; implement bus lanes; and add smaller public transport vehicles to navigate the small streets of St. John's, while also providing users

with discounts to other services which can make public transit a more competitive mode of transportation. By connecting these communities to one interconnected multi-mode transportation system that's affordable, reliable and easy to use through integrated technology, we can change the way residents interact with the city.

Primary Outcome 2: Make Sustainable Transportation More Accessible Using Inclusive Design

To increase accessibility we will connect residents who experience mobility restrictions and persons with disabilities to an integrated data exchange technology. This technology receives data from several transportation sources and then repackages it to be sent back to users, providing them with transportation options including accessible public and community-based transit routes, walkable streets, and road conditions for other forms of human-powered transportation. This can be done through mobile apps or online platforms that collect GPS data on users, transportation services, and beacons that continuously monitor the conditions of the most accessible routes based on residents' exact locations.

Mobility for an aging population also means inclusive design. It means having a broad range of mobility options, for all residents of the city, including those with mobility restrictions. Evidence suggests that walkable neighbourhoods are linked to increased walking among seniors, including those with mobility restrictions. [6]

Our unique topography of hills with uneven streets and our cool northeastern climate make it challenging for seniors to be mobile for a large portion of the year. Many people can walk up a hill in fair conditions but not in icy ones—so they cannot plan to walk unless they know if it is icy. Connected technology such as mobile apps, voice activated technology and municipal street monitoring systems can help anyone with a mobility restriction easily trip-plan safe routes. Increasing residents' abilities to freely move around the city and socially interact builds a sense of community that promotes mental wellness. [6]

We recognize the importance of the involvement of the people who are at a higher risk of social exclusion by ensuring they are present around the table through the participation of people with lived experiences and organizations who serve them. Encouraging better use of urban services by vulnerable populations can be supported by the integration of new technologies into the administrative activities of the municipal government in an innovative way, with a new approach of proximity to and ease of access of basic public services such as transit and recreation facilities. Our Integrated Mobility Network would include Smart Kiosks planned for selected bus shelters which

include free WiFi, which was indicated as an incentive by low-income youth and residents during public consultation sessions. Data analysis can inform a map of “rest hubs” whereby people can stop along a transit corridor while waiting for the bus. This can be anything from a public parkette to a local coffee shop. Some of these locations could be equipped with free WiFi in order to reduce barriers to accessing transit information for those with a smartphone but without data.

References:

1. The State of the Economy. 2017.
<http://stjohns.ca/sites/default/files/files/publication/State%20of%20the%20Economy%202017%20-%20Sept.pdf>
2. Statistics Canada. 2017. Population and dwelling counts, for census metropolitan areas, 2016 and 2011 censuses (table). Population and Dwelling Count Highlight Tables.
3. Stats Canada. 2013. *National Household Survey, 2011: commuting to work*. Statistics Canada Catalogue no. 99-012-2011003. Ottawa.
4. Statistics Canada. Table 105-0508 - Canadian health characteristics, annual estimates, by age group and sex, Canada (excluding territories) and provinces, occasional (number unless otherwise noted).
5. Statistics Canada. 2017. Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29 2017.
<http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E>
6. Public Health Agency of Canada. 2017. *The Chief Public Health Officer's report on the state of public health in Canada 2017: Designing Healthy Living*.
<https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/chief-public-health-officer-reports-state-public-health-canada/2017-designing-healthy-living/2017-designing-healthy-living-eng.pdf>

Question 5:

Please describe how your community residents have shaped your Challenge Statement. Describe your plans for continuing to engage and involve them in your final proposal going forward. (1,500 words max)

This proposal is based on information collected from more than 1000 community members, stakeholders, and experts in St. John's on what aspect of community is not meeting the needs of people. The City of St. John's is currently leading a healthy communities initiative both internally and across the Northeast Avalon region. Through public consultation, surveys and a Healthy Communities Forum attended by more than 100 stakeholders from various sectors, disciplines and levels of government, we heard that transportation was, across the board, the top priority. Through this proposal of an integrated mobility network, we are bringing the issues of residents to the forefront of municipal action.

The City of St. John's and Happy City St. John's, a local community organization with expertise in community engagement, have pursued a rigorous engagement process to ensure residents of St. John's have been involved effectively in the development of this proposal. This process has adhered to the core values of public participation, as defined by IAP2 Canada, which are the following:

1. Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
2. Public participation includes the promise that the public's contribution will influence the decision.
3. Public participation promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers.
4. Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
5. Public participation seeks input from participants in designing how they participate.
6. Public participation provides participants with the information they need to participate in a meaningful way.
7. Public participation communicates to participants how their input affected the decision.

