

# Smart Cities Challenge

City of Fredericton & St. Mary's First Nation

March 2019

**Fredericton**



## A City to Like, Share and Follow

A poem written for the City of Fredericton & St. Mary's First Nation joint Smart Cities initiative (read at the joint Council briefing on January 30, 2019)

On the bus ride home, I watch a video of a Fredericton 5th grader who used her allowance to buy coffeeshop gift cards for the homeless in her neighbourhood. It's been a Shakespearean winter for those living rough, one of discontent and thin tents—a child can see that. I want a city as compassionate as that 10-year-old, chatting with strangers outside the community kitchen like she's with old friends; a city as warm as the hand-knit scarves tied around street poles and fences alongside the water treatment plant for those in need of heat, of comfort. I want a city that recognizes me in the same way that the vendors at the Boyce Farmer's Market do on a busy Saturday morning, knowing my name and what I do for a living, that the Guinness aged cheddar I buy pairs well with the sweet apple cider from the next stall over, that I live around the block and it's a short walk. I want a city that's a friend and an ally to St. Mary's First Nation; a city that connects with its residents like the Bill Thorpe marries the North and South sides. I want a city old as the Wolastoq River and as current so fewer friends leave to go out west and instead take root, I want to retain our youth. I want a city as smart as its population, as its university town reputation: UNB and STU, NBCC and the College of Craft and Design nourishing artists and scholars, blue-collars and doctors. I want a city that's accessible, easily navigable, multilingual, a city that is a home, a safe-haven, a welcome wagon. I want a city that's tech-savvy and customizable, a city to like, share, and follow.

Written by Jenna Lyn Albert, Poet Laureate for City of Fredericton

## City of Fredericton & St. Mary's First Nation Partnership



*St. Mary's First Nation Band Council and Fredericton City Council at their joint gathering on January 30, 2019.*

# Executive Summary

Our original **Challenge Statement** that we created for our application is:

My city does not recognize me or connect me to what matters most; Fredericton will collaborate with First Nations to create an accessible, welcoming, supportive city for youth, newcomers, and an aging population, empowering everyone with a Personalized Inclusion Plan that connects people to create an exceptional quality of life.

Over the course of the finalist phase, we engaged further with stakeholder and residents, tested out concepts and ideas, and refined our **Vision** for our Smart Cities Proposal:

Fredericton & St. Mary's First Nation are collaborating to create an accessible, welcoming, supportive community, starting with youth, newcomers, older adults, and persons with mobility-related disabilities; recognizing what is important to individuals and connecting them to what matters most, empowering residents with personalized digital tools, data & technology that enable them to create an exceptional quality of life.

To achieve this vision, we're proposing to carry forward the main initiatives that we set out in our original application, including the **Digital Fredericton** transformation initiative, the **Digital Community Hub** (formerly Smart City Dashboard/Real-Time Census), as well as three other community initiatives: **Doorable**, **Non-Profit Data Collaboration**, and **Road Home Digital Platform and Enablement**.

The initiatives we're proposing will offer more meaningful ways for community **Engagement**. We're using human-centred design to involve residents throughout the process of designing solutions, tailoring them to their unique needs. We've developed a unique model to discover who our residents are, gain deep insights about their aspirations and challenges, generate ideas for solutions, and co-create and test solutions with the community. We've piloted this approach with the key initiatives during the finalist phase, which generated key insights guiding this proposal and leading to the creation of four prototypes. We've also widely and deeply engaged community stakeholders throughout our Smart Cities Journey, developing partnerships and working relationships to deliver the initiatives in this proposal.

We've scoped out each of the key initiatives in **Project Management**, defining the goals and deliverables and resource requirements, while using an overall, coordinated approach for procurement, communications, risk management, and monitoring/managing issues.

We built our **Performance Measurement** plan across three strategic areas, aiming ultimately to achieve our vision to through three long-term outcomes:

- Developing a detailed community profile with richly defined segments and needs.
- Providing more efficient and targeted services that address needs, working in an end-to-end environment that puts resident engagement first.

- Connecting people to what matters, increasing inclusion through the uptake of personalized digital tools.

We've developed the deliverables and performance milestones that will trigger progress payments of the prize money. We've also outlined an approach to monitor, report and evaluate progress on performance at monthly and quarterly intervals

We have crafted a **Technology** architecture to achieve these outcomes, creating new user experiences and rich data sets and augmenting the workforce. We've designed the architecture across layers – from sensors and edge devices through to smart algorithms. Our technology selections are guided by principles to ensure interoperability, extensibility, scalability and replicability to achieve and sustain our technology vision. The technology architecture will be able to respond to rapidly changing technology environments. The proof of our technology is in the prototypes. We've demonstrated all layers of the technology architecture in action to provide sharply tailored personalized experiences using connected technology and data.

In terms of **Governance**, our Fredericton Smart Cities Task Force will oversee the implementation of our Smart Cities proposal. The Task Force includes representatives from City of Fredericton, St. Mary's First Nation, committee leads for the main initiatives and as well as stakeholders to provide academic, commercial and social oversight. The City and St. Mary's also intend to enter into a Friendship Accord, which will build on the governance structure to offer a framework for continued collaboration on this and other broader community issues of mutual interest. We have plans for program administration and implementation and have developed a number of partnerships with stakeholders to deliver our proposal outcomes.

We went through an intensive process to develop a plan for **Data and Privacy**, particularly as it relates to protecting personal information. We've completed a PPIA that examined each of the main initiatives in our proposal and outlines the risks related to privacy and planned measures to minimize those risks and comply with privacy legislation and standards. We've summarized those risks and plans to protect data and privacy in this proposal.

To meet the **Implementation Phase Requirements**, we've outlined the approach that we will use for consultation between St. Mary's First Nation and City of Fredericton, as well as our intention to provide employment and/or procurement opportunities for youth/ Indigenous peoples, small-to-medium-sized social enterprises, and women under the Community Employment Benefits initiative.

As part of the **Financial** plan, leveraging other sources of revenues and investment to increase the impact of the initiatives, including investments from the City of Fredericton, its wholly-owned subsidiary e-Novations Comnet Inc., and in-kind investments from technology partners. We used similar experiences, industry standards, estimates from vendors for specific items, agile development, and detailed cost breakdowns of project subcomponents

- to estimate costs and minimize finance risk.

## Vision

“Not everyone has the same needs & wants – but everyone has needs and wants.”

**City of Fredericton Mayor Mike O'Brien**

“Everyone matters. The City of Fredericton and St. Mary's First Nation are thinking outside the box so that we can develop and plan for today, tomorrow and the future.”

**St. Mary's First Nation Chief Alan Polchies Jr.**

Imagine a *Smart City* where all residents are recognized and connected to digital services and resources they need 24/7 on a personal, interactive level.

Imagine an *Accessible City* where there are no barriers, doors wirelessly open, and you can easily find available, wheelchair accessible parking.

Imagine an *Inclusive City* where no one is left behind, and the most vulnerable are digitally enabled and expedited on a path for sustainable living.

Imagine a *Digital City* where free WiFi and open data access fuels new startups – enabling residents to create networks and design solutions addressing community problems.

Imagine a *Caring City* where non-profit organizations in the community are connected to provincial and municipal data infrastructure to influence policy development and drive evidence-based decision-making to improve the lives of residents.

## Our Smart Community Vision

Fredericton & St. Mary's First Nation are collaborating to create an accessible, welcoming, supportive community, starting with youth, newcomers, older adults, and persons with mobility-related disabilities; recognizing what is important to individuals and connecting them to what matters most, empowering residents with personalized digital tools, data & technology that enable them to create an exceptional quality of life.

## A Look Back at Our Smart Cities Journey

When the Smart Cities Challenge was first issued in November 2017, **Fredericton set out to determine through wide-ranging engagement what the biggest challenge facing our community was and how we could solve it using data and technology.** Through an extensive engagement process, we received hundreds of responses from the public through surveys (online and in paper copy), with a game app, using social media and emails to networks of community stakeholders.

What we found was that people had an incredible wide range of issues and solutions in mind. While we found **the biggest issue facing the community is different for each person,**

the commonality is that everyone has desires and needs that could be better met. People expressed a desire for the City to better understand the needs of residents through improved data and targeted services to individuals based on their needs.

We saw a unique and historic opportunity for St. Mary's First Nation and Fredericton to partner together in this ambitious and important endeavour. **Both communities remain committed to work together to develop innovative solutions** to issues we share as well as the issues that are unique to our communities. We consider this the launching point for a future Friendship Accord.

We collaborated and consulted deeply with the community to create our application and our proposal through our Smart City Task Force and its committees. More than **40 people from 20+ organizations** have been directly involved during the finalist phase in creating this proposal and moving forward its key initiatives, with additional stakeholders being engaged through individual projects. **Residents have also been directly involved in the design and creation of the solutions proposed** through the use of deep one-on-one conversations and observation, online survey responses, user-centred design workshops and focus groups, and testing the prototypes. (See *Engagement* for more detail.)

Before we entered the Smart Cities Challenge, we held a number of broader community engagement efforts that, together with the engagement efforts we undertook in the application and finalist phases, have helped inform our proposal:

- **Imagine Fredericton** – involving 2,800 people over 85 days to articulate the vision for the City as it grows, including the importance of being a welcoming and supportive community.
- **Digital Fredericton** – engaging more than 120 staff from across the City of Fredericton at every level on how the City can improve operations for better service.
- **Partnering for Impact** – 72 people from 30+ non-profit organizations coming together, identifying that to collaborate on shared concerns, there is a need to enable data collection, collaboration and measurement in the non-profit sector.
- **Age-Friendly Survey** – more than 900 older adult survey respondents identifying what they like about the community and what could be improved to make it more welcoming and safer for older adults.
- **Open Space Forum on Homelessness** – involving 40+ faith-based groups, highlighting the need to better coordinate efforts of these groups for those experiencing poverty and/or homelessness.
- **The Road Home: A Plan to End Homelessness** – consulting more than 130 community stakeholders including frontline workers at homeless serving agencies and people who have lived experience with homelessness, identifying that shared data management is a key feature to better serving people who experience homelessness in the community.

One of the key insights we had in the lead up to our original application was that **we could not be a smart community if we left behind the people that are most likely to be under-engaged – those who often experience vulnerability, marginalization or exclusion**. We decided that a smart community respects, values and facilitates the contributions and talents of all residents and accepts and embraces our diversity.

We created our challenge statement to focus on community collaboration to create a welcoming, supportive and accessible community for all by recognizing and connecting people to what matters most to them. We set a bold aspiration in our application for the **primary outcome** we wanted to achieve – to identify citizens' unique needs, connect them to personalized services and resources that meet those needs using enhanced data tools, and to develop new collaborations and partnerships to achieve it.

Connecting culturally is important for a sense of inclusion and belonging. For First Nations, language and culture are core to identity; reconnecting with customs and language are important in restoring a personal sense of inclusion and rebuilding national identity. **Applying a cultural lens to our digital tools will result in services that are both sensitive to these needs and direct in address them.**

“Our Smart Cities Challenge proposal addresses the issue of belonging. It’s so important to foster communities where every citizen has the opportunity to belong; where barriers are broken down so that every person can access the benefits and advantages of their community. Working on this project has brought the community together and generated an awareness, sensitivity and motivation to design tools that enable and promote the inclusion of those who have not been adequately serviced and/or aware of services that exist. Through the Smart Cities Challenge, experts in every field are contributing their knowledge and skills to create a sense of belonging to make our city the best it can be for all its residents.”

**Kate Rogers | Executive Director, Fredericton Community Foundation  
City Councillor**

What we propose is **a fundamental shift away from community leaders and service providers needing to rely on assumptions** of what the needs and wants of the community are and how they serve them. This is a necessary shift.

For example, we saw through the Imagine Fredericton exercise in 2016-2017 that the city will change significantly over the next generation, with a likely 50% increase in population by 2041, largely growing through immigration (like the rest of Canada). This will massively increase demand for services. We’ve also seen over recent years that people expect immediate access to services – government services included – and that people expect services to be maintained, even improved, without necessarily paying more. We must have a continual pulse on who is in our community and be able to adapt to their needs and aspirations. This is also critical in terms of having talent to fuel our local businesses.

## Looking Ahead – What We Propose

We will create modern Smart City digital infrastructure that will enable us to recognize who is in our community and what is important to them, connect them to what matters most, and enable collaboration to create a welcoming, accessible, inclusive, supportive community. Our overall guiding approach to achieving this is to:

- **Understand our resident landscape and define aspirations for the desired experience** to enable the development of prototype solutions for service improvement.
- **Modernize and integrate core digital infrastructure** and systems to enable more efficient and targeted services and increased collaboration.
- **Connect aggregate and de-identified data** from a wide variety of sources to build a detailed community profile/census with richly defined segments and needs.
- **Develop more accessible digital tools and connected technologies that are personalized and support the inclusion of residents**, enabling people to connect more to what matters to them in the community.

Our proposal demonstrates the advancement of and continued focus on the initiatives that we proposed in the original application to recognize and connect people to what matters, including:

- the **Digital Fredericton** transformation initiative
- the **Digital Community Hub**
- Connected Community initiatives (**Doorable, Non-Profit Data Collaboration, and Road Home Digital Platform and Enablement**)

## Digital Fredericton

At the **epicenter of our Smart City aspiration** is the need to completely change and modernize how the City operates, serves residents, and collaborates with community. The Digital Fredericton transformation initiative represents a five-year journey to become a more flexible, efficient, responsive, and transparent government that works with community partners and focuses on what matters most to residents. This means a focus on delivering experiences to residents instead of services, establishing new collaborative working relationships, and engaging with our community in new and meaningful ways. There are three key layers to make this happen in a structured and integrated way:

- **Layer One: Core Foundation**  
*(becoming a more efficient organization to better serve citizens)*  
This is about transforming how the City runs its business with standardized and efficient processes through modernizing systems and IT infrastructures and establishing metrics that matter. As the City gains efficiencies inside the organization, it will reallocate human talent to improve or extend citizen services. Putting these digital core systems in place will provide more accurate and detailed data that will bolster the City's human resources with new insights and data-driven knowledge. It orchestrates an augmented workforce that is both efficient and customer-focused.
- **Layer Two: E-Government**  
*(transforming services for citizens)*  
This work involves enabling better digital citizen experiences through easy, intuitive access to technology-enabled services that are available 24/7. It's about putting systems in place to better understand and communicate with residents and businesses in real-time to address priorities and needs to make more effective, more resident-centric decisions.

- **Layer Three: Connected Community**

*(connecting community partners for innovation at the edge)*

This involves working collaboratively with partners in our knowledge ecosystem to continue to enhance services through innovation, becoming a living lab for solutions. It means making data easily accessible, enabling online collaboration and participation from the public and community stakeholders to develop improvements in the community that will help citizens experience life in extraordinary ways.

The transformational work undertaken through Digital Fredericton will make it possible to have both the human and foundational digital infrastructure resources necessary to make possible the other initiatives we feature as part of our Smart Cities Challenge proposal.

Much work has begun with the Core Foundation over the past year, with implementation of key internal systems. To set the stage for the work to be undertaken as part of the implementation phase for this Smart Cities proposal, a Citizen Experience Strategy will be undertaken to define segments and understand the overall aspirations of the customer.

## Digital Community Hub

In order to enable new community collaborations, innovation and to get a picture of our community, we propose creating a City of Fredericton and St. Mary's First Nation Digital Community Hub. Currently, information and data about what's available and happening in our communities and the people in them is extremely fragmented and siloed, collected by a wide range of government, academic, non-profit and business sources. How can we connect people to what matters if organizations and individuals don't have a unified, complete, evidence-based picture to understand what is available and where gaps are?

The Digital Community Hub will combine aggregate data from shared data platforms and disparate data systems to create a multi-level hub – creating rich, open data on and for our community, opportunities for unique collaborations on issues that matter to residents, as well as personalized access to what matters most to people. This hub will bring together both existing data and applications as well as new ones developed through the work described in this proposal. The goal is to create a seamless, integrated resident experience, tailored based on the needs and preferences of the individual.