With these values in mind, the City of St. John's and Happy City undertook a multi-modal approach to public engagement throughout this process. As an integrated mobility network has impacts on all residents on St. John's, there was a wide net cast to include a diverse set of voices in St. John's. This involved both broad consultations online and in-person, as well as a more refined approach to participation through the use of a "Challenge Committee".

Public engagement was pursued both online and in-person, through an online survey, promotion of the project via social media, blog posts, and other online channels, and through in-person consultations with both broad groups and specific groups. Happy City St. John's in collaboration with the City of St. John's hosted a public consultation session with residents, where we heard recurring themes around safety, efficient user-friendly services, such as integrated Smart Cards, and harnessing technology to improve planning around walkability and accessibility across the City.

An online survey, focused on how people move around St. John's, collected 977 responses in just a ten-day period. This provided valuable information in relation to the mobility experience of residents, the related barriers, sense of safety when moving around the city, and the willingness of residents to support a smart cities approach to mobility in the city.

Happy City St. John's and City of St. John's also requested feedback through an online portal, social media, and via email. In-person consultation sessions were held with the broader public at City Hall, as well as more targeted consultations with youth, seniors, at-risk populations, and residents with different mobility needs.

To ensure a broad and diverse set of voices were involved in the development of this proposal, our team also relied upon partner organizations who were able to represent and engage with specific constituencies. This was pursued through in-house consultation sessions, promotion through these organizations, and through engagement with the "Challenge Committee".

Engagement with residents with different mobility needs was led by Coalition of Persons with Disabilities, who promoted the project via their channels and hosted in-person consultation sessions. Choices for Youth, a local non-profit that supports at-risk and homeless youth, led an in-house consultation session regarding the mobility needs of their constituents. The Office of Student Life at Memorial University also hosted a consultation session with youth (aged 30 and under). The Stella Burry Community Services group, a non-profit focused on supporting vulnerable adults, led a consultation

session regarding the needs of their constituents.

This proposal was also developed with the involvement of our “Challenge Committee”, a group of stakeholder individuals and organizations who provided guidance and support throughout this process. This Challenge Committee met regularly throughout the process to develop and review this proposal, and the members of the Challenge Committee also represented their constituents at the table. The members of the Challenge Committee include, but are not limited to:

- St. John’s City Councillor Maggie Burton
- Representatives from Happy City St. John’s who participated in and facilitated discussion
- Dr. Daniel Fuller, Canada Research Chair in Population Physical Activity
- Representatives of Coalition of Persons with Disabilities NL
- Representatives of Healthy Communities Northeast Avalon Alliance
- Representatives of the NL Universal Design Network
- Representatives of the Essential Transit Association
- Representatives of the local architecture community
- Representatives of the St. John’s Native Friendship Centre
- Citizen representatives of the tech entrepreneur community
- Representatives of Eastern Health
- City staff

Another group which has been integral in engagement of residents and will continue to be key to engaging community stakeholders in our next phase will be Healthy Cities St. John’s and the Healthy Communities Northeast Avalon Alliance. These initiatives began as a result of the City of St. John’s recognizing the success that other jurisdictions in Canada had using a ‘Healthy Communities Approach’ to improve health outcomes, safety and inclusion. In October 2017, the City of St. John’s started a conversation about Healthy Communities which lead to organizing and facilitating the first ‘Healthy Communities Forum’, which brought together over 100 professionals with diverse backgrounds to create a vision for a healthier future for St. John’s. A “What we Heard” document was compiled following the forum, which highlighted key priorities as identified by the more than 100 stakeholders. Of these priorities, ‘Transportation’ was the biggest.

This was the starting point for change, working together across sectors to build healthier, sustainable futures for everyone in St. John’s. As a result of this, the City of St. John’s is taking a leadership role in the development of a Healthy Communities – Northeast Avalon Alliance. This group will be engaged to further capture the mobility

needs of all residents, as well as utilizing their knowledge and expertise in the research, evaluation, development of an integrated mobility plan.

Should the City of St. John's enter the next phase of the Smart Cities Challenge, this Challenge Committee will be maintained and expanded to include representatives who have expertise in the area of smart cities, and particularly areas of smart technologies and integrated mobility. Happy City St. John's, as a non-profit focused on civic engagement, plans to continue the discussion around mobility in St. John's. Specifically, Happy City is preparing reports on the feedback heard throughout the process, and will be sharing this information with the municipal government and residents. Happy City will also lead the process of communicating publicly how the public participation throughout this process impacted the challenge statement and the broader proposal.