### Components of the Digital Community Hub

#### Smart City Dashboard

Allowing for transparent measurement of community performance based on established smart city indicators (e.g. livable community, mobility, safety, environmental stewardship)

#### Cause-Based Hubs

Enable organizations to contribute data and work with like-minded organizations on issues or community interest and evaluate the effectiveness of their work

#### Personal Digital Inclusion

Enabling individuals self-serve and personalized access to resources, tools, people and services they need in the areas that matter most to them

#### Resident Contribution

Enabling individuals to voice their need / report an issue and to contribute based on a community need (e.g. volunteer, develop an app, report a problem, add individual perspectives to community issues)

## Connected Community Initiatives

### Doorable (Developed by Appdigenous)

People with mobility-related accessibility challenges experience a number of barriers, even when something is purportedly designed for them. The existing “push buttons” on accessibility doors are often blocked, not functioning, awkwardly placed, or simply not easily used by people who have limited mobility in their arms and hands.

Doorable, developed by early-stage startup Appdigenous, is an Internet of Things solution featuring a multi-functional mobile app & custom designed hardware. It will help reduce barriers by wirelessly opening doors through a smartphone/tablet app. It will further help in identifying and reducing accessibility barriers by mapping the accessible city, creating a platform for app users to communicate directly with each other and facilities about accessibility barriers, and building data through interactions between citizens and infrastructure. The technology will integrate with the Digital Community Hub to help offer more robust information and data around accessibility and related challenges in our community. This project would make Fredericton and St. Mary's First Nation an early adopter test bed for the technology and a product development living lab for accessibility in Canada. Testing has already begun and is revealing insights on how the physical shape of our cities can profoundly hinder or enhance full participation in civic life. Appdigenous has, as part of this process, already developed concrete plans to expand into communities across the province and country with this next generation technology.

### Non-Profit Data Collaboration

Many non-profit organizations (NPOs) lack expertise in data-driven outcome evaluation and measurement and miss out on the benefit of using data to best inform the decisions and policies they make. Government departments across Canada do not have robust access to data related to the frontline services of non-profits, which is a huge gap in information for policy development. NPOs want to go beyond siloed agency-specific data and be able to compare and link their data to other open data sources to gain a more holistic understanding of the impact of the services they provide on community.

Through this project, we will build the NPO community's capacity to collect data, establish measures and integrate with other public data. It will involve working with NPOs on establishing meaningful measurements, standardizing how to collect data, and how to link it with other data that is available to be able to measure efficiency and impact, improve access to funding, identify gaps and improve services. This project will allow agencies to collaborate and access data at a community level through the Digital Community Hub in cause-based hubs. Secondly, through the New Brunswick Institute of Research, Data and Training (NB-IRDT), one of the most secure data centres in Canada, it will allow government, non-profits, and researchers to secure aggregate/anonymous data on the impact of their services which can be cross-referenced with community demographics. You can see more about the process of how data is shared through NB-IRDT in this video:

<https://www.youtube.com/watch?v=vUrkCUyFunM>

## Road Home Digital Platform & Digital Enablement

Our homeless serving agencies are continually dealing with resource constraints to help their clients move along the continuum of care to achieve stable housing. These agencies lack the technology most organizations take for granted to operate efficiently and effectively. Clients often have to tell their story multiple times when they present themselves at homeless serving agencies that can and do work together to help them.

Adopting a shared digital platform through HIFIS4 (the latest version of the federal government's Homeless Individuals and Families Information System) will allow for shared case management and provide agencies with quick, accurate information to help better support clients, securely capture aggregate data, and generate useful reports to track performance and needs at an agency and community level. The plan is to expand HIFIS4 across the homeless-serving system to enable a coordinated approach to serving clients. For individuals, this system will reduce the need for them to re-tell their story to multiple service providers and help them connect to services along the continuum of care more effectively. To further enable this connection, we're also proposing to expand access to free, high-speed Internet in the shelters and in public places, as well as enhance and design new self-serve digital personalized inclusion resources for this segment as part of the Digital Community Hub.

## Ongoing Development of Connected Community Applications

There are many more solutions that our focused iterative model will produce and refine. Connected Community applications will be based on the insights we gain from understanding residents more deeply and developing solutions to help recognize and connect them with what matters personally.

Through the finalist phase, we continued to uncover new opportunities using the model of dialogue with a segment to learn about the needs of people in that segment and then involving them in user-centred design to co-create a prototype. In one example, we partnered with a local startup to prototype an app for newcomers to connect them with a personalized tool designed to help facilitate their inclusion.

Our vision includes ongoing mutual learning about the data and technology opportunities within First Nations. This proposal recognizes Indigenous rights to self-determination. Under Indigenous control and directed by staff hired from Saint Mary's First Nation, the team will develop technologies and applications that match the aspirations of Indigenous people and are culturally sensitive to First Nations' needs.

## Smart City Internet of Things (IoT) Telemetry

- Resident experiences can be personalized in real-time with data about the status of services that impact them.

- Cities deliver many common services to residents using infrastructure, public spaces and assets that are spread across a large geographic area. Telemetry is an automated communications process by which measurements and data about infrastructure and public

services are collected at remote geographic or inaccessible points and transmitted to receiving equipment for monitoring.

Services can be optimized and personalized using real-time and historical data. Real-time data about the availability of a parking space, the status of a transit bus, the current river height during a flood, soil condition at sports fields after rain, air quality, noise level, current snow clearing and garbage routes and road conditions will be pushed from our LoRaWAN IoT network to our open data portal and accessible through application program interfaces (APIs) for consumption by Connected Community applications, third party developers, and internal City operations.

## Our Repeatable Community Model

With the Digital Fredericton transformation initiative and Digital Community Hub providing the foundation, we have developed a repeatable community model to recognize and connect residents with what matters to create an accessible, welcoming and supportive community through the use of personalized digital tools and data, achieving the transformation we envision. First, to get an overall picture, we will undertake the Citizen Experience Strategy to identify and learn more about resident segments in our community. Once we have the overall experience defined, we will conduct in-depth learning on each segment and develop solutions in response to the unique needs and aspirations of residents. Below is an outline of the process (see *Engagement* for more details).

- We will **deeply get to know each segment** (beginning with those who are most likely to have experienced marginalization or exclusion) **and their experiences through direct interaction** using ethnography. Ethnography means having deep one-on-one conversations and interactions with people to understand day-to-day experiences of residents, what's important to them, and what barriers/challenges prevent them from having a great day in the community. We will supplement this approach with engagement through the resident contribution feature on the Digital Community Hub to confirm insights and offer broader opportunities for people to identify barriers they face to their quality of life.
- Based on the research, we will use **journey and empathy mapping** to develop insights about what matters to people in that segment. We also use the research to develop distinct “personas” within the segment (a resident profile that brings together specific types of similar experiences and behaviours within a segment).
- We will then engage and connect with community partners (e.g. NPOs, entrepreneurs, tech businesses, etc.) to **ideate potential solutions** based on the insights using connected data and technology.
- We will **co-design the solutions with residents** from the segment and work with community partners to **develop prototypes** of personalized digital tools, data and technology using user-centred design workshops.
- We will bring the applications and data from the developed tools and technology into the **Digital Community Hub**, which will feed back into the cycle by further giving us insight into the challenges and aspirations of our community. This will contribute to the

metrics that enable better policy and decision making and offer richer, personalized information tailored to each individual's unique set of needs and preferences.

This model isn't a straight line – it's an iterative cycle. We will continually go through the process of taking what we learn from each segment through the engagement, ideate on solutions, prototype, test and build more data and insights to improve on those ideas and develop new ones.

## Outcomes

Through the initiatives we propose, we will achieve our **primary outcome** of identifying residents' unique needs and connecting them to personalized services and resources that meet those needs using enhanced data tools. We will do that through the following key related outcomes (see more detail in *Performance Measurement*).

- Improve the quality of life by making it easier for citizens to access all services provided by the City and for the City to push out information that is meaningful to citizens.
- Use customer relationship management (CRM) systems and move more staff to customer-facing roles to create a more personal, welcoming city, enabled by efficient, technology-driven processes.
- Create a multi-level hub to create a channel for interactive government, personalized access to services and activities available in the community, and a place where the community can collaborate on key quality of life issues, bringing together both traditional & non-traditional partners to deliver on common objectives.
- Increased economic vitality and job creation through the development of new technologies resulting in the creation of new startups and new opportunities for existing businesses, as well as increased participation of underrepresented groups in the job market due to increased accessibility and connection to needed supports.
- Recognizing that language and culture is identity and the importance of these for Indigenous people, enable an Indigenous cultural resurgence through digital technologies that youth and elders can use to connect with their language and heritage.

“Indigenous community members of all ages use digital technologies – in particular social media. A holistic approach to digital technology can support Indigenous language and cultural resurgence.”

**David Perley | Director of the Mi'kmaq-Wolastoqey Centre**

“Language is identity. It's the foundation. This is the International Year of Indigenous Languages. We have a prime opportunity to remove barriers to learning our language.”

**Chief Alan Polchies Jr. | St. Mary's First Nation**

- Empower the City's non-profit agencies to make data-based decisions that will help them to better serve their clients and our community and be able to contribute to the community-level data.

“Shared data within and from the non-profit community will enable a full conversation with all social sector stakeholders who are working with the most vulnerable members of our community day-in, day-out. The greatest benefit of this project will be how shared data enables government, business, and community partners to collaborate on the solutions to the most pressing problems facing our community. As a community, we are striving to achieve bold targets to address deeply entrenched social issues; without shared data, we cannot really know if our efforts are amounting to the change we desire, or why they may not be working. You can't manage what you don't measure. Data and results are essential in making sound social and public policy decisions, and so often we are limited to making important decisions based on hunches or anecdotes.”

**Jeff Richardson | Executive Director, United Way**

- Enable a more accurate assessment of the housing and support needs of people experiencing homelessness in our community and reduce their need to tell their story multiple times through enabling shared case management and resource allocation between homeless-serving agencies.
- Making the physical infrastructure of the city more accessible, and movement through the public space more fluid, making it easier for people with mobility-related accessibility challenges to live and get around their community with fewer barriers.

“AbilityNB applauds the leadership of the City in seeking solutions to accessibility challenges with our City to ensure everyone can live work and play in our community. Universally designed communities and programs are essential so all residents of a community can actively participate. More than 73,000 New Brunswickers live with a mobility disability – the most common disability type in NB. At 26.7% of the population, New Brunswick has the second highest rate of disability in Canada. A disability lens on policy, infrastructure and program development is critical.”

**Haley Flaro | Executive Director, Ability NB**

## Progress Towards Outcomes During Finalist Phase

During the finalist phase, we focused on further developing this final proposal while also making significant progress towards these outcomes and testing our approach. Over six months, we put systems in place and tested out the ideas and concepts we're proposing, conducted research on some of our priority segments and accelerated the development of key prototypes of solutions for them.

<p><b>Building core foundation</b></p>	<ul style="list-style-type: none"> <li>Engaging more than 120 City staff to select, test and configure technology tools to assist in streamlining business operations. Modernizing our approach to internal systems has driven results for staff and gained efficiencies that are being re-invested in delivering value to citizens.</li> <li>Built most of the City of Fredericton's core digital foundation through implementing an enterprise resource planning cloud solution (Canada's first cloud-based municipal core), enabling staff with modern technology and corporate standard processes to be more efficient in their operations.</li> <li>Freeing up staff capacity and reallocating staff toward customer-facing roles to improve services for citizens.</li> </ul>
<p><b>Uncovering insights on resident aspirations &amp; challenges</b></p>	<ul style="list-style-type: none"> <li>Focusing on three of the priority segments – older adults, people experiencing accessibility challenges, and newcomers:             <ul style="list-style-type: none"> <li>One-on-one conversations with older adults to uncover insights that removed assumptions and highlighted opportunities to help older adults in our community.</li> <li>Co-design workshops with older adults and persons with mobility-related accessibility challenges for the Digital Community Hub.</li> <li>Conducting a day-in-the life tour with a person in a wheelchair to understand challenges.</li> <li>Broader online survey to uncover more about the barriers people with mobility-related accessibility challenges face with entering buildings and getting around the community.</li> <li>Conducting a co-design workshop and journey mapping with newcomers of diverse backgrounds.</li> </ul> </li> <li>Conducting an environmental scan of NPO best practices of data privacy, use and collaboration.</li> </ul>
<p><b>Stakeholder relationship/partnership development</b></p>	<ul style="list-style-type: none"> <li>Developing relationships and in-kind and other partnerships (see <i>Governance</i>).</li> <li>Building stronger relationships with other municipal governments and levels of government to ensure a repeatable model is designed for resident-centric communities.</li> <li>Onboarding 11 non-profits for the Non-Profit Data Collaboration, mapping out their current data collection, use and disclosure practices and privacy standards and delivering education on the benefits of data collaboration with other non-profits through a video and workshop.</li> <li>Onboarding 5 homeless-serving agencies for Road Home Digital Platform &amp; Enablement, identifying the most meaningful outcomes achievable through digital enablement to help better serve those who experience homelessness and begin data transfer to HIFIS4 (shared digital platform).</li> <li>Engaging with the Mi'kmaq-Wolastoqey Centre to uncover potential ways to support Indigenous resurgence with digital technologies.</li> <li>Engaging with Mayor, Chief, City Council &amp; Band Council on progress and goals of proposal.</li> </ul>
<p><b>Data and Privacy</b></p>	<ul style="list-style-type: none"> <li>Completing comprehensive preliminary privacy impact assessment (PPIA).</li> <li>Mapping out data flow for projects.</li> </ul>

	<ul style="list-style-type: none"> <li>• Conducting extensive workshops with project leads, led by a privacy expert with more than 25 years of experience to create a detailed plan with clear principles to ensure all projects comply with legislation and meet the standards of Privacy by Design and the 10 Canadian Standards Association (CSA) Privacy Principles.</li> </ul>
<p><b>Ideating and Prototyping</b></p>	<ul style="list-style-type: none"> <li>• Running an ideation workshop to generate and prioritize ideas for prototypes based on insights gained from older adult ethnographic research.</li> <li>• Rapidly prototyping a check-in companion app (developed by a local startup) that can be used by older adults so they feel connected and safer in our community.</li> <li>• Running the two co-design workshops with individuals that identified as older adults and persons with mobility-related accessibility challenges to identify the best design for the Digital Community Hub prototype.</li> <li>• Creating a prototype of the Hub with a focus on mobility, accessibility, and older adults.</li> <li>• Accelerating the development of the Doorable hardware and first version of app software.</li> <li>• Developed Hullo app MVP (minimum viable product) for newcomers to connect with settlement organizations.</li> </ul>
<p><b>Testing Prototypes</b></p>	<ul style="list-style-type: none"> <li>• Usability testing of Digital Community Hub, Hullo App, Companion Check-In, and Doorable (see <i>Engagement</i>)</li> </ul>

## Why This is a Winning Proposal

Our proposal thoroughly embodies a smart cities approach. We will bring together diverse sources of data to break down silos between government, organizations and residents so that we can address issues of importance to the community in a holistic way, with a complete picture of what matters and a more accurate measure of our performance in addressing the needs of our residents. It's about coming together as a community, bringing together partners and stakeholders – from the City and St. Mary's First Nation, to businesses, non-profit organizations, academia, and individuals – to collaborate in creating a more welcoming, accessible and supportive community. First by getting a more accurate and deep assessment of what the experiences, aspirations and challenges of our residents are, then developing innovative approaches to improve services and break down barriers to inclusion and full participation for all.

We have developed a unique approach to understand and better serve residents:

- using ethnography and a continuous dialogue with residents to gain a deep and ongoing understanding of our residents, their aspirations and challenges
- interconnecting data from a wide variety of disparate sources to build a complete community profile and enable effective analysis & insight-driven decision-making to make services more effective for residents
- intensely collaborating with community partners from all sectors
- involving residents directly in the design of solutions using human-centred design

- enabling a more personalized experience for each resident, tailoring services, information and tools to their unique needs and preferences

We have the momentum to make this proposal a success. The initiatives that we propose build on work that has been ongoing in the community. We have made further significant progress during the finalist phase – creating several prototypes in addition to creating this final proposal. **We have demonstrated our ability to make significant progress in a short amount of time and to make investment dollars go far.**

We have a demonstrated ability to build and implement smart solutions that will be a model for the country. As part of the Digital Fredericton transformation, the City of Fredericton has launched Canada's first cloud-hosted enterprise resource planning solution for a municipality, which was implemented using agile development in just eight months and was completed on time and within budget.