Happy City and the City of St. John's are already planning further public participation which will support the engagement process in future stages. After pursuing feedback regarding neighbourhood organization, Happy City recognized the need for stronger neighbourhood associations and organizations in St. John's. The organization is therefore, with support from the City of St. John's, planning a Neighbourhood Forum for Fall 2018 which will seek to consult and educate residents on aspects of community organization and how to effectively interact with municipal government as a neighbourhood. This initiative, in particular, offers a unique opportunity to engage residents during the implementation phase at a neighbourhood level.

Happy City St. John's and the City of St. John's will also be engaging residents on how they would like to participate during the development of the final application. This will involve rigorous public engagement both online and in-person, and this conversation has already begun.

Moving forward, the technologies used by Dr. Dan Fuller and the Walkability Lab, as well as other initial smart technology will be utilized to further analyze movement within St. John's and inform the final application. These applications, developed and used in collaboration with Memorial University, will be scaled up to allow analysis of movement within the City of St. John's.

Question 6

Please describe your preliminary proposal and its activities or projects. (2,000 words max)

We plan to integrate smart technology features and tools to solve a deeply rooted community issue - efficiently and safely getting around in all seasons. Community involvement will be invaluable for this process as we learn what residents need to freely move around the city year round. Each activity and project will consider health as an indicator to ensure that all design changes are health promoting in nature and make choosing the healthy choice, the easy choice.

Our integrated data driven mobility network will be built using open source machine learning methods. As much as possible we will strive to have our technologies and analysis be open source and accessible to residents and other cities. We have already created a GitHub page where we will share our methods.

(https://github.com/SmartCitiesYYT/baseline_survey/blob/master/baseline_survey.md)

The key principles of an integrated mobility plan is creating complete communities that are centred around public transit and access to services, moving people and goods instead of focusing solely on moving vehicles, managing congestion instead of attempting to eliminate it, and integrating solutions—recognizing there is no one solution to solve mobility barriers in the City. Mobility should be connected, healthy, affordable, and sustainable.

The objective of our preliminary proposal is to be able to quickly implement and begin collecting data in order to meaningfully begin to understand and change travel behaviours for our residents. We are confident that we can implement the first stage of our data driven integrated mobility network. We have broken the five data collection methods in our proposal into 2 broad categories: understanding mobility and creating change.

1. Understanding Mobility

The technologies and approaches in our understanding mobility proposal are related to understanding how people are using transportation systems in St. John's, understanding the potential for sustainable transportation, and evaluating changes we make to our system to achieve our primary objectives.

Itinerum App

Itinerum is an open source platform developed by Dr. Zachary Patterson at Concordia

University designed to study transportation behaviours. [1] Itinerum allows groups (from the academic, public and not-for-profit sectors) to develop, administer, and collect self-report, ecological momentary assessment, and global positioning system (GPS) data from participants using a customized smartphone app that is simple and easy to implement. The Itinerum app is already well tested and has been used in large scale transportation behaviour surveys in Montreal and Toronto. We will leverage our existing collaboration with Dr. Patterson to use Itinerum to better understand people's travel behaviours.

There are 2 crucial aspects to our initial proposal related to Itinerum:

1. We will need to recruit a large sample of St. John's residents in order to understand travel behaviours in general. We will also need to work with our partners such as the St. John's Native Friendship Centre, Stella Burry Community Services, and the Coalition of Persons with Disabilities to ensure that we can recruit participants from vulnerable populations to participate and use the Itinerum app.
2. To understand travel behaviours using Itinerum, we will need to work with academic partners at Memorial University to implement machine learning methods that can detect which mode of transportation a person is using. These methods are currently widely in development and have been implemented by our academic partners.

Metrobus' transit MiFare smart card system was designed and installed by Payment In Motion out of Ontario. The system makes use of the MiFare Classic smart card produced by NXP Semiconductors. With the City purse already available on our m-Card, it is possible for a card holder to use one smart card for transit, parking, bike share, access to recreation, etc. The transit application is already in use.

Combining MiFare smart card data with the Itinerum data will allow us to understand what factors contribute to people using sustainable versus unsustainable modes of transportation and how travel time differs between the difference modes in St. John's.

Open Beacons

We will use Open Beacons (<https://estimote.com/products/>) at bus stops, on buses, and along cycling routes and walking trails to better understand not only those people who are using these networks, but also, the behaviours of people who are near the network but do not use it. For example, we will know from the Itinerum app where people are cycling and from the MiFare smart cards which buses people are getting on and off of. What we won't know, for example, is how many potential bus riders are there near a particular bus stop. Beacons can also be placed on bus stops and used for apps such

as BlindWays or BlindSquare, which guides blind pedestrians to the bus stop sign using reliable navigational clues. Crowdsourced visual clues help users navigate the last few final and crucial feet to the bus stop, improving inclusivity. Integrating Open Beacon technology with the Itinerum app will allow us to understand the potential for creating linkages with the transit, cycling, and walking network.