Other initiatives we are undertaking further demonstrate how we are able to lead the country in building smart communities. The Non-Profit Data Collaboration project is a game-changer, as it is the first time that NPOs are working together to collect and bring together data on their services on this scale, connecting them with provincial and municipal data infrastructure.

The Connected Community apps developed through the implementation of this proposal, such as Doorable, will be developed with the view of being adoptable by other communities across the country. We're also building technology that is enabling a likely unprecedented amount of collaboration among community partners of all types, as well as an ongoing dialogue with citizens.

The initiatives in this proposal will not only lead to an improvement in the quality of life for Fredericton and St. Mary's First Nation; the transformative solutions we develop will also be able to benefit communities of all sizes across the country. Any community will be able to replicate our approach to recognizing and connecting residents to what matters and building personalized digital tools that respond to their community needs.

# Engagement

## Engagement is the Cornerstone of Our Proposal

Traditional community engagement includes broadcasting information (through news releases, web and social media updates), public meetings and open-houses, online surveys, stakeholder meetings and emails, sometimes more unique activities like an “ideation bus”, etc. These methods of engagement are useful, but there are ways to more deeply and meaningfully engage with residents.

The initiatives and projects that are part of this proposal will offer ways for the City of Fredericton and St. Mary's First Nation, as well as other organizations within our communities, to engage with approaches and tools that put our residents at the center and allows for better understanding of their needs, desires and challenges. Residents will have an improved ability to voice their needs and contribute back to our community.

We are also deeply involving residents and stakeholders in the design of these solutions that we will use to be able to engage and better understand residents and connect them to services and resources that meet their unique needs.

## Using Human-Centred Design

We're using human-centred design (or user-centred design) to involve the people we are designing for and facilitating citizen co-creation throughout our Smart Cities projects – from concept to design, implementation, and evaluation. This will ensure that the solutions are tailored and adjusted along the way to meet their needs and achieve meaningful outcomes.

Human-centred design informs better decision making by understanding not only what works or doesn't work, but also why. It allows us to more deeply understand the pain points and ambitions of the community's residents to be able to build the most effective and appropriate solutions to connect them with what matters. Here are the elements of the human-centred design process we're using:



Source: Jules Maitland, Human Centred R&D

The process doesn't end with testing the solution – there's a continuous loop as we brainstorm solutions for improvements based on feedback we get in the testing phase, prototype those improvements, and test them again with people. It's an iterative and ongoing cycle within a living lab environment.

## Discovering Who Our Residents Are, Defining Aspirations & Challenges

**It's easy to get lost in demographics and data.** We want to go beyond the data to gain a more holistic understanding of our residents.

Ethnography is the primary method we will use to understand what residents want in terms of their experience in the community and the barriers and challenges that might prevent them from achieving that experience. Ethnography involves interacting with and observing people directly through one-on-one interviews and other interaction and observation in places where the person spends their time.

It leads to uncovering much better information about people's motivations and aspirations than self-reported information through a survey. We get a better understanding of how residents think, what they see, how they feel, what they hope for, what they fear, what goes well in their day, and where their pain points are. We can then map those insights using empathy and journey mapping to gain an understanding of what the end-to-end experience is for the resident.



Example of empathy mapping (Source: GNB Silobusters)

A foundational piece of the work through Digital Fredericton is the Citizen Experience Strategy. We will use ethnography, which we piloted during the finalist phase, to gain deep learning of different segments of the population in both the Fredericton and St. Mary's First Nation communities. As part of the ethnographic process for each segment, we will:

- **Have in-depth one-on-one conversations/interviews with residents, representing a wide range of segments.** The hour-long conversations occur at the participant's home or other familiar place.
- **Do "walkabouts"/"day-in-the-life tours"** with 1-2 participants in each segment in order to observe and learn more about the challenges identified in interviews.
- Use **empathy and journey mapping** to be able to visualize where the high and low points of the resident's experience is and map out the moments that matter.
- Based on the information uncovered as part of these exercises, **develop distinct empathy-based personas** within each segment and document their current experience, aspirations and pain points.
- To test our findings, we will supplement ethnography with broader traditional engagement tools.
- Document the "moments that matter", we will analyze our efforts to **develop new and unique insights** to understand the future experience desired by residents to be able

to both ideate and prototype segment-specific solutions and make overall improvements to common, digital infrastructure used by all residents.

This process is a very effective way to test and challenge existing assumptions and uncover new and unique insights.

## Piloting our “Discover and Design” Approach

During the finalist phase, we piloted these engagement methods to test their effectiveness and suitability in our Smart Cities operating model. It proved to be very effective in discovering more about specific resident segments and define the unique challenges they face. During the pilot activities many existing assumptions were tested and broken. This collection of field research ultimately leads to real evidence-based decision making.

As a **very early pilot of the ethnography**, and to secure long-term support for this method, nearly all the City of Fredericton’s senior leadership participated in a workshop exercise – interviewing citizens from different customer segments, developing personas, mapping out what a typical day looks like for that persona, and identifying the key challenges that persona faces. They then designed concepts that might help solve some of the challenges. As a result of this engagement, the senior leadership of the City is energized by this approach because the level of engagement is much deeper than normal methods of public engagement and resulted in new insights that would have previously not been considered in service delivery, public policies and setting government priorities.

We then did a **full pilot for one segment, conducting ethnographic interviews with 13 older adults**. As a result of hour-long, in-depth conversations, we got a clear sense of what the participants’ current experience is, what the “moments that matter” are in their day, what challenges they face and what they would like to see improved to make their experience in Fredericton a better one. We used the information to develop three distinct personas based on analysis of the information.

We piloted a **“day-in-the-life-tour”** as part of the work to uncover challenges for another key segment – persons with mobility-related accessibility challenges. Appdigenous Founder and CEO Melissa Lunney accompanied Zack, a young man who uses a wheelchair, as he went around the City. We filmed the experience and attached a Go-Pro camera to Zack’s wheelchair to gain perspective of a person with accessibility challenges and experience a day in their life as a tool to develop insights. Through his interactions with people and the environment and conversation with Melissa, Zach revealed several accessibility barriers he faces in Fredericton.



*Appdigenous Founder and CEO Melissa Lunney accompanies Zach on a day-in-the-life tour.*

As part of the finalist phase, we also conducted a **market research survey** for Doorable. The survey was largely distributed online through the City of Fredericton's social media, Ability NB's (the provincial organization for persons with accessibility challenges) social media and email list, and physical copies at the Stan Cassidy Centre for Rehabilitation (where the link to fill the survey out online was also promoted).

More than 100 New Brunswickers who identified as having an accessibility challenge (or in a few cases, caretakers for people who have an accessibility challenge) filled out the survey' 57 of respondents reported living in Fredericton and the remainder from other communities in New Brunswick. The data indicates not only receptivity within the City of Fredericton but also the opportunity to spread the technology elsewhere.

### Key Insights Informing Prototypes

**Without a network, older adults seek to build their own.** Those who live alone, don't have family close by, or are more vulnerable have created their own support networks through friends and neighbours. We found an extraordinary example of this in talking with Sharon (last name held upon request).

Sharon is in her 70s and she and a group of her female friends who live alone in the city use a crossword app on their phones as a way to check in on each other each morning. If one of them hasn't played a word by 9 a.m., the others will arrange for someone to visit their house to make sure their friend is okay. One of the friends didn't play her word. When they went to check on her, they found she had fallen into a diabetic coma. They called 911 and emergency responders saved her life. Without connection to this network, this woman would not be alive today. But not everyone has access to these networks. Social isolation is a real demonstrated issue across the country that needs to be addressed.

**Volunteering is limited by mobility.** When older adults are unable to drive, their participation in volunteering decreases. Older adults are actively looking for ways to give back their time and energy in Fredericton, but are prohibited by limitations in their mobility.

**Accessibility challenges prevent people from participating in the community.** 88% of people with accessibility challenges that responded to the Doorable survey found that lack of accessibility prevented them from going to public places that they'd like to/need to go (83% for Fredericton). Respondents reported that buttons or accessible doors themselves are often broken and that the buttons too hard to push (whether due to an issue with the button itself or the user's limited strength) or were in an awkward location or height.

77% of respondents felt that a solution that would open "push button" accessibility doors from a smart phone or table would or might make a difference whether they would enter a building (83% of Fredericton). Respondents also overwhelmingly valued a platform to communicate about accessibility barriers (87% for all respondents; 84% Fredericton only),

“I think that [Doorable] is an excellent idea because I am in a wheelchair and I find it hard to go places when there is no one with me. I can't use my arms, so I am not able

to reach the button. Also, often times the buttons are in places that no one in a wheelchair could reach unless they have full mobility in their arms. [...] I am very intrigued, and I think this is something that would be great and that people with disabilities would benefit from. [...] I would really like for this new invention to come to life so that people with disabilities can live independently and don't have to rely on someone to open the door every time they want to go somewhere.”

**Erica (last name held upon request)**

**Use of technology is more common among certain segments than we might think.** We came up against an assumption during the finalist phase that perhaps technology use is not common among the segments we focused on in our finalist phase due to either unfamiliarity or unaffordability. We found that assumption was flawed.

The ethnographic interviews revealed that email, Facebook, and Skype, among other online applications are all commonly used by older adults. Although technology literacy may not be the barrier, affordability can be. Those with financial limitations tend to rely on public access or choose to live without it entirely. This creates a level of unfamiliarity not from being disinterested in technology but rather out of circumstance. In a similar vein, conversations with homeless serving agencies have revealed that many people experiencing homelessness do have a smartphone – either their own or through sharing one with another person, but with limited means, they generally can't afford a regular phone or data plan, so they rely on free WiFi to use them. Early indicators are smartphone and tablet use is widespread among people with mobility-related accessibility challenges – nearly every respondent in the survey noting that they use one or the other.

This shows how effective this approach can be in challenging and confirming or debunking assumptions.

## Living Lab – Ideating, Prototyping & Testing Solutions

Co-creating with community to develop tailored digital solutions for residents

With much clearer insights on the aspirations and challenges our residents face, we will continue our Citizen Experience Strategy work that will be undertaken early in the implementation phase, sharing the findings and **partnering with entrepreneurs, residents and community organizations** to brainstorm ideas/solutions to address problems, and create prototypes of those solutions to test them with residents they are designed to help.

- We will conduct **brainstorming/ideation sessions** with frontline staff and managers from the City of Fredericton and St. Mary's First Nation, entrepreneurs from the local technology community, as well as NPOs that provide frontline services to the residents in the segment we're designing for. We will tap into their creativity to **generate exploratory concepts guided by the resident insights** for data and connected technology solutions that will solve a specific issue for each of the resident personas to help them achieve their ambitions and overcome the barriers they identified. The ideas will be prioritized for implementation by the participants in the session based on feasibility and impact.

- As part of our Digital Fredericton Connected Community layer, we will work with businesses/startups and others to create prototype solutions using **rapid prototyping & co-design workshops** to see how ideas might work. Prototypes could include creating mock-ups and wireframes or a small minimally functioning product to be able to better show the capability.
- We will continue to directly involve residents in the design of solutions through **co-design workshops**, involving them in the prioritization of features and what should be included in the design.
- Once a concept has been prototyped, we will move to **testing and refining solutions**. We will hold usability testing with residents, finding out what works and what doesn't about the product so the design can be iterated and improved upon. Based on the feedback received, the idea will be refined and launched to the public. The community will continue to act as a living lab for new technologies and solutions.
- In the design and testing stages, we will also **engage with accessibility and other experts** that work with the people we're designing for (e.g. people with expertise in accessibility standards) to ensure we design with diversity and inclusion in mind, taking into account how certain population groups may have different abilities to access, use the technology, and benefit from the solutions we design.

## Piloting our Approach for Ideating, Prototyping and Testing

Over the course of the finalist phase, we have piloted the core elements of this approach. After the “discover and define” efforts we piloted with older adults and persons with accessibility challenges, we worked with community partners to ideate, prototype and test new digital solutions to the challenges and ambitions identified and refined the Community Digital Hub to personalize it for the target segments. At the end of the finalist phase, the solutions are at various stages of design, development and idea testing.

The progress completed in the development of this proposal demonstrates our Smart Cities Model in action: connecting people to what matters most to them, creating an assessible welcoming community, and taking strides towards personalized digital inclusion.

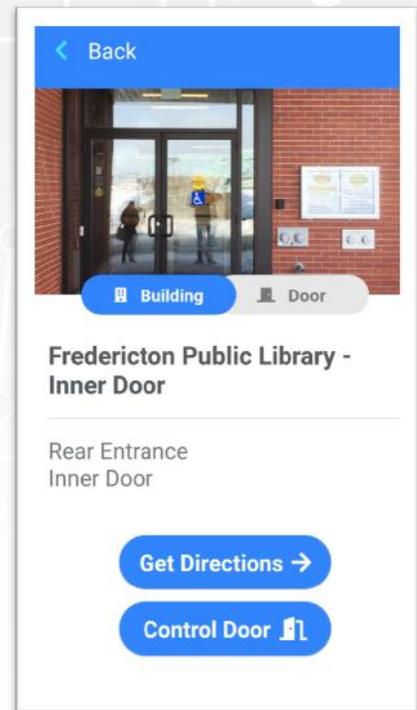
## Doorable for Improving Accessibility

Over the finalist period, Doorable has moved from concept to early stage production. Hardware was developed and installed in test sites and more advanced user-centred design was used to build the software application. These were field tested with the target audience.

Appdigenous created prototype hardware and a plan for prioritized features based on the challenges and other insights identified by people with mobility-related accessibility challenges in the design and discover stages. Guided by human-centred design principles, usability testing was conducted with the participation of a person who uses both a wheelchair and a walker to inform the most intuitive and useful app development.

During this phase, consultations were also held with Stan Cassidy Centre for Rehabilitation occupational therapists specializing in assistive technology and an assistive technology specialist from CNIB (Canadian National Institute for the Blind) to identify ways to make the technology most accessible and inclusive. Consultations are also being undertaken with owners-operators of public spaces to understand their needs as secondary users of the technology.

Based on the insights gained during this phase, a first version of the app was developed. Hardware was deployed at six locations (including City Hall, Fredericton Public Library, Research and Productivity Council, Brookside Mall, Grant Harvey Centre and Willie O'Ree Centre). As of February, the technology is being tested in-the-field with a group of users who have mobility-related accessibility challenges and those with specialized knowledge associated with the technology or manage/own buildings. Already, the app is available publicly for download in Google Play and Apple's App Store.



Screenshot of Doorable app

## Companion Check-In App for Older Adults

The ethnographic research revealed that one of the personas of older adults include individuals who live alone, have no family in the community, and are therefore potentially vulnerable. Without a family network, being able to connect with friends to check in on their wellbeing is important to this group. We also saw that giving back to the community is important to this persona, although their ability to do so through volunteering is hampered by difficulties getting around the city without access to a vehicle of their own. These older adults are very familiar with Facebook.



Screenshot of the Companion Check-in App

We held an ideation session to come up with solutions for some of the insights uncovered. Inspired by the story of the women who check on each other by playing a crossword game app, we came up with the idea of an app that would allow people to interact and check in on friends by playing simple games while also earning points to give back to the non-profit organization of their choice. In just a few weeks, we partnered with a local startup (Mav Synergetic) to rapidly prototype and test a Facebook-based companion check-in app.