The integration of the data from the MiFare smart cards, the Itinerum app, and the Open Beacons will allow us to begin the development of our integrated data driven mobility network. Using these three data sources combined with machine learning technologies will provide us with a clear picture of the potential to increase the use of sustainable mobility and allow us to understand the impact of changes we make to the network.

2. Creating Change

The creating change technologies and approaches are designed to help St. John's understand and prioritize creating changes that will provide the largest impact in helping us achieve our objective. In some cases these approaches have already been used and in others new data collection and data analysis will be required.

Accessibility Changes

While building safer modes of transportation, we will also be working to integrate technology to reduce accessibility barriers. In the April 2018 Happy City Mobility Survey, 75% of respondents felt that St. John's was not designed for accessible transportation. 45% of respondents felt that the layout of the City does not meet their mobility needs.

[2]

The integrated mobility network will use smart technologies so that users can easily track transportation systems and plan the safest, most accessible route. To do this, we will need to encourage seniors and other residents to embrace simple, new technologies that are collect data to make moving around easier. The mobility plan can utilize smart technologies in consultation with residents and stakeholder groups working in the community on accessibility, inclusion and universal design to ensure that the system is working for the people, and not the other way around.

The fear of ice and falling is high among seniors, and finding accessible routes for persons with mobility restrictions is challenging in all seasons. Residents are slow to embrace cycling as an alternative mode of transportation because the systems and connectivity do not exist to make it a safe option, while walkability during the winter months presents added challenges when sidewalks are not cleared. Integrated smart technology will help us better inform residents when conditions are unfavourable, with a

system that provides multiple options for how residents can get around safely based on their preferred method of transportation. This includes using sensed technology to help residents choose frequently used and safer bike routes (Bike maps), walking and other forms of human powered transportation routes, well maintained and frequent shelters with free wifi to protect residents from the elements during public transit travel, sensed lights for night-time transportation, and convenient transfer nodes across the city in areas of intensification.

Transit and Cycling Network Changes

Efficient public transportation will be at the core of the mobility plan to leverage ridership to meet our challenge statement. Interconnected transportation technology will improve transit system efficiency and allow fluid movement throughout the city. In the Happy City Mobility Survey, only 3% of respondents used a combination of transit and cycling as the main method of getting around, while 73.5% made trips that combined the use of a car and sidewalks and trails. [2] Additionally, in the 2017 Bike St. John's Public Opinion survey only 6% of respondents used cycling "purposefully" which included getting to work, visiting a friend's house, etc., [3] while 33% they would use it more often if changes were made. We would implement a pilot project of GPS-based dockless bicycles with Dropbike or a related platform that will inform where people prefer to cycle currently in the City and inform future planning of routes.

Evaluating what could improve transit-bike connections while reducing reliance on private vehicular use in the city would be a priority and would require extensive data collection. Combining a pilot project of dockless bikes equipped with GPS and analyzing GPS on buses would provide an opportunity to measure improvements. City bus systems with GPS tracking devices allow passengers to monitor the bus schedule. When passengers are aware of the time and location of every bus stop, people are likely to follow the routine, resulting in buses filled to its capacity.

Existing accessible transit systems like the City of St. John's, GoBus can further help us collect and analyze user data to problem solve issues around efficiency for residents with mobility restrictions. 75% of respondents to the Happy City Mobility Survey were willing to use smart technologies to support an Integrated Mobility Network in St. John's. [2] Further consultation with users of accessible transit to see how best to engage use of technology to improve service would be a priority.

Our academic partners have developed a measure of public transit access for St. John's. This measure is based on previously published literature and includes a number of salient features related to public transit including stops, frequency and variety of service, and population characteristics. We will use this measure to better understand

where transit may be lacking in the City, and to prioritize key aspects of transit planning that will cause increases in sustainable mobility use. We also plan to develop similar cycling and trail access methods to understand and prioritize modifications to the existing cycling and trail network.

Trail Network Changes

The Grand Concourse Authority is a charitable non-profit that manages a trail network that was completed in 2005 with approximately 125 km of walkways, linkages and connecting sidewalk routes. [4] An interactive mapping website could be integrated with City apps and related technologies. [5] We will explore multi-use trail policies while supporting any implementation through continuous consultations with the public. This network has the potential to improve cross-town and regional access. Data analysis would expedite implementation of priority sections.

Snow Clearing Priorities

Snow clearing is a major issue in St. John's. Sidewalk clearing was identified in the 2018 Citizen Satisfaction Survey as having an 81% importance rating with only a 20% satisfaction rating. [6] There is even a Facebook group dedicated to the topic (<https://www.facebook.com/WinterSidewalksInStJohnsNewfoundland/>).