The prototype was tested for user feedback with a user-centred design test with an older adult, and a broader market acceptance test using Facebook's demographic and geographic targeting capabilities. Over a period of just four days, 574 older adults in Fredericton (between 3-4% of the city's older adult population) responded to the test promotion and accessed the app. An in-app survey was administered to present the concept of the check-in companion function of the

app, to which 86% of users responded positively. Two non-profit organizations were also interviewed about the value of the app, one of them specializing in supporting people with intellectual disabilities, noted that the check-in function would be incredibly helpful to many of the people it serves, not just older adults.

The testing confirmed the app's value proposition, with an overwhelmingly positive response in a short time. Primary feedback from the older adult during the user-centred design test was that app seemed to be designed for a much younger demographic and its purpose was unclear. This demonstrates the value the iterative user testing approach. The next step will be working on the app's design to respond to the concerns.

Recognizing that a game may not appeal to everyone, the City developed second prototype application that tested advanced technology features of voice command and IoT devices. The prototype supports four types of simple and non-intrusive check-in interfaces including: a simple responsive browser-based web interface, Amazon's Alexa family of devices using voice command, a simple IoT connected button that is uniquely registered to a specific user, a traditional telephone-based Interactive Voice Response (IVR) system that uses caller ID. The City will conduct further user-testing to get feedback on these new interfaces.

## Hullo App for Newcomers

Newcomers are important to the growth of Canada's communities, including Fredericton. Connecting newcomers to what matters most to them will help them to integrate into their communities more quickly, feel welcomed, and build new lives in our Cities. Ali Allauddin is a newcomer to Fredericton and an entrepreneur. He says, "When I came to Canada, I struggled to find connections that could help me navigate everyday life and I realized there was an opportunity to make it better." Based on his and other newcomers' experiences, Ali came up with the idea of creating an app called Hullo that would help with the inclusion of newcomers in the community.

Using the approach, we have adopted for all our Smart Cities projects, Ali conducted a user-centred design workshop to test two assumptions:

- Newcomers want to integrate and belong to a community with quick access to services, and that an app can help with that.
- Newcomers who first arrive can be, for a time, invisible to the groups and individuals that exist to help them.



*Journey mapping with newcomers during a user-centred design workshop.*

- A minimum viable product of the app was developed to test with users, including a simple sign-in/registration and steps to create a profile, a Google Map integration with language

preference and chat interface for newcomers to interact with settlement organizations/agencies (such as the Multicultural Association of Fredericton). Further development will allow Hullo to present users with a map filled with local resources, including location-tracked transit and shuttle services, geographically-indexed calendar events, and job postings. Newcomers will be able to be automatically added to their own language and cultural communities upon registration.

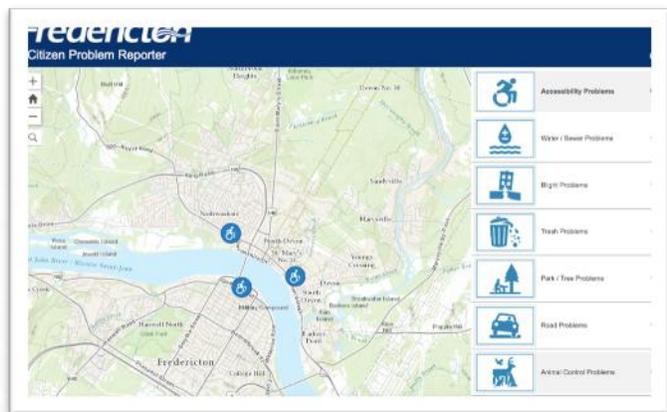
Finding meaningful employment opportunities was identified in the user-centred design as one of the most important aspects of settlement. The MVP prototype is being further developed with this feature set first.

Like the Check-in Companion, Doorable and other Connected Community apps developed, Hullo will be connected into the Digital Community Hub.

## Digital Community Hub

To design the initial prototype of the Digital Community Hub, we held co-design workshops with two segments – older adults and people who have mobility challenges – to find out what information was most important and how they preferred to see it curated for them. We partnered with Esri Canada Limited to build a prototype through which users can access the shared information of our database in an easily accessible and personalized way.

The prototype includes: a Smart City Dashboard feature using existing and prototype data from the City and other sources; segment-specific curated personalized digital inclusion resources (events, information, services) most relevant for older adults, people with mobility-related accessibility challenges and people who are at risk of/experiencing homelessness; and a citizen reporter feature where users can report problems and upvote/comment on problems others have reported, providing a living database of issues in the city. Other key features of the Hub, including cause-based hubs for like-minded organizations to collaborate on issues of common interest will be developed in the implementation phase.



*Screenshot of the Citizen Reporter feature of the Digital Community Hub prototype.*

GIS mapping is embedded in most of the features so users can easily see where resources and where issues are reported. Users can create a personalized profile, in order to earmark the information most relevant to them and to follow progress on issues / items of interest (e.g. if they report a problem, they can receive a notification when it's been addressed).

**To see results of the ethnography, the prototypes completed, the user-centred workshops and our video content, along with links to downloadable prototype applications, please visit [www.fredericton.ca/smartcity](http://www.fredericton.ca/smartcity).**

## Stakeholder Partnership and Collaboration

One of the key opportunities of this proposal has been our stakeholder collaboration. From the very start, we've relied heavily and intentionally on working with a broad cross-section of community partners and thought leaders in technical innovation, entrepreneurship and social innovation through our Smart City Task Force. **In addition to the 40+ representatives from more than 20 organizations** that have worked to collaboratively design this proposal, other stakeholders have been and will continue to be engaged through the projects. Ongoing stakeholder engagement includes:

- Holding **education/Q&A workshops** for non-profit organizations on the benefits and concerns surrounding data collaboration.
- Engaging **11 early adopter NPOs** for Non-Profit Data Collaboration, beginning with mapping out their current data collection, privacy and use practices and policies (see *Governance* for list of organizations).
- Engaging **five homeless-serving agencies** on their challenges and the benefits of adopting a shared platform. Some of the homeless serving agencies have already begun or completed data transfer to HIFIS4, with plans to bring on other agencies in subsequent years (outreach to the other agencies has already begun)
- Consulting with **owners-operators of public spaces** to better understand how to get the highest participation in installing Doorable technology, including bringing on Brookside Mall as a partner organization. Doorable plans to conduct a research study summer 2019 to determine the number of wheelchair push button doors and then rolling out the technology starting with public and institutional access, and then private sector.
- Meeting with organizations to **understand the availability of data sets and what's missing to build out the Digital Community Hub** concept.
- Holding **workshops with City of Fredericton staff** at all levels to understand business processes and opportunities to improve, to select the right technology to implement to streamline operations, and to establish the roadmap forward.
- **Briefings** with the Mayor and Council for City of Fredericton and Chief and Council for St. Mary's First Nation on the progress of our Smart Cities Challenge.

We also have and will continue to establish **stakeholder partnerships and use stakeholder networks** to identify participants for and get word out about engagement opportunities.

## Additional Insights That Helped Shape the Proposal

**Demographics alone are not a good identifier of challenges.** In the case of older adults, we discovered factors that affected the challenges they face including whether or not they live alone, their income status (e.g. stable, fixed, limited), their access to a car/transportation, and their state of health. Instead of looking at older adults as one big segment, we're better

able to contextualize the unique situations and develop a more nuanced understanding of the realities that exist within the segment to identify and address challenges when we break it down on these levels. This shows us the importance of getting to know our residents in a deeper and more comprehensive way through the engagement methods in this proposal.

**We need to engage with residents directly to learn how they identify themselves and about their lives instead of making assumptions.** There is a perception that older people are lonely and feeble. As we confirmed in the pilot ethnography exercise, “seniors” covers a very large age group, and many people within it live active and independent lives. In fact, we discovered that even if some may use it to describe themselves, the term ‘senior’ can carry subtle ageism. As one 69-year-old participant said, “I don’t like the term senior. I’m an adult, I don’t think of myself as anything else.”

**People enjoy the opportunity to be included in the early stages of design of innovative concepts.** Here’s what one participant in our older adult co-design workshop had to say about the opportunity to participate in a co-design workshop for Digital Community Hub:

"It is heartening indeed that seniors are being afforded the opportunity of involvement in a workshop of this nature. I would be most grateful to be included."

**Meris K Brookland**

## Engagement Risks and Planned Mitigations

Risk	Mitigation
Not getting a true representation of the community in engagement efforts (not fully reflecting diversity or those that don't traditionally participate in engagement)	<ul style="list-style-type: none"> <li>Reaching out widely through community networks for user-centred design efforts, including non-profits that serve those who are often underrepresented in engagement efforts.</li> <li>Rewarding people for their time (e.g. using grocery cards or other incentives) to reduce the barriers to participation.</li> </ul>
Failing to get perspectives of important stakeholders that are tight on resources and failure to communicate benefits of participating	<ul style="list-style-type: none"> <li>Minimize off-site training/consultations to save time.</li> <li>Use regular social media, email updates to share progress, opportunities for feedback, and success stories of how stakeholders benefit from projects.</li> </ul>
Confusion/speculation from staff and stakeholders around what's happening, how things will change with the Transformation	<ul style="list-style-type: none"> <li>Establish a Transformation Office to coordinate Digital Fredericton effort in a structured way, including integrated stakeholder engagement/change management plan that aligns all projects.</li> <li>Develop a robust Transformation Hub (e.g. SharePoint site) to host timely and accurate project details for staff and use multiple modes of communication.</li> <li>Use tools, such as ChangeScout, to identify communications based on change impacts and schedule distribution for targeted messages to end-users based on unique impacts.</li> </ul>
Leaders are silent and “invisible”	<ul style="list-style-type: none"> <li>Build / refine Sponsorship Cascade to expand the engagement of key leaders across the business.</li> </ul>

# Project Management

## Road Home Digital Enablement

### Scope

This project will build digital infrastructure to support people who are experiencing homelessness and modernize the core systems that homeless serving agencies require to more accurately assess needs and increase service coordination.

- Connect all homeless serving agencies in Fredericton and St. Mary's First Nation with a shared data platform (HIFIS4) (deployment, data transfer to HIFIS4, and staff training for the system and create a consistent triage model).
- Feed de-identified/aggregate data to the Digital Community Hub.
- Deploy free, high-speed internet access at all homeless shelters as well as computers/kiosks for resident use.
- Deploy and upgrade free high-speed internet access in public places in the City center and on transit.
- Enhance and design new self-serve digital personalized inclusion resources as part of the Digital Community Hub.
- Provide first responders with digital resources so they can more effectively help people in the field.

### Goals

These activities are designed to reduce barriers for people experiencing homelessness to reconnect / remain connected to community. They will:

- Help homeless serving agencies connect residents with what they need most in a continuum of care more quickly, with a more coordinated approach.
- Reduce the need for individuals to re-tell their story to multiple service providers.
- Allow for more efficient operations for shelter staff.
- Offer a necessary, easily accessible, high-quality internet connection.
- Offer a one-stop for enhanced, relevant online resources for shelter residents and first responders (e.g. places for a free meal, laundry service, crisis support, etc.).
- Take a more proactive, preventative approach in addressing chronic or episodic homelessness and help intercept those at risk.

### Project Committee

The committee is comprised of subject matter experts and community stakeholders including: Community Action Group on Homelessness, City of Fredericton, St. Mary's First Nation, Fredericton Homeless Shelters Inc, John Howard Society of Fredericton, Capital Region Mental Health & Addictions, Youth in Transition, and Ignite Fredericton to lead the project.

## Sustainability Beyond Project Lifecycle

At the end of the five-year project, the homeless serving agencies will have a shared client management system and coordinated intake and assessment system to better serve clients. It is anticipated there will be operational efficiencies due to reduced redundancies in the homeless serving system. This time can be reallocated to other priority areas. It is also anticipated that where HIFIS4 is a federal platform, that there will be a renewal agreement between adopters and the government for the sustainability of the system.

## Non-Profit Data Collaboration

### Scope

This project will connect NPOs with provincial and municipal data infrastructure and will build community capacity to collect data, establish measures and integrate with government and community data.

- Work with NPOs to establish data-sharing agreements.
- Develop consistent data collection standards based on academic research and security/privacy protocols.
- Develop data entry collection tools, templates and DIY data toolkit for NPOs.
- Transfer, de-identify and link data with provincial data infrastructure at NB-IRDT.
- Aggregate and anonymize data to the community level and make it accessible via the Digital Community Hub and provincial open-data portals.
- Run custom analysis of data in-house and in context of community.

### Goal / Expected Results

By enabling community-wide engagement in the use of data and improving how our non-profits collect and use data, the project will enable NPOs to more accurately measure efficiency and impact, community needs and recognize gaps and overlaps in service. They will be able to create greater community impact through effective and targeted service design, delivery and evaluation, increased partnerships, and have more outcome-oriented funding in order to more effectively address community problems and influence policy development.

### Project Committee

The committee is comprised of subject matter experts and community stakeholders including: Greater Fredericton Social Innovation, City of Fredericton, St. Mary's First Nation, NB-IRDT, NB-Social Policy Research Network, United Way, Fredericton Community Foundation, Fredericton Public Library, Civic Tech and Saint Thomas University to lead the project.

## Sustainability Beyond Project Lifecycle

At the end of the five-year project, the NPOs will have 20% of Fredericton's non-profit agencies with the ability to make data-based decisions that will help them to better serve their clients and our community. Greater Fredericton Social Innovation will continue to support the NPOs in data collaboration and lead post-project activity that maintains growth and development. It will host regular gatherings to develop more advanced uses of data.

## Digital Fredericton

### Project Scope

The project scope includes work across three areas, which will be informed by the desired citizen experience, as defined by the Citizen Engagement Strategy.

#### 1. Core operational systems

This involves implementing modern cloud applications for **streamlined utility and customer billing, work order management, and field service delivery**, which will:

- Enable self-serve customer access to billing accounts with real-time balance and transaction information systems to enable a transition to smart meters.
- Provide a centralized view and point of control for monitoring field service activities to increase productivity and reduce costs.
- Ensure adequate staffing and on-time arrival of field service personnel and more accurately predict a window for customer service delivery for improved service.
- Diagnose symptoms and potential resolution for service calls before dispatching field service resources to prevent unnecessary service calls.

#### 2. Implement core HR/Talent strategies & systems

- Develop a **digital talent strategy** to align human resources, recruiting, training and development to this vision.
- **Automate staff scheduling**, auto-selecting the best employees for the work based on rules, history and future schedule needs, and transforming how the City prioritizes, assigns and delivers work assignments.
- Modernize **talent and performance management** and make it an ongoing activity through continuous conversations on goals, alignment, frequent checkpoints to review progress, and coaching to enhance performance.

#### 3. Customer facing strategies & systems

- Developing a **comprehensive citizen experience strategy** using ethnography and user-centred design to understand and enable desired resident experiences.
- Implement **CRM systems for 311 services** to understand customer needs and develop operational strategies & technologies that close the gap between the current service delivery approach and the digital experience desired by residents.
- Deploy a **self-service citizen portal** that empowers residents to help themselves to services and information, making it more convenient and faster for residents.
- Create technology interfaces and an innovation lab space to enable the development of **connected community applications**.

## Goals / Expected Results

1. **Operational efficiencies** achieved by streamlining processes and offering self-serve options, freeing up internal staff to focus on more analytical and strategic tasks.
  - Faster and more convenient billing and collections for citizens.
  - Repurpose 50% of account billing work to more relevant citizen-facing roles.
  - Improve customer service delivery.
  - Increase internal operating efficiencies and generate operational savings.
2. A **nimble, agile, innovative workforce** that can apply digital solutions to citizen issues.
  - Clear view of the talent requirements to deliver a new service experience.
  - Engage employees and help them be more strategic and productive in their work.
  - Track resources to increase productivity and improve service delivery to citizens.
  - Efficiencies and cost savings through reduced overtime costs.
3. Provide citizens with **highly personalized, interactive services, access to open data**, and provide the City with **better analytics about what matters to residents**.
  - Convenient and intuitive access to information and services.
  - Better understand and communicate with residents and businesses in real-time.
  - Capturing real-time data to address priorities and needs to make more effective, more resident-centric decisions.
  - Facilitating the environment for potential and existing businesses to innovate through open data access, which will lead to economic development.

## Project Committee

The committee is comprised of subject matter experts to lead the digital transformation. Please refer to *Governance* for an organizational approach to project oversight of this area.

## Sustainability Beyond Project Lifecycle:

This initiative will generate operational efficiencies, which will be transitioned to sustain ongoing customer service roles and initiatives.

## Digital Community Hub

### Scope

We will fully build out a multi-level platform that will bring data sets & digital resources from diverse community sources to measure progress on key smart city/quality of life areas, create communities of interest for collaboration on issues, and offer a personalized curation of resources, tools, information and services that matter most to users.

- Establishing data sets to feed into census aspect of the Digital Community Hub and creating process for data identification and refinement.

- Developing partnerships with organizations to provide data and tools to include on the Hub, and identify alternative ways for people to connect non-digitally.
- Fully developing a platform for each of the Hub levels.
- Developing an opt-in profile for people who want to provide personal info to personalize the information, resources, and services displayed on their Hub.
- Conducting user testing of the platform.
- Creating an engagement survey mechanism to be conducted at regular intervals.
- Monitor our progress towards becoming a Smart City and identify indicators for mobilizing to continue improving the quality of life for all our residents.

## Goal / Expected Results

The goal is to give a complete and detailed profile of our community with rich data on who is in our community and their challenges and priorities.

- Increase the sense of citizen inclusion and participation.
- Allow for better informed and proactive decision-making by the City, St. Mary's, organizations, and entrepreneurs, supported by citizens' core needs.
- Improve the ability for citizens and organizations to effect change and have a voice in decisions in their community (participatory democracy).
- Enable open data access so residents and businesses can design solutions to address community problems, which leads to new innovations and economic development.
- Enable more innovative responses to service delivery.

## Project Committee

The committee is comprised of subject matter experts and stakeholders including: City of Fredericton, St. Mary's First Nation, WSP Canada, the University of New Brunswick, and the Fredericton Community Foundation to lead the project.

## Sustainability Beyond Project Lifecycle

By year five, it is anticipated that the Digital Community Hub platform will be complete and operational. As we generate efficiencies in internal processes, the City will redeploy staff for the sustainability of the Digital Community Hub. As we develop the hub, organizations will have a space to specifically evaluate their direct and indirect impact on our community's well-being. Alternative funding sources will be explored through subscribing partners.

## Doorable (Developed By Appdigenous)

### Scope

Appdigenous will fully develop hardware and software to make built physical infrastructure more accessible, available free of charge to users (residents). With the wide-spread adoption of Doorable technology that this project will enable, Fredericton and St. Mary's will become Canada's living lab for accessibility.

- Map the current inventory of push button doors across the City.
- Produce and deploy hardware on doors where there currently is a “push button” throughout Fredericton and St. Mary's First Nation.
- Further develop the core user app to allow users to communicate directly with each other and with facilities about accessibility barriers.
- Develop a next version of existing Doorable hardware (Bluetooth-based), that will enable Doorable to be web-based; significantly enhancing the range of services available through the app.
- Build data through interactions between citizens and infrastructure (e.g. count of door opens, use geo-location features for those that opt-in to specialized research to identify barriers/gaps in accessibility in the community, and help better inform municipal decisions with respect to accessibility).
- Build an application that will assist installers in rolling out the technology in diverse facilities and configurations.
- Build a revenue stream through subscribing facilities, that will allow those facilities to push information on services, programs, events and goods to (opting in) individuals who use Doorable to access their space(s).
- Expand the technology throughout Fredericton and St. Mary's and to other communities in the province and across Canada.

## Goal / Expected Results

The goal is to make it easier for people with mobility-related challenges to live and get around their community with improved accessibility, allowing them to be more independent & fully participate in education, jobs, services, the community. This will be done by making it easier for people with accessibility challenges to get into buildings and to access better information about options available to them as well as by giving decision makers better information on gaps in accessibility, so that they can address them. Doorable will also contribute to the Internet of Things ecosystem as a catalyst for other infrastructure changing advances and become Canada's product development living lab for accessibility.

## Project Committee

The committee is comprised of subject matter experts and community stakeholders including: private sector lead-Doorable, City of Fredericton, New Brunswick Community College, Stan Cassidy Rehabilitation Centre, St. Mary's First Nation, Research and Productivity Council, AbilityNB, and Hotspot Parking (private sector) to lead the project.

## Sustainability Beyond Project Lifecycle:

Appdigenous has developed a commercial business plan for Doorable. The Smart Cities funding will seed the preliminary market testing. With a proven revenue model, Doorable will access investor and government funding to sustain business development.

## Budget, Timelines and Milestones

Please see detailed project timelines and budget shown in *Financial* and milestones and progress payments shown in *Performance Measurement*.

## Overall Project Management

### Resource Assessment Management Plan

The following criteria will be used to manage the resources, both human and equipment, for project implementation.

<b>Authority/responsibility</b>	<ul style="list-style-type: none"> <li>Smart Cities Manager</li> </ul>
<b>Timing for resource management</b>	<ul style="list-style-type: none"> <li>Monthly meetings</li> </ul>
<b>Methods of acquiring resources</b>	<ul style="list-style-type: none"> <li>Job posting competition to acquire HR</li> <li>Secondments of City Staff to this program</li> <li>Procurement process to acquire materials/services</li> </ul>
<b>Training requirements for resources</b>	<ul style="list-style-type: none"> <li>Training resources will be engaged as need be based on technical requirements for project implementation.</li> </ul>
<b>Tools for managing resources</b>	<ul style="list-style-type: none"> <li>Resource performance progress reports</li> <li>Committee meetings – resource performance</li> <li>Schedule baseline &amp; cost baseline – resource assignments</li> </ul>
<b>Tools for resources measurement</b>	<ul style="list-style-type: none"> <li>Resource performance review</li> </ul>
<b>Authority/responsibility for accepting resource changes</b>	<ul style="list-style-type: none"> <li>Smart Cities Manager</li> <li>Project Committee Leads</li> </ul>

### Human Resource Requirements

Resource Role	Timeframe	Responsibilities
<b>Digital Fredericton</b>		
Manager of Corporate Systems Renewal	Existing and ongoing	Leads the Digital Fredericton Transformation, provides visionary leadership on renewal of corporate systems and alignment to the Digital Fredericton Vision. Manages the strategic partnerships and oversees the project implementation, milestones and Digital Fredericton outcomes.
City Subject Matter Experts	Secondments as required	Provides subject matter expertise on City service delivery, and is seconded to agile project teams with technology partners to develop core systems and CRM projects throughout the project lifecycle.
Redeployed internal staff		Staff time gained through efficiencies generated in modernizing core systems will be redeployed to digital customer relationship management.
<b>Digital Community Hub</b>		
Digital Community Hub Coordinator	5 years/ongoing	Developing a structured five-year Digital Community Hub Plan in consultation with the Smart Cities Manager; data discovery and establishing/negotiating data sharing agreements, maintaining data sharing partnerships with organizations; liaising with Digital Fredericton team/St. Mary's ethnographer in terms of receiving ethnography inputs (segments & personas and insights); coordinating user-centred design as it relates to the Hub and feeding this into the design; developing data maintenance/renewal plan and long-term data strategy for future sustainability.
Data Analyst	5 years/ongoing	Modelling data; conducting analyses; liaising with data contacts with partner organizations to obtain aggregate data transfer; inputting data, facilitating the creation of required data; and assisting with data discovery.

Content Creator	5 years/ongoing	Creating content and assisting with the implementation of the Smart Cities marketing/communications plan includes: advertising/promotions for public engagement; hub/segment releases; social media and website content generation; building the brand, etc. This position also assists with the data entry and supports the overall Fredericton/St. Mary's Smart Cities Program.
<b>Appdigenous</b>		
CEO	Ongoing	Overall business leadership and development.
President	Ongoing	Operational management of Doorable.
Technology lead	Ongoing	Updating of Application(s). Leadership role with outside developers.
Finance Lead	Ongoing	Management of Financial plan, budgets, payroll, billing and costing systems.
CRM	Ongoing	Technical support for users, installers and subscribers, social media promotion.
Installers/Service	Ongoing	To install Doorable hardware on subscribing facilities, capturing information required to populate the User App (maps, etc.). Service existing installs.
6 Researchers	Jun-Aug/19	To undertake the inventory project of all accessible doors in Fredericton and research strategy.
Data Entry Specialist	July 1-Sept/19	To input data from inventory project.
Data Analytics Expert	Sept/19	To analyze data from inventory project.
Research coordinator	May – Oct/19	To coordinate research for inventory project.
<b>Non-Profit Data Collaboration</b>		
Project Manager		Resourced through GFSI.
Process Design Consultant		Resourced through GFSI.
Data Analyst		Resourced through NB-IRDT.
<b>Road Home Digital Platform</b>		
Resourced through participating agencies and in-kind partnerships.		

<b>Smart Cities Program Management</b>		
<b>Smart Cities Manager</b>	5 years/ongoing	<ul style="list-style-type: none"> <li>Managing the Digital Community Hub administration.</li> <li>Liaising with project committees to facilitate the successful implementation of projects.</li> <li>Managing budget oversight, and funding disbursements to the five projects.</li> <li>Reporting to Infrastructure Canada.</li> <li>Coordinating quarterly Fredericton Smart Cities Task Force meetings including report generation (quarterly progress reports, budget, issue management).</li> <li>Managing strategic marketing and communications for the Smart Cities Program as it relates to Fredericton's brand. This includes the development of an integrated marketing communications plan (encompasses public awareness element/storytelling, leveraging partnerships with respect to marketing, public relations, refreshing GoFred brand, elevating Digital Fredericton brand, etc.).</li> <li>Cultivating and fostering stakeholder relations/partnerships.</li> <li>Managing Smart Cities Innovation Lab and liaising with potential and existing entrepreneurs as it relates to Smart Cities app development – connecting them with partners/staff and funding.</li> </ul>
<b>First Nations Lead</b>	5 years	<ul style="list-style-type: none"> <li>Lead ethnographic research initiatives.</li> </ul>

		<ul style="list-style-type: none"> <li>Oversee technology development and implementation.</li> <li>Advocate and monitor OCAP principles for First Nations data.</li> <li>Liaison for Digital Community hub and NPO data teams.</li> </ul>
<b>Privacy Officer</b>	5 years	<ul style="list-style-type: none"> <li>Sub-contract consultants for annual privacy audit</li> </ul>
<b>Chief Information Security Officer</b>	5 years	<ul style="list-style-type: none"> <li>Sub-contract consultants for quarterly security review and ongoing development of policy and security practices</li> </ul>

With the University of New Brunswick and New Brunswick Community College both located in Fredericton and other post-secondary educational institutions, it is assumed that talent acquisition will be viable.

## Procurement Management Strategy

The following criteria will be used to manage the procurement components of this project.

<b>Authority/responsibility</b>	<ul style="list-style-type: none"> <li>Smart Cities Manager</li> <li>City Purchasing</li> </ul>
<b>Timing for procurement management</b>	<ul style="list-style-type: none"> <li>As required as per procurement list pertaining to requisitions</li> </ul>
<b>Procurement management approach steps</b>	<ol style="list-style-type: none"> <li>Determine procurement items required (planning)</li> <li>Determine lead time required &amp; timeframe needed</li> <li>Complete procurement documents (as required)</li> <li>Determine &amp; document decision criteria</li> <li>Engage Purchasing</li> <li>Conduct procurements (source vendor)</li> <li>Award &amp; approve contracts</li> <li>Administer &amp; manage contracts</li> <li>Verify &amp; contact deliverables</li> <li>Close contracts</li> <li>Complete procurement evaluations</li> </ol>
<b>Procurement documents required</b>	<ul style="list-style-type: none"> <li>RFP (Source selection criteria and pricing forms)</li> <li>Statement of work</li> <li>Terms &amp; conditions</li> <li>Non-disclosure agreement</li> <li>Letter of intent</li> <li>Firm fixed price contract</li> <li>Procurement audit form</li> <li>Procurement performance evaluation form</li> </ul>
<b>Tools for managing procurement</b>	<ul style="list-style-type: none"> <li>RFP/RFI</li> <li>Statement of Work (SOW)/Contract</li> <li>Standard contracts</li> <li>Purchase Orders</li> <li>Historical information – vendor performance evaluations</li> </ul>
<b>Measurement tools for procurement</b>	<ul style="list-style-type: none"> <li>Procurement baseline</li> <li>Approved SOW/Contract</li> </ul>
<b>Contracts approval steps</b>	<ul style="list-style-type: none"> <li>Procurements for standard contracts - approved by project management</li> </ul>
<b>Authority &amp; responsibility for contract approval</b>	<ul style="list-style-type: none"> <li>Smart Cities Manager</li> <li>City Purchasing (as required for RFPs over certain amount)</li> </ul>

## Communications Strategies / Management Plan

A full-scale integrated marketing/communications plan will be developed for the Smart Cities initiative, including approaches to ensure the public and many stakeholders are kept informed on progress and given opportunities to participate in engagement activities. The following criteria will be used to manage the communication for this project.

<b>Authority &amp; responsibility</b>	<ul style="list-style-type: none"> <li>• Smart Cities Manager</li> <li>• Project Committee Leads</li> </ul>
<b>Timing for communications</b>	<ul style="list-style-type: none"> <li>• Public update on progress every two months</li> <li>• Project Committee meetings</li> <li>• Ad-hoc (as required)</li> </ul>
<b>Tools for managing communication</b>	<ul style="list-style-type: none"> <li>• Quarterly project status reports</li> <li>• Project committee presentations if required</li> <li>• Committee meeting agendas</li> <li>• Project committee meeting minutes</li> </ul>
<b>Authority &amp; responsibility for accepting communication changes</b>	<ul style="list-style-type: none"> <li>• Smart Cities Manager</li> <li>• Project Committee Lead</li> </ul>

## Stakeholders

See *Governance* section for list of stakeholders and roles/responsibilities.

## Risk Management Strategy

The following criteria will be used to manage the risk components for project implementation.

<b>Authority &amp; responsibility</b>	<ul style="list-style-type: none"> <li>• Smart Cities Manager</li> <li>• Project Committee Leads</li> </ul>
<b>Risk management approach steps</b>	<ol style="list-style-type: none"> <li>1. Do a quarterly risk assessment</li> <li>2. Identify &amp; capture risk in register</li> <li>3. Qualify &amp; prioritize risk</li> <li>4. Determine risk owner, approach and assignment</li> <li>5. Update risk &amp; action (communicate as required)</li> <li>6. Close risk in register</li> </ol>
<b>Timing for risk management</b>	<ul style="list-style-type: none"> <li>• Monthly – during project committee meetings</li> <li>• Initiated by change control process (as required)</li> </ul>
<b>Tools for risk identification</b>	<ul style="list-style-type: none"> <li>• Committee meetings</li> <li>• Workshops</li> <li>• Brainstorming</li> <li>• Historical information from similar projects</li> <li>• SWOT analysis</li> <li>• Stakeholder engagement</li> <li>• Corporate risk register</li> <li>• Project risk register</li> </ul>
<b>Tools for risk qualification &amp; prioritization</b>	<ul style="list-style-type: none"> <li>• Risk register criteria (defined below)</li> <li>• Decision trees</li> <li>• Monte Carlo analysis/what if scenario planning</li> </ul>
<b>Approach for risk monitoring &amp; control</b>	<ul style="list-style-type: none"> <li>• Monthly review of open, prioritized risks</li> <li>• Communication of impact of triggered risks (meetings, status reports)</li> </ul>

<b>Authority &amp; responsibility for accepting risk plan changes</b>	<ul style="list-style-type: none"> <li>• Closing of completed risks</li> <li>• Smart Cities Manager</li> <li>• Project Committee Leads</li> </ul>
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## Monitoring, Controlling, and Checkpoints for Project Management

The following framework will be used to monitor and manage the issues of project implementation.