There are two challenges we plan to address with the snow clearing priorities objective. First, based on the data from Itinerum, we will develop snow clearing priority routes along sidewalks with critical amounts of pedestrian traffic. This will ensure that people will be able to walk along specific routes and be confident that the sidewalks will be cleared.

Second, along with our academic partners will be attempt to develop a method to use video data captured by snow plows to automatically detect whether a sidewalk is cleared. These data could be included in daily maps of St. John's that would provide information on where sidewalks are likely to be cleared and where they are not cleared. This would provide residents with the ability to use real-time data collection technologies to better plan their winter transportation and integrate walking as a mode of transport. See appendix for a snow heat map.

References:

1. Itinerum: <https://itinerum.ca/>
2. Happy City St. John's. 2018. "Happy City Mobility Survey". Pending Publication.
3. Bike St. John's. 2017. *Bike St. John's Task Force - Final Report*. January 25, 2017. Retrieved: http://bikestjohns.ca/assets/PDF/BSJ_Task_Force-Final_Report.pdf

4. Grand Concourse Authority: <https://www.grandconcourse.ca>
5. Grand Concourse Authority Mapping Initiative:
<https://www.grandconcourse.ca/mapping/>
6. City of St. John's Citizen Satisfaction Survey [in confidential annex]

Question 7:

Please describe the ways in which your preliminary proposal supports your community's medium and long-term goals, strategies, and plans. (500 words max)

City of St. John's Strategic Plan:

http://www.stjohns.ca/sites/default/files/files/publication/CSJ_Strategic_Plan_2015_05_25.pdf

The City of St. John's developed its first Strategic Plan in 2015, which is framed by existing supporting plans such as the Roadmap 2021 and Envision: Municipal Plan, as well as citizen and stakeholder engagement. Several of the influences shaping the Strategic plan coincides with our proposal, including: vehicular traffic, demands to improve infrastructure for pedestrian traffic, enhanced citizen engagement and citizen inclusion, demands for improved safety. The new strategic plan will be for the 2019-2021 timeframe.

Our integrated mobility proposal will support the Cities values of, doing things better; to be innovative and adopt new ideas and methods of delivering services by harnessing technology; create and support healthy safe and secure environments; and take ownership. While additionally supporting two of our six guiding strategic directions in the plan, including "A City for All Seasons" which is to support year round active transportation, support a weather resilient city, develop a winter strategy, and to be "Responsive and Progressive" becoming a welcoming and inclusive city, delivering comprehensive and responsive communications products and services.

City of St. John's Municipal Plan - Envision St. John's:

<http://www.stjohns.ca/sites/default/files/files/publication/Draft%20Municipal%20Plan%20with%20Appendices%20July%202017.pdf>

The Envision St. John's Municipal Plan is the city's principal planning document. It sets the vision for the city and considers the goals, strategic directions and policies that support the vision, while guiding growth and development over the next decade. Our proposal compliments the City of St. John's medium, and long-term goals and plans as we work to manage growth sustainably, while maintaining the uniqueness and character

that St. John's represents. Integrated mobility will support building a strong, diverse economy, the contribution of heritage to the culture and economy of the city, and our focus on creating healthy and complete neighbourhoods.

In this plan, the proposal would align with three key themes we are working toward. Vibrant, complete Neighbourhoods, supports our plan to create a healthy, walkable city with access to local services and spaces. Quality neighbourhood Design, supports increasing emphasis on compact, walkable residential neighbourhoods for improved social engagement and mobility. Finally, our proposed integrated mobility plan and use of smart technologies supports our Investment in Transportation and Services addressing transportation issues and building complete streets that enable safe use and access for all users, including vehicles, pedestrians, cyclists and transit.

Roadmap 2021:

<http://www.stjohns.ca/sites/default/files/files/publication/Roadmap2021.pdf>

The Strategic Economic Plan for St. John's is a long-term vision and action plan that provides a framework to guide the province's largest city through to 2021. Roadmap 2021 is about embracing new directions, leveraging opportunities, building partnerships, developing linkages and taking new approaches. Business and investment activity brings employment, opportunities and innovation. Our integrated mobility plan will nurture business, bringing employment to generate long-term, innovative economic activity. The Economic Plan's highlights St. John's desire to support initiatives, like a technology driven integrated mobility plan, and encourage dialogue for creative approaches to heritage, density and sustainability in through smart approaches and design.

Question 8:

Please describe your community's readiness and ability to successfully implement your proposal. (1,000 words max)

Residents of St. John's are engaged, energized and are interested in improving mobility. The results of the first Citizen Satisfaction Survey in 2018 identified widespread dissatisfaction with transportation and planning issues, including sidewalk clearing and public transportation.