<b>Authority &amp; responsibility</b>	<ul style="list-style-type: none"> <li>• Smart Cities Manager</li> <li>• Issue owner</li> </ul>
<b>Issue management approach steps</b>	<ol style="list-style-type: none"> <li>1. Identify &amp; capture issue</li> <li>2. Categorize/prioritize issue (communicate as required)</li> <li>3. Assign action owner</li> <li>4. Determine issue resolution plan &amp; due date</li> <li>5. Close issue (communicate as required)</li> </ol>
<b>Timing for issue management</b>	<ul style="list-style-type: none"> <li>• Monthly - during committee meetings</li> <li>• As required for high priority issues</li> </ul>
<b>Tools for issue identification</b>	<ul style="list-style-type: none"> <li>• Committee meetings</li> <li>• Risk triggers</li> <li>• Escalation to Task Force</li> <li>• Stakeholder interviews</li> </ul>
<b>Tools for measurements &amp; management</b>	<ul style="list-style-type: none"> <li>• Project issues log</li> </ul>
<b>Project issue categories</b>	<ul style="list-style-type: none"> <li>• Technology</li> <li>• Business</li> <li>• Political/Legislative</li> <li>• Resource</li> <li>• Project</li> <li>• Process</li> <li>• Departmental</li> <li>• Security /Privacy</li> </ul>

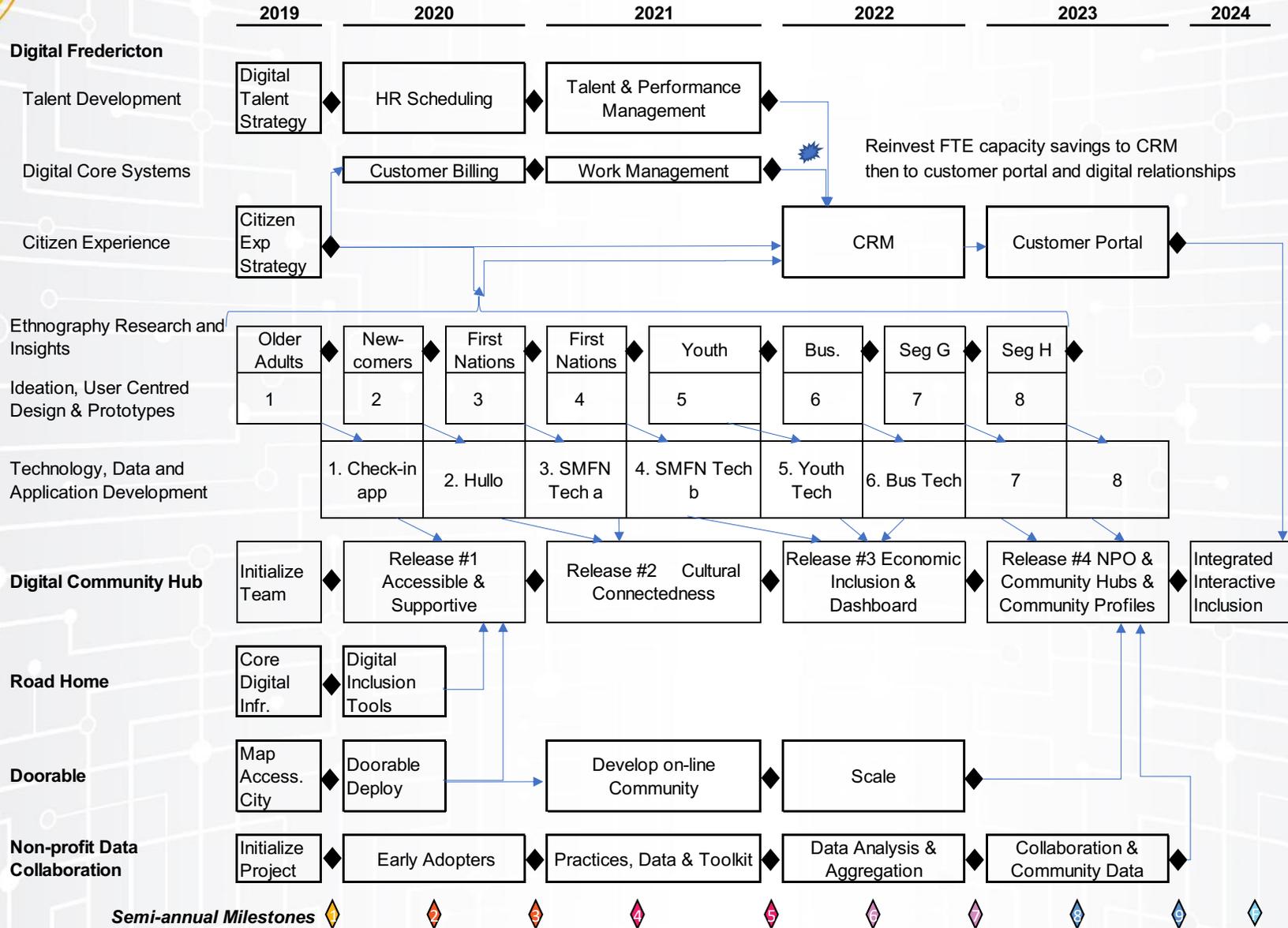
High level summary of project checkpoints and contingency measures will be brought forward in the quarterly progress report to the Task Force.

## Project Management Risks and Planned Mitigations

<b>Risk</b>	<b>Mitigation</b>
Risk of building too many one-off Connected Community solutions without the full Customer Experience Strategy and necessary core & talent development systems to be sustainable and efficient (e.g. if an app is built to report a problem to the City, need to connect with automated work management system)	<ul style="list-style-type: none"> <li>• Build a detailed the citizen experience strategy that outlines the required digital talent strategy and citizen experience and the expected connections to back-end systems in the first six months.</li> <li>• Build core systems in the first 2.5 years of implementation, which will support the sustainability and efficiency of CRM, Customer Portal, and Connected Community apps.</li> </ul>
Poor cost management & over-runs	Develop full cost management plan, conduct monthly budget checks for each project to highlight need for adjustments/course corrections as necessary; communicate to Smart Cities Manager monthly.

Cashflow beyond lifecycle of project	Seek alternative funding sources and revenue generation models (e.g. subscription base, etc.).
Inability to meet milestones	<ul style="list-style-type: none"> <li>• Strong, organized leadership.</li> <li>• Maintaining well defined scope &amp; project schedule.</li> </ul>
Talent acquisition/personnel loss	Good recruitment strategies and relationships with educational institutions, coop programs, summer internships, cross-training, advancement planning.
Lack of operational efficiency/redundancies	Ensure quality plan/process training is in place to ensure projects are completed on time and on budget.
Low morale or change fatigue leading to delays and low-quality work	Kick-off and planned subsequent pulse checks and working sessions to be tailored to equip leaders and team members with knowledge, skills and tools for success in their role on the Transformation and to fuel team effectiveness.
Failure to plan and communicate need for sustained behaviour change /change management support	<ul style="list-style-type: none"> <li>• Use change impacts to identify where behavior change is needed and establish integrated approach across all work streams and business units.</li> <li>• Identify resources responsible for sustainment of learning content and nurturing the change agent network to include them in the design of the initial products and approaches to establish alignment.</li> <li>• Implement robust knowledge transfer program.</li> </ul>
Team members, key stakeholders and business leaders work in silos and fail to harness the interconnectedness of the Transformation, resulting in wasted efforts	Use training to kick-off the project and support staff in onboarding and continuous learning throughout the course of the Transformation.
Adoption risks are not meaningfully communicated for targeted action	Leverage Transformational Risk Framework to proactively identify and manage risks to adoption in collaboration with project and organization leaders.
Stakeholders are not clear about what they need to do to prepare for change	Work with the Transformation teams to develop Personas for key roles.
Business leaders do not take ownership for their stake in the change journey	Use digital change tool (e.g. ChangeScout) as the repository for stakeholder and change impact assessment and readiness dashboards that can integrate across the Transformation for a holistic view.
Losing relationships with community organizations due to lack of time/changing players	Hiring a community digital hub coordinator to establish and maintain relationships, ensure continuity of relationships when there is a change in personnel.
Failure to get/keep NPOs and homeless serving agencies onboard with the projects that rely on them sharing data because they don't see the benefit of participating	<ul style="list-style-type: none"> <li>• Start with a small number of NPO early adopters for projects, engaging closely/maintaining relationships to identify what's working, what's of benefit, and what could be improved to make it easier or yield more benefits for them, addressing any issues.</li> <li>• Be transparent about the progress made, successes/benefits/ROI achieved, and how we're addressing issues that have surfaced.</li> </ul>
Increased workload for NPOs, inconsistent/invalid data, competency for data mine analysis for ROI	Staff training, train the trainers, standardized system and data standards.
Boxing out NPOs that provide important services but don't know how to use the data, then receive less funding in outcomes-based grants	<ul style="list-style-type: none"> <li>• Skills training and education on how to use data.</li> <li>• Civic Tech Fredericton team will partner with NPOs to help them link and analyze their data in-house and when linked with other open data sources. Each member of Civic Tech Fredericton will "adopt" a Caused-Based Hub and be the go-to person for data analysis.</li> </ul>

# Project Scheduling, Sequencing and Dependencies



# Performance Measurement

## Strategic Themes

Our plan is focused on measuring performance across three key strategic themes to achieve our vision.

### Collaborating to Create a Welcoming, Accessible, Supportive Community

We need to create more efficient, effective and targeted services that appropriately address resident needs to achieve increased inclusion for all residents. Modernizing our community's core technology infrastructure is a fundamental step to achieving the efficiencies we need to create the capacity to offer value-added, targeted, resident-focused services. With improvements in core systems, we will be able to conduct far more effective analysis and make evidence-based and insight-driven decisions to be able best address resident service expectations. This will also allow us to offer a higher level of tailored and more resident-friendly service.

### Recognizing What is Important to Individuals

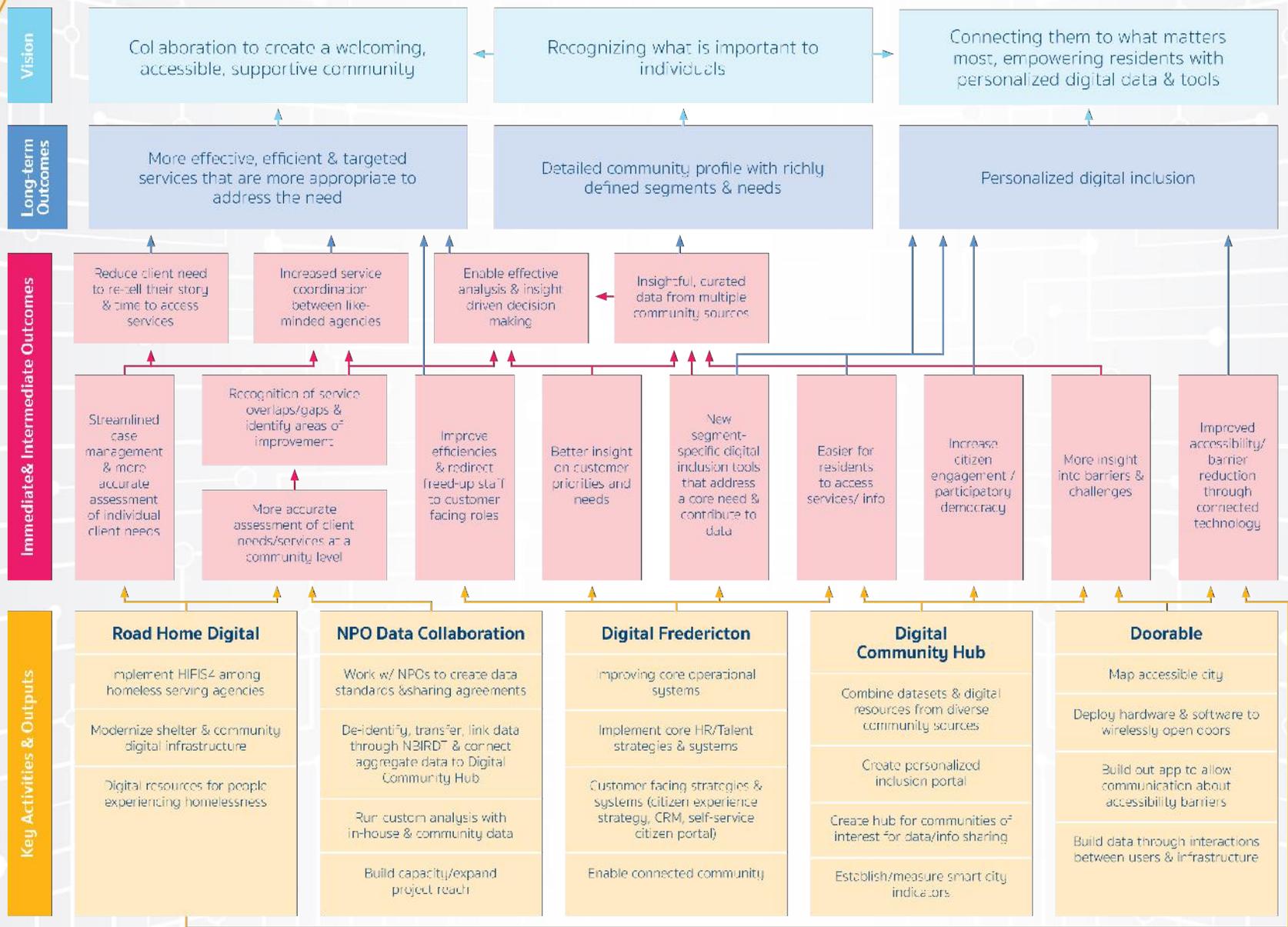
This requires a deep understanding of who our residents are and the challenges they face to enjoying a high quality of life in their community. By collecting and curating detailed data and information from diverse sources – including data from community organizations, the City's CRM, ethnographic research, and connected community apps – into the Digital Community Hub, we will be able to develop much richer information on our community needs. We will use that to develop deep insights about the issues that matter to people in our community and what impact addressing them will have, developing a much more complete profile of the people we serve and the issues that matter to them. This insight will feed into the activities under the other two strategic themes.

### Connecting Residents to What Matters Most Using Personalized Digital Tools

Upon recognizing resident needs, we will use connected technology & digital tools to connect them to what is important. The meaningful insights we gain will inspire new solutions for under-addressed core needs and provide opportunities to further tailor how we connect people to resources they need most. By involving residents at every step of solution design, the tools created will be truly effective in both helping people find personally relevant resources to connect with their community and reducing barriers to that connection. The result will be an increase in inclusion.

There are several interconnections across project activities/outputs and outcomes. To manage performance over five years, we will monitor the three themes with metrics to track progress in achieving outcomes at each level. Following are the logical links between activities and outcomes and a balanced scorecard for each theme.