Many of the City's initiatives planned for 2018 are centred around the topic:

1. Transportation Master Plan
2. Metrobus and GoBus Review
3. Paid Parking Management Strategy
4. Neighbourhood Mapping Initiative
5. Healthy Communities Northeast Avalon Alliance

The community has also responded energetically to the Smart Cities Challenge. Happy City's online mobility survey had 977 responses in 10 days. Our application for the Challenge received significant support from community organizations, bringing a wealth of expertise and resources to the Smart Cities Challenge.

While this level of community support represents a real opportunity, it also presents an organizational challenge. The City has responded to this challenge by forming a Challenge Committee, as outlined in Question 5, with experience coordinating community organizations and a mandate to make decisions quickly.

The City has significant experience managing complex, multi-stakeholder projects. In the past few years the City has been successfully managing the redevelopment of the City's historic Water Street, several major infrastructure projects, the introduction of automated garbage collection, and the addition of a major new subdivision.

These projects have succeeded because of the City's experienced and dedicated staff and its commitment to core values and standards: <http://www.stjohns.ca/city-hall/about-city-hall/corporate-and-operational-policy-manual>.

Key Community Partners:

Key Community Partner: Happy City

In the Happy City St. John's Mobility Survey respondents indicated support for using wearable devices and smartphones to aid in the development of the Integrated Mobility Plan.

Key Community Partner: Dr. Daniel Fuller

Dr. Daniel Fuller and team will allow this project to be fully implemented. Dr. Fuller is a Canada Research Chair in Population Physical Activity. Fuller is a lead for the

INTERventions, Research, and Action in Cities Team (INTERACT - <http://www.teaminteract.ca/>) a \$2 million grant funded by the Canadian Institutes of Health Research. Dr. Fuller is also the Neighbourhood Factors co-lead of the Canadian Urban Environmental Health Research Consortium (CANUE - <http://www.canue.ca/>). CANUE is a \$5 million Canadian research consortium.

Existing Data

The city already has considerable available data that will help develop the integrated mobility network. The data relates to public transit use, Urban Sprawl, Neighbourhood Active Living Potential, and Public Transit Access. Public transit ridership was 2.88 million in 2017.

Data Infrastructure and Analysis

The city with its various internal initiatives in partnership with our key partners, Happy City, and Dr. Fuller, and other community supports, have the experience with developing and maintaining large scale data infrastructure. We will use modern artificial intelligence and machine learning methods to analyze these data. The required experience, expertise, and infrastructure is non-trivial for a project of this scale and should not be overlooked.

Supportive Community Partners

Canadian National Institute for the Blind NL: a national voice to ensure Canadians who are blind or partially sighted have the confidence, skills and opportunities to fully participate in life

Canadian Hard of Hearing Association NL: non-profit charitable organization committed to the prevention of hearing loss

Canadian Mental Health Association NL: provides resources to maintain and improve mental health and community integration, build resilience, and support recovery

Seniors NL: offers the resources, connections, and information needed by seniors, their families, caregivers, and friends

Coalition for Persons with Disabilities NL: influences change and policy towards the advancement of inclusion

NL Human Rights Commission: responsible for promoting an understanding of, acceptance of, and compliance with the provisions of the Human Rights Act

Bicycle NL: governing body of cycling and cycling events in NL, serving the cycling community in education and promotion

Universal Design Network: promotes and increases awareness of universal design in our communities

St. John's Native Friendship Centre: a community-based, non-profit, registered charity, serving the urban Aboriginal population and broader community through celebration and support of Aboriginal culture

Choices for Youth: charity that supports at-risk and homeless youth secure stable housing, education and employment

Stella Burry Community Services: provides support and opportunities for healing and self-discovery through programs that affirm every individual's strengths and abilities

Municipalities NL: represents the 276 incorporated municipalities in the province

St. John's Status of Women Council: a feminist organization that works to achieve equality and justice through political activism, community collaboration and the creation of a safe and inclusive space for all women.

Consumers' Health Awareness Newfoundland and Labrador: provides support programs for mental illness in the province

Network of Disability Organizations: 19 organizations provide services and programming for persons with disabilities, including the Independent Living Resource Centre, Empower NL, and Easter Seals NL

Association for New Canadians: offers programs and services to the newcomer community

Canary Cycles: bicycle vendor

Community Employment Collaboration: links community agencies working in the area of employment in St. John's

St. John's Transportation Commission: provides enhanced customer service and an efficient transportation system for residents

Destination St. John's: provides information for visitors to St. John's

College of the North Atlantic: provincial public college

Essential Transit Association: promotes sustainable public transportation in the NE Avalon region.

Eastern Health: Mental Health and Addictions Services; assists individuals and families who have mental health and/or addiction concerns

Eastern Health: Health Promotion Division: works to support healthy communities

Genesis Centre: an award-winning innovation hub for technology start-ups

NL English School District: the de facto school board for Eastern NL

Centre for Research on Work Disability Policy: national research network aiming to identify how people, when disabled, can be better retained and integrated into the labour force

Disability Inclusion Group of Memorial University: collaborative group at Memorial University to promote better disability inclusion at Memorial University and develop a Disability Studies curriculum for Memorial students.

NL Brain Injury Association: a non-profit advocacy organization which strives to improve the quality of life of survivors of brain injuries, their families and friends.

Memorial University of NL: the province's only university.

MUN departments and organizations: Harris Centre, Graduate Students' Union, Sustainability Office, Faculty Union.

Neighbouring towns of Portugal Cove-St. Phillip's and the Conception Bay South.

Question 9:

Describe your plan for using the \$250,000 grant, should you be selected as a finalist. Provide a high-level breakdown of spending categories and an accompanying rationale. (500 words max)

Over the past three weeks, a large community effort has enabled us to prepare a high-level overview of the situation and a list of possible solutions and improvements. We will focus our spending of the \$250,000 on two primary aspects. First, we will use funds to hire 2 new staff members, a data scientist and an engineer. These staff will focus their work on laying the groundwork for a successful \$10M application. These staff will conduct our mapping and integrated mobility network planning related to transit, cycling, walking, and snow clearing. The staff will also conduct pilot work, in conjunction with our partners, to ensure our new technologies, MiFare cards, Itinerum App, Open Beacons, and Dockless Bikeshare can be scaled for a major data collection. This pilot work will focus on gathering early data, informing cost estimates, analyzing data we collect (using committed in-kind donations), and consulting with our community partners. In short, our goal will be to develop our plan, pilot test, and be successful in winning the \$10M.

Second, these staff will continue the work of community consultation and develop to ensure that our full application meets the needs and address the challenges our community members face related to integrated mobility.

1. Investments in New Technologies and Data Analysis:

Open Beacon pilot project: \$4,500

We will purchase 100 Beacons and install them at specific locations in St. John's in order to pilot test their feasibility for understanding how many people are at a specific location and for pilot testing the integration of the beacons with the Itinerum App.

Dockless Bicycle pilot project: \$8,000

We will purchase 20 dockless bicycles and launch a pilot Bikesharing program in St. John's. We will collect data from the bicycle location to inform our data driven integrated mobility network.

Secure data storage and cloud: \$2,500

We will invest in secure data and cloud storage to ensure the data we collect are safe and secure.

Itinerum app: \$35,000

The Itinerum App will be used and new features will be added including integration with Beacons.

Data analysis staff: \$80,000

A 1 FTE Data Analysis staff person will be in charge of developing some of the innovations we describe, along with in kind contributions from our community partners. The staff will also focus on preparing scalable hardware and software infrastructure to ensure that we can scale for the \$10M prize.

Total: \$130,000

2. Management time devoted to improving service delivery and efficiency of the organization

Experienced engineer or planner to work exclusively on final proposal for 1 year:
\$120,000

1 FTE engineer or city planner will be hired to work in the planning and development of the integrated mobility network. This person will lead the work of collecting data about transit and cycling networks, walking trails, and informal networks. They will also lead community consultations and engineering work for our integrated mobility network.

Question 10:

Describe the partners that are or will be involved in your proposal. Where partners are not yet determined, describe the process for selecting them. (500 words max)

Happy City St. John's: a St. John's-based community organization with the mission to inform, encourage, and facilitate civic dialogue in the city of St. John's. Happy City has a proven record of engagement in the City of St. John's, and has led the public engagement elements of the process. They have provided continuous promotion and engagement with public through online communication channels, an online survey, in-person consultation sessions, and collection of commentary from residents. Happy City will continue to be a partner in future stages.

Dr. Daniel Fuller, Canada Research Chair in Population Physical Activity, Memorial University of Newfoundland: Dr. Fuller is currently leading or co-leading two large scale national research projects related to smart and healthy cities. In addition to providing evidence of community readiness, Dr. Fuller has also been a key advisor for this proposal. He will continue to advise in future phases, and will be directly involved with the development of our smart cities approach.

Healthy Communities - Northeast Avalon Alliance: a regional alliance which takes a collective impact approach involving leaders from various disciplines, sectors, and levels of government to improve the physical and mental health and the inclusion and safety of residents on the Northeast Avalon region of the province. Including more than 40 partners from 21 sectors in the province, it will contribute as an advisory resource throughout future phases.