# Activities, Outputs and Links to Outcomes and Strategic Vision



## Measuring Outcomes and Performance Indicators

STRATEGIC THEME

### Collaboration to create a welcoming, accessible, supportive community

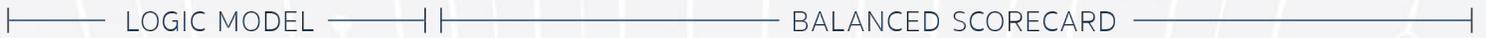
LOGIC MODEL

BALANCED SCORECARD

	OBJECTIVE	MEASURE	TARGET	BASELINE	DATA SOURCE	
Long-term Outcomes	<b>Services Address Needs</b> Increase inclusion by providing targeted services that address needs, working in an end to end environment that puts citizen engagement first	Increased percentage of citizens who are satisfied with the supports and services to help them participate fully in the community	95%	TBD	Citizen Attitude Survey; Digital Community Hub	
Immediate and Intermediate Outcomes	<b>Increased Collaboration</b> Increased service coordination between like-minded agencies	Number of new service collaborations between NPOs	10	TBD	Greater Fredericton Social Innovation (GFSI)- self report	
		Recognition of service overlaps/gaps & identify areas of improvement	Agencies reporting use of data to improve services	10	TBD	GFSI - self report
Immediate and Intermediate Outcomes	<b>Streamlined Service Delivery</b> Streamlined case management	Clients connected to appropriate services quickly	TBD	Unknown	Shelters	
		Reduction in duplicate files	0	Unknown	HIFIS4	
		More accurate assessment of needs using shared data	Granting agencies using data/outcomes as a criteria for funds	2	0	United Way and Fredericton Community Foundation
		Faster more convenient City services	Increase in customer satisfaction	40%		Citizen Attitude Survey
Project Activities and Outputs	<b>Modernize Core Systems</b> Implement HIFIS 4 Core	Number of agencies	9	0	Homeless agencies	
		Modernize core City systems for efficient service delivery and operations	Reallocating talent from admin to customer service	4000 hrs	0	Lean 6 Sigma process reviews
			Realized operational efficiencies	38%	0	
	Develop core data tools for NPOs	Number of orgs who contribute and share data	40	0	GFSI - self report	

STRATEGIC THEME

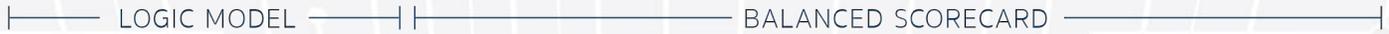
## Recognizing what is important to individuals



	OBJECTIVE	MEASURE	TARGET	BASELINE	DATA SOURCE
Long-term Outcomes	<b>Detailed Community Profile</b> Develop a detailed community profile with richly defined segments & needs	% of population captured in a one or more personas	100%	0	Ethnographic Research compared to Stats Can data
Immediate and Intermediate Outcomes	<b>Develop Rich Insights</b> Develop rich insights into community needs through thorough analysis of diverse data inputs connected technology and people	Number of issues that have comprehensive analysis using community input	14	Unknown	Digital Community Hub Data Analyst
		Diversity of inputs used on issue analysis (organizations, individuals, research, connected technology)	>3 per issue	Unknown	Digital Community Hub Data Analyst
Immediate and Intermediate Outcomes	<b>Strong Community Voice</b> High-level on-going engagement from community organizations, interest groups and individuals contributing to caused based hubs, identifying issues, and voicing perspectives	Number of organizations contributing data and participating in cause-based hubs	10	0	Digital Community Hub Coordinator
		Number of individual monthly users participating in the Digital Community Hub	500	0	Digital Community Hub Coordinator
Project Activities and Outputs	<b>Diverse Collection of Digital Input</b> ID segments and develop insights, and ideas through ethnography	# of detailed segment aspirations and experience analysis	8	0	Ethnographic Researchers Completed Reports
		# of personas	24	0	
		# moments that matter	100	0	
	Develop cause based hubs for diverse community issues	# of cause-based hubs created	8	0	Digital Community Hub Coordinator
	Connect data from connected community applications to drive insights	# of segment-specific applications providing data to the dashboard	8	0	Digital Community Hub Coordinator
	Drive insights from CRM/311	Annual analysis of top 5 issues	25	0	Service Fredericton

STRATEGIC THEME

## Connecting residents to what matters, empowering them with personalized digital tools



	OBJECTIVE	MEASURE	TARGET	BASELINE	DATA SOURCE	
Long-term Outcomes	<b>Personalized Digital Inclusion</b> Increased inclusion through uptake of personalized digital inclusion tools and citizen portals	% of population using personalized digital inclusion tools	10%	Unknown	Sum of DCH users, CRM users, and users of connected community apps.	
Immediate and Intermediate Outcomes	<b>Segment Specific Tools</b> Create self service tools that are intuitive and help people find resources relevant to their needs and reduce barriers	Customers who rate the digital tools as highly satisfactory in connecting to what matters and reducing barriers	75%	0	Develop customer feedback areas within tools	
		# of tailored tools per segment	1		Smart City Manager	
Immediate and Intermediate Outcomes	<b>Citizen Co-creation</b> Incorporate user-centred design iterations to improve and deploy technology that reduces barriers and improves access	Customers who provide on-going feedback on the digital tools (CRM portal, connected apps and DCH)	10%	0	Develop customer feedback areas within tools	
		End user participation in user-centered design workshops	300	0	User-centred design consultants' reporting	
		# of user centered design iterations	>2/app	0	User centred design consultants' reporting	
Project Activities and Outputs	<b>Connect Data, Ideas and Technology</b> Deploy technologies for user adoption	User uptake on each new tool	8%	0	Application userbase	
		Market penetration for Doorable	50%	0.7%	Doorable	
	<b>Connect Data, Ideas and Technology</b> Improve basic digital access	# of agencies and public spaces with digital access for clients	50	15	Free-o Zone reporting	
		Create personalized inclusion spaces	Number of unique visitors to Digital Community Hub and CRM portals	5000	0	Develop analytics on Digital Community Hub userbase
		Create rich data sets and resources for users and innovators	# of datasets in the hub	TBD	TBD	Digital Community Hub Coordinator reporting
			# of services and programs listed/linked in the hub	TBD	TBD	

## Progress Timelines, Deliverables, Milestones and Payment Schedule

The schedule of deliverables and performance milestones with a proposed payment schedule are shown on the following pages. The rightmost column shows the **progress for each performance milestone anticipated at each stage relative to the end-target**. For example, we will develop three empathy-based personas by December 2019, showing progress towards a total target of developing 24 before the end of the five-year period.

Certain deliverables have immediate performance measures within the same timeframe, while others have resulting performance measured in the subsequent period.

Deliverable Milestones	Performance Milestones	Progress and Payment
Complete Citizen Experience Strategy Complete Digital Talent Strategy Community Digital Hub team established NPO team operational Ethnographic research older adults Map of the Accessible City Doorable initial deployment Road Home Core Infrastructure Installed	Empathy based personas Insightful moments that matter Segment aspirations and experience analysis Number of installations of Doorable hardware Number of agencies onboarded to HIFIS4 Number of users of digital access at homeless agencies per month	3/24 12/100 1/8 200/200 5/9 100
<b>1 December 2019</b>		<b>\$ 1,925,000</b>
Complete Newcomer ethnography Check-in companion app V1 Technology inclusion tools for homelessness Doorable deployment & dev	Empathy based personas Insightful moments that matter Segment aspirations and experience analysis Number of user centered design iterations User uptake as a percentage of segment Number of agencies on HIFIS4	6/24 24/100 2/8 2 8% 8/9
<b>2 June 2020</b>		<b>\$ 620,000</b>
Implemented core Customer Billing Implement core HR Scheduling Complete 1 First Nations ethnography Develop Newcomer technology V1 10 NPOs on-board data project	% of customers transitioned to self-serve online accounts Number of FTE hours efficiency gained Empathy based personas Insightful moments that matter Segment aspirations and experience analysis Number of user centered design iterations User uptake as a percentage of segment Number of user-centered design iterations First 10 out of 40 NPOs Number of cause based hubs created Number of monthly contributors to the DCH Number of unique visitors to DCH & CRM portals Market penetration of Doorable on public facilities	50% 2000 9/24 36/100 3/8 2 8% 2 10/40 3/8 100/500 500/5000 50%
<b>3 December 2020</b>		<b>\$ 2,700,000</b>

## Deliverable Milestones

Complete 2nd First Nations ethnography  
Develop First Nations technology (a)

## Performance Milestones

Empathy based persona	12/24
Insightful moments that matter	50/100
Segment aspirations and experience analysis	4/8
Number of user centered design iterations	2
User uptake as a percentage of segment	8%
9 agencies on HIFIS	9/9
Reduction in number of duplicate files	TBD
Speed to connect clients to appropriate services	TBD

## Progress and Payment

**4 June 2021** **\$ 200,000**

Implement Talent & Performance Management  
Implement Work Management & Field Service  
Complete ethnography for youth segment  
Develop First Nations technology (b)  
Create Doorable online community  
Create NPO data and practices toolkit  
DCH Release #2 Cultural Connectedness

Increase in customer satisfaction with billing	40% increase
Number of FTE hours efficiency gained	6000
Empathy based persona	15/24
Insightful moments that matter	62/100
Segment aspirations and experience analysis	5/8
Number of user centered design iterations	2
User uptake as a percentage of segment	8%
Number of users on the Doorable application	2000
Next 10 of 40 NPOs	20/40
Number of caused based hubs created	5/8
Number of monthly contributors to the DCH	200/500
Number of issues that have comprehensive analysis using community input	4/14
Number of unique visitors to DCH & CRM portals	1000/5000

**5 December 2021** **\$ 1,695,000**

Complete ethnography business  
Develop technology for youth

Empathy based persona	18/24
Insightful moments that matter	75/100
Segment aspirations and experience analysis	6/8
Number of user centered design iterations	2
User uptake as a percentage of segment	8%

**6 June 2022** **\$ 195,000**

Implement CRM  
Complete ethnography Seg G  
Develop business technology  
NPO Data analysis and aggregation  
Doorable scale business  
DCH Release #3 Economic Inclusion and dashboard

First 2000 hours reallocated to customer relationships	2000/4000
Analysis of top CRM issues in 311 data	10/25
Segment aspirations and experience analysis	7/8
Empathy based persona	21/24
Insightful moments that matter	87/100
Number of visitors to the Digital Community Hub and CRM portals	5000/5000
Number of user centered design iterations	2
User uptake as a percentage of segment	8%
Next 10 NPOs on board	30/40
NPO testimonial reporting using data effectively	10
Number of caused based hubs created	7/8
Number of issues that have comprehensive analysis using community input	9/14
Number of monthly contributors to the DCH	300/500
Number of unique visitors to DCH & CRM portals	2000/5000

**7 December 2022** **\$ 1,275,000**

## Deliverable Milestones

Complete ethnography Seg H  
Develop technology for seg G

## Performance Milestones

Empathy based persona  
Insightful moments that matter  
Segment aspirations and experience analysis  
Number of segment specific tools deployed  
Users who rate the digital tools as highly satisfactory in connecting them to what matters  
User uptake as a percentage of segment

## Progress and Payment

24/24  
100/100  
8/8  
8/8  
75%  
8%

8 June 2023

\$ 197,000

Implement Customer Portal  
Develop technology for Seg H  
NPO data collaboration & community data  
DCH Release # 4 NPO Community Hub & Community Profile

Next 2000 FTE hours reallocated to customer relationship  
Analysis of top CRM issues  
Number of user centered design iterations  
  
User uptake as a percentage of segment  
Next 10 NPOs on board  
Funding grants supported by data using outcomes as a criteria  
Number of organizations contributing data to the DCH  
Number of service collaborations between NPOS  
Number of cause based hubs created  
Number of monthly contributors to the DCH  
Number of issues that have comprehensive analysis using community input  
Diversity of inputs used in analysis per issue (organizational input, individual input, ethnography, connected technology)  
Number of unique visitors to DCH & CRM portals

4000/4000  
25/25  
2  
  
8%  
40/40  
2  
10  
10  
8/8  
400/500  
14/14  
<3  
5000/5000

9 December 2023

\$ 1,190,000

Interactive Integrated Personalized Inclusion

Number of monthly contributors to the DCH  
% of residents who are satisfied with services to help them participate fully  
% of residents captured in 1 or more empathy based personas  
% of population using personalized digital inclusion tools, DCH and Customer portal

500/500  
95%  
100%  
10%

F June 2024

\$ 3,000

**\$ 10,000,000**

## Performance Monitoring, Reporting & Evaluation Strategies and Checkpoints

Each project team will report on outcome measures, milestones and payments for the respective project. The Digital Community Hub administration, led by the Smart Cities Manager, will compile and monitor performance indicators monthly and/or quarterly (whichever is more appropriate for the measure), establishing reporting with both internal and external sources of data and sharing the information directly with all projects. Monthly cashflow variance reporting will occur as outlined the financial tools and accounting methods section.

The Smart Cities Manager will bring forward a high-level summary of project performance checkpoints and contingency measures from project monitoring as part of the quarterly progress report to the Task Force (as outlined in *Governance*). The Task Force would suggest course corrections for the project committees if not meeting objectives and a change control process if there are major project deviations.

## Performance Measurement Risks and Planned Mitigations

Below are risks and mitigations identified for performance measurement.

Risk	Mitigation
Disproportionately focusing on a few select groups (not representing whole community), preventing a complete community profile	<ul style="list-style-type: none"> <li>Selecting a relatively high number of distinct segments (12), ensuring segmentation represents the entire population so each individual will be able to see themselves represented in at least one segment.</li> <li>Conduct annual surveys to ensure proper capture; ongoing ethnography to identify changing needs, new customer segment profiles/personas, etc.</li> </ul>
Lack of people using personalized digital inclusion tools due to privacy concerns and/or of real or perceived value by residents	<ul style="list-style-type: none"> <li>Being clear and upfront about how the data is collected, used, disclosed and protected through a simple consent form and in communications efforts.</li> <li>Using user-centred design principles and stakeholder collaboration to directly involve users/stakeholders at each step (including post-launch) and understand their concerns related to ease of use, privacy, etc. as well as what they value.</li> <li>Develop &amp; regularly update full marketing/communication plan for all projects, with wide range of communication mediums to address concerns about value/privacy.</li> <li>Conduct regular surveys to determine satisfaction, solicit feedback, and identify new and changing needs.</li> </ul>
Lack of participation in cause-based hubs, or lack of cause-based hubs	Marketing and awareness efforts; stakeholder engagement via Digital Community Hub Coordinator working with organizations.
Lack of data sets, services, programs to include in the Hub	Research to identify data sets, and stakeholder engagement to onboard new agencies.
Inaccurate data sets to feed into Digital Community Hub	<ul style="list-style-type: none"> <li>Ensure data quality via analyst &amp; hub coordinator.</li> <li>Work with NPOs to establish data standards.</li> <li>Community Hub Coordinator to work with stakeholders to identify issues and recommended fixes.</li> </ul>
Lack of citizen engagement in co-creation process	Marketing and awareness and more targeted outreach re: user-centred design.

No measurable change or citizen dissatisfaction with support and services created to increase inclusion	More targeted engagement to increase awareness and/or more in-depth research to better understand needs and gather insights.
Choosing inappropriate metrics to measure improvement	Segmentation research & workshops.
Transformation effort of Digital Fredericton does not make a material impact on organizational behaviours	Launch Transformation Academy to develop leadership skills and gather key feedback and insights about how they can best be supported in their role to be visible and accountable change leaders (e.g. coaching, key messages).
Digital Fredericton stakeholders have not adopted new behaviours, processes, policies, and / or tools	Embracing/adopting new learning modes: micro-learning, self-service, "in the moment", engagement as learning, etc.

# Technology

## Technology Vision

Fredericton and St. Mary's First Nation will create a modern Smart Cities digital infrastructure capable of responding to an increasingly fast pace of change, providing innovative new user experiences to residents while augmenting our workforces and community service organizations to elevate our human and social capital to new heights.

We will use agile human-centred design practices and a digital mesh of platforms to create a smart city that is open, secure, interoperable and extensible. Putting digital ethics at the core of all we do, our network of interconnected personalized digital inclusion tools and services will be safe, cyber secure, with privacy and transparency built in by design. It will be governed in the public trust with data owned by the public domain.

"It has been an honour to work with the City of Fredericton team over the past two years, as an early client of our pioneering cybersecurity engagement and risk management platform. I have experienced firsthand the skill, vision and passion the City will employ to successfully execute on their proposal. I can also attest to their commitment to cybersecurity, privacy, data and connected technology. As we strive to build the smart cities of tomorrow, ensuring they are secure and respect the privacy rights of citizens is fundamental. Fredericton's commitment to empowerment and engagement for its employees and to continuous improvement in its people, processes, culture and technology is a powerful example for other Canadian municipalities. I can think of no better Canadian city, town or village that embodies both the spirit of innovation and collaboration than the City of Fredericton."

**David Shipley | CEO, Beauceron Security**

## Technology Architecture Guidelines and Principles

The many technology selections, and approaches to development and integration available in the market presents a challenge in reaching and sustaining our vision. The following principles will guide our approach to mitigate the risk of selecting technologies, designs and integration methods in an ad hoc fashion that do not support our vision.