Harris Centre, Memorial University: hub for public policy and regional development. The Harris Centre will connect our team with healthy community initiatives recently undertaken at the University of the Sunshine Coast in Australia for advice on their process. The Harris Centre will continue to be a partner in future phases, providing valuable insight and guidance with regard to how our smart cities approach can be supported by provincial public policy and regional development.

Coalition for Persons with Disabilities NL (COD-NL): COD-NL has been engaged as a partner from the beginning of this process, providing valuable insight on how to ensure an inclusive approach to our smart city. COD-NL will continue as a partner in future phases to ensure an inclusion lens throughout.

Other existing community partners include the St. John's Native Friendship Centre, the Royal Newfoundland Constabulary, Choices for Youth, and Stella Burry Community

City of St. John's, Newfoundland and Labrador

Services; all of whom have provided and continue to provide expert advice.

We will strengthen these and other community partnerships in order to engage members of the community who can be more vulnerable to social exclusion and isolation due to a lack of access of equitable transportation options.

Our team has continued to recruit new partners throughout the process, and we anticipate further partners to join in future phases. In particular, given the smart technology aspect of this project, we will be seeking partners in the technology sector.

The Genesis Centre, an innovation hub at Memorial University, will play a key role in recruiting partners from the technology sector to bring this application to fruition. We have begun reaching out to request expressions of interest from entrepreneurs in the province.

Question 12:

Provide a 200-word summary of your preliminary proposal. You may also provide an image that represents your preliminary proposal.

St. John's has a mobility problem. A combination of challenging hills, some of Canada's worst weather, and extensive sprawl has created a city – and a culture – dominated by the private car and hostile (or at best, indifferent) to active and sustainable transportation. This version of mobility excludes huge segments of the city's population – seniors, people with disabilities, people living with low income, and the many people of all ages who would rather get around differently. An integrated mobility network will change that.

The network we plan for St. John's will implement many new data-collection tools including measures of transit access, cyclist tracking apps, and ways of leveraging transit smart card data. Open beacons will build an understanding of the movement of people who are near the network and don't use it, and sensors will provide street-level data on ice conditions to facilitate active transportation in all seasons. At the same time, we will be implementing improvements to our transit and active-transportation infrastructure that leverages this data to speed trips and improve user experience.

Taken together, this will build a city where our citizens will be more free to move the way they want to move.

St. John's a un problème de mobilité. La combinaison de la topographie, des pires conditions météorologiques du Canada et de l'étalement urbain a créé une ville - et une culture - dominée par la voiture privée et hostile (ou, au mieux, indifférente) au transport actif et durable. Cette version de la mobilité exclut d'énormes segments de la population

de la ville - les aînés, les personnes handicapées, les personnes à faible revenu et les nombreuses personnes de tous les âges qui préfèrent se déplacer différemment. Un réseau de mobilité intégré va changer cela.

Le réseau que nous planifions pour St. John's mettra en œuvre de nombreux nouveaux outils de collecte de données, y compris des mesures de l'accès au transport en commun, des applications de suivi des cyclistes et des moyens de tirer parti des données des cartes à puce. Les balises ouvertes permettront de comprendre le mouvement des personnes qui se trouvent à proximité du réseau et ne l'utilisent pas, et les capteurs fourniront des données au niveau de la rue sur l'état des glaces pour faciliter le transport actif en toutes saisons. Parallèlement, nous apporterons des améliorations à notre infrastructure de transport en commun et de transport actif qui tire parti de ces données pour accélérer les déplacements et améliorer l'expérience des utilisateurs.

Pris ensemble, cela construira une ville où nos citoyens seront plus libres de bouger comme ils veulent.

Question 15:

Please identify the point of contact for the application.

- Name: Maggie Burton
- Title and affiliation: Councillor, City of St. John's
- Phone number: 709-740-0982
- Email address: mburton@stjohns.ca

Question 18:

Please select the focus area of your preliminary proposal.

If your preliminary proposal seeks to achieve outcomes that span more than one area, you may choose up to two.

- Healthy living and recreation
- Mobility

Question 19:

Select all the community system/service areas expected to be implicated in your preliminary proposal.

There is no limit to the number of community systems/service areas you may select.

- Economic development
- Environment
- Land use planning and development
- Public health
- Recreation and parks
- Roads and transportation

Question 20:

Select all the technologies expected to be implicated in your preliminary proposal.

There is no limit to the number of technologies you may select.

- Artificial intelligence (AI)
- Assistive technology
- Autonomous and connected vehicles
- Big data analytics
- Geospatial
- Health or Medical technology
- Internet of Things (IoT)
- Mobile applications
- Networks
- Open data platforms
- Payment platforms
- Sensors
- Video analytics
- Wearables