### Accessibility and Usability Principles to Support the Uptake and Acceptance of Diverse Users, Residents, and Other Stakeholders

#### New User Experiences

There is a plethora of smart technologies being released to the market. These allow for new user experiences to be developed. New user experiences will be powered by artificial intelligence (AI) and natural language processing. More specifically Machine Learning to allow for voice enablement of services, as well as using new data sets from embedded sensors, video, and imagery to allow for an increased level of cognitive

computing. Mobile apps will be supplemented with chatbots, conversational user interfaces and intelligent assistants.

We will use insightful moments to deliver more meaningful and personalized experiences. This connection of data, smart algorithms, and insights will lead to deeper and more meaningful interactions sharply tailored to the individual and their situation.

## Design Ops

We will combine agile development, dev-ops and design thinking to create design driven engineering or “Design Ops”. We will use rapid prototyping to re-engineer outcomes.

Design thinking visualizes the end experience first, then synthesizes the pieces together to achieve, augment and build toward that vision. It is human-centric and iterative.

Design-ops will fundamentally shift user experiences to interfaces that are more intuitive. Design thinking is about adopting a deeply human-centric viewpoint to redefine why and what should be built in the first place. It will refine and then perfect user experiences to create better, more enjoyable productivity – for both residents and service providers.

## Augmented Workforce

Technology will not replace the expert. Instead, it will bolster the expert with new insights and data driven knowledge to serve customers better.

To be digital on the customer service side, we must first have digital process inside. We will transform and modernize our workforce including non-profits and service organizations. We will use technology to drive an efficient internal process and use digital talent management to drive customer focus. Technology will achieve new outcomes while simultaneously optimizing core operations.

## Rich Data Sets

We will leverage existing, widespread data to gain exponential value from new ecosystems, to generate even more value than the sum of the different pieces, advancing the entire system of service delivery, rather than individual agencies.

This will lead to new learning about how to partner and crowdsourcing innovation to solve problems by going beyond traditional organizational and digital borders to benefit from the knowledge of people who would not normally interact.

## Guidelines for Future-Proofing the Technologies

### Interoperability

Interoperability is imperative in sustaining a smart city solution that will be very heterogeneous in environment, both in terms of present and future state.

These systems encompass many layers from communications, data interfaces, service interfaces, and user interfaces like voice and IoT devices. Interoperability of systems ensures they can exchange and make use of information.

We will create a dynamic mesh that seamlessly connects people with things, algorithms, data, and future innovations, with digital personal assistants, automated agents, and other entities. Application and data interfaces will connect many systems and data sources to leverage the power of multiple platforms.

## Extensibility

A key component of any smart city solution is to ensure the solution developed and implemented takes future growth into consideration. While this may seem like trying to predict the unknown, we will follow best practices to “Future Proof” the solution. Those include using loose coupling of solutions in a service-oriented manner so continued development can occur even if not all requirements are known at the onset. Taking an Agile approach to solution development will also facilitate extensibility.

Interoperable and extensible platforms create opportunities for multiple meaningful engagements for residents and enable partners to take advantage of a “mesh of interactions” and future technologies that connect to legacy data.

Access to shared data and access to add on to systems and add new features using service-oriented architecture will create solutions that are flexible enough to use in new ways that are not yet known. This will allow others to extend existing solutions in innovative new ways we have not thought of.

## Scalability

In the spirit of future proofing a solution, we must ensure it will scale in many different ways including volume of data, number of users, and types of usage. Cloud based computing will be a key resource to assist with this in that it supports auto scaling of resources. We realize that might not come automatically, but wherever possible we will look for solutions that are delivered in a secure Software as a Service model (SaaS). Any solution developed will utilize cloud native resources and tools that support auto scaling.

## Legislative, Regulatory and Ethical Principals

### Digital Ethics

Ethics is more than just what is legally required for compliance; given what is possible through technology, it is creating that which is morally desirable. With AI and big data, the digitization of everything, and our extended ecosystem, the potential impact of secondary and unintended consequences is greater and harder to predict than ever before.

Every digital action can have an equal and potentially unintended secondary consequence and decisions we make about our digital experiences are particularly

significant. From personal data and privacy protection, to compliance, trust and responsibility, ethics has never been so important.

We will address issues like data security, trust and privacy with guidelines of how data should be obtained and used. We will demand digital ethics from all participants who must adopt digital ethics and act with responsibility, transparency, compliance and privacy.

We will educate stakeholders on what is possible, how data is being used, and on threats and security considerations. We will manage data interactions from other repositories, establishing data sharing agreements and secure technologies to share data between platforms.

### Security and Privacy by Design

Given the ever-increasing threat of cybercrimes, and the legislative requirements within the New Brunswick Right to Information and Protection of Privacy Act, we will ensure all solutions are designed with security and privacy as a foundation. This includes securing data at rest and in transit, least privilege access as well as robust monitoring and auditing. It also includes leveraging cloud native development platforms where the traditional security vulnerabilities do not exist.

Systems will be designed for privacy and security using upfront analysis, and designs that facilitate regular privacy and security assessments, reviews and audits. Designs should include audit logs that can be routinely monitored and analyzed.

### Technology Standards, Architectures, and Initiatives

Developing a Smart Cities technology that seamlessly connects people to what matters most requires definition of elements at every layer of the data collection and information management process. Definition of the specific standards used for integration allows for the interoperability principle to be achieved. Each element shown in the following technology architecture is commercially available and easily deployable. Following this architecture and the guiding principles will allow for replicability and scalability.

An overall architecture is defined that includes sensors and edge devices, networks of WiFi, low powered radio, cellular, and fibre networks connecting to secure data storage platforms and linking to advance computing algorithms within a service-oriented architecture to create smart user experiences.

This Smart Cities proposal builds on a multi-cloud approach using hosted applications, on-demand infrastructure, and micro-services. In 2018, the City of Fredericton successfully launched SaaS applications for core Financial and Human Resources Management on the Oracle cloud with authentication and application interfaces using ADFS services and SOAP webservice hosted in the Microsoft Azure cloud.

The City of Fredericton has an extensive geographical information system (GIS) and open data portal already built on Esri ArcGIS. The Digital Community Hub will extend these existing resources to deploy new community-based features and services.

Fredericton was one of the first municipalities in North America to build a community fibre network and offer free Public WiFi. Several hundred kilometers of fibre connect the city.

The City recently partnered with technology company eleven-X to pilot a new LoRaWAN IoT sensor network which is now operational and available to the community.

Our ecosystem has grown substantially over the past year and has attracted both technology partners with specialized skills, academic researches, and social innovators building technology solutions that are important and useful to people who live in our City.

## Interoperable Open Architecture for a Smart City

Layer	Object	Technology
<b>Intelligent Adaptive User Applications</b>	Enterprise core applications	Oracle ERP, Human Capital, and Work Management
		MS Dynamics 365 CRM
		HIFIS 4
	Digital Community HUB	ESRI Geographic IS
	Connected community applications	ESRI ArcGIS Community Hub
		Doorable
LiveKool Check-in Hullo & Future Development		
<b>Smart Algorithms and Microservices</b>	Serverless computing	Amazon S3, AWS Lambda
	Identity management	AD B2C, Cognito
	Access and authentication	MS ADFS
	Recommendation engines	Amazon Personalize
	Chatbot and voice recognition	AWS Lex
	Machine learning Computer vision	SageMaker on AWS Amazon Rekognition
<b>Service Oriented Architecture</b>	Web Services	SOAP
	Application Programming Interfaces	JSON REST APIs
	IoT device data brokering	MQTT
<b>Infrastructure and Storage</b>	Database storage	AWS RDS and S3
	Open Data	ESRI Open Data Hub
	Secure data storage and analytics	NBIRDT
	Cloud backup	MS Azure Blob
	Infrastructure and servers	MS Azure, AWS EC2
<b>Network</b>	Municipal fibre network	F6 Networks
	Public WIFI	e-Novations
	Cellular 4G, 5G	Rogers
	Telemetry IoT network	LoRaWAN by eleven-X
	Security monitoring	IBM Q-Radar
<b>Edge Devices</b>	WIFI Access Points	Fortinet
	Cameras	Cisco
	Smart water meters	eleven-X
	Digital displays	Samsung
	Urban telemetry sensors	LoRaWAN IoT protocol

## Technology Partnerships and Collaboration

Open integrated architecture creating a digital mesh of interactions requires an open and integrated collaboration of technology partners.

One key partner, Deloitte, started with us on our journey, supporting our vision to digitally transform. Our strategic relationship with Deloitte includes a combination of project support, in-kind contributions, and general transformation management activities that will span core, e-government (customer experience) and connected community strategies, with designs and implementations. The relationship is likely to evolve over that timeframe, given the rapid pace of technological and other change that will occur.

A strong partnership, with a unified team focused on delivering value to our community through innovation, is able to build and sustain a strong innovation ecosystem and community.

“We are proud of the milestones that the City and Deloitte have achieved together thus far. We are also thrilled to have the opportunity to continue to collaborate, along with community groups, Oracle and other private companies, and others to achieve the Digital Fredericton aspirations of improving quality of life and driving economic prosperity. We are confident that together, an ecosystem will mature to fundamentally change the way the City works and interacts with its citizens.”

**Greg MacQuarrie | Partner, Deloitte**

## Roles and Responsibilities of Technology Partners

**Deloitte** – Transformation leadership and visionary support; Core systems implementation Oracle Cloud Integration; global perspectives and Smart Cities insights

**Blue Spurs** – Technology Innovation leadership; Adaptive Smart Application extensibility to other digital systems; serverless application development for connected applications; technology support for Civic Tech Fredericton; adoption and implementation of AWS smart algorithms; innovative edge devices with smart algorithms

**Bulletproof** – Cybersecurity monitoring using IBM Q-Radar and security operations centre; threat hunting and risk assessment; training and development of cybersecurity workforce

**Civic Tech Fredericton**<sup>1</sup> – Technical learning, volunteer and collaboration opportunities for developers and social innovators; analyze and visualize data and develop applications and microservices to provide technical solutions to social issues for non-profit agencies;

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<sup>1</sup> The City of Fredericton works together with Blue Spurs to provide AWS cloud infrastructure and microservices to Civic Tech Fredericton. Volunteers from Blue Spurs provide training and leadership in building advanced applications based on AWS cloud technology. [www.civictechfredericton.com](http://www.civictechfredericton.com)

develop social applications on the AWS platform, using low cost and scalable infrastructure.

**eleven-X** – Engineering, support and delivery of public IoT network using LoRaWAN; supply urban sensors and build out smart city telemetry devices and data; provide smart city sensor data through Open Data Portals and APIs.

**Esri Canada Ltd.** – Expertise in geographic information systems; in-kind support and development of the Digital Community Hub.

**F6 Networks** – Maintain and extend Fredericton's metro fibre infrastructure; provide gigaburst, high bandwidth internet connectivity.

**NBCC-NSERC Industrial Research Chair in Mobile First Computing** – Provide applied academic research in emerging UX design.

**Rogers** – Innovation investments in Fredericton; provide LTE networks for IoT extensions; provide data connections on municipal transit to enable public WiFi.

## Results of Testing and/or Piloting in Finalist Phase

To prove out development methods, guiding principles and technologies, many of the technology architectures have been used by the City in production environments or prototyped with pilot projects during the finalist phase. The links below are to working prototypes or minimum viable products. Please visit [www.fredericton.ca/smartcity](http://www.fredericton.ca/smartcity) for more information about these prototypes with video content and latest developments.

**Doorable** (minimum viable product, version 1.0):

<https://play.google.com/store/apps/details?id=com.appdigenous.doorable>

(also available on the Apple App Store)

**Digital Community Hub** (prototype of features and functions):

<http://fredericton-dashboard-fredericton.hub.arcgis.com/>

**Velocity CRM Portal** (functioning pilot, integrated with back-end systems, not publicly launched): <https://cof.microsoftcrmportals.com/en-US/submit-a-service-request>

**Hullo** (prototype setup for android device):

<https://drive.google.com/drive/folders/11EvGboyBSSwi08f-RxILmKaJFLmQVAo?usp=sharing>

**LoRaWAN Telemetry IoT network** (pilot project using parking sensors):

<https://demoapp.eleven-x.com/>;

User Name: [fredericton.parking@eleven-x.com](mailto:fredericton.parking@eleven-x.com) , Password: parking

**Companion Check-In and Online Community Support Tool** (prototype used for market testing): <http://livekool.com/nonprofit>

**Real-time Data integration of IoT LoRaWAN network with Digital Community Hub** (MQTT and JSON APIs protocols for interoperable application and data integration):

<http://how-are-we-doing-fredericton.hub.arcgis.com/>

“Shortly after we started working with the City of Fredericton, it became apparent that this is not your average city. First, they already had an impressive amount of Smart City infrastructure in place. Specifically, they had their own fiber network, city-wide Wi-Fi, and an impressive operational open data platform. In addition, they were already working with a local company to develop a smartphone app to help people with accessibility issues. Impressive for any city of any size, in my humble opinion. Second, they move at lightning speed compared to any other city we have encountered. For example, the RFP was issued in September and awarded in October, our network was deployed several weeks after that and the in-ground parking sensors were installed shortly after that. In around three months they went from initiating the RFP to getting real-time parking data. Third, they listened to their community to find out what is important to them, structured their Smart City Challenge Statement around that, and found an innovative way to address the challenge with technology. The first parking spots that Fredericton choose to monitor are the accessible parking spots. The data is being fed into their existing open data platform and from there into the accessibility parking app I mentioned earlier. Fourth, in case it is not obvious, Fredericton is willing to take risks and be early adopters. I can tell you this is very uncommon for cities, but it is a fundamental and often overlooked ingredient required to truly achieve innovation.”

**Ryan Hickey | COO, eleven-X**

## Technology Risks and Planned Mitigations

Risk	Mitigation
Digital tools/platforms/apps are not user-friendly	Employing user-centred design workshops/usability testing throughout ideation/prototyping/development stages as well as post-launch.
Personal Privacy	Annual privacy audit, PIA and guidance, governance subcommittee.
Cybersecurity	Monitoring, threat assessments and threat risk assessments from Bulletproof Security Operations Centre using IBM Q-Radar appliance.
User acceptance and usability	Iterative user-centred design, reporting on monthly users.
Workforce efficiency	Lean 6 Sigma reporting to performance subcommittee.
Interoperability	<ul style="list-style-type: none"> <li>Develop and document an integration strategy that defines the service-oriented architecture and interface protocols to be used, and the application service end-points. Publish the documentation on the Open Data portal.</li> <li>Maintain a central library of documented system interfaces and with subscriber list.</li> </ul>
Knowledge gaps	Create networks of systems experts through Civic Tech and business partners, hire staff with existing skills, train internal staff on new protocols.
System architecture – the current infrastructure is not ready to build out a project of this magnitude.	Review and update internal architecture in parallel. Understand the implications of lack of infrastructure readiness on organizational success and team adoption.
Abandoned platforms HIFIS-Feds; NB-IRDT, NPOs	<ul style="list-style-type: none"> <li>Federal housing agreement renewal, NBIRDT agreement renewal.</li> <li>Maintaining relationships among adopters.</li> </ul>

# Governance

## Governance Frameworks and Strategies

The Smart Cities Program and the initiatives and projects in this proposal will be governed by the Fredericton Smart Cities Task Force comprising 15 members outlined below representing a broad community of interests. Meetings will be held quarterly. The Task Force's primary role is an advisory one with respect to the overall progress of the Smart Cities Challenge and its five projects. Reporting will be by way of quarterly progress reports furnished by the Smart Cities Manager, which will include projects' progress, marketing/communications/engagement and budget. The Task Force will provide input with respect to issue management, mitigation strategies, change control process if there are major project/cost deviations, and ensuring data, security and legislative compliance requirements are executed (including an annual privacy audit).

### **Fredericton Smart Cities Task Force Composition:**

1. Fredericton Smart Cities Task Force Chair
2. St. Mary's First Nation designate (ex-officio)
3. Smart Cities Manager (ex-officio)
4. Fredericton City Clerk / Privacy Sub-Committee Chair (ex-officio)

### ***Five Project Committee Leads representing:***

5. Non-Profit Data Collaboration (Greater Fredericton Social Innovation)
6. Road Home Digital Platform (Community Action Group on Homelessness)
7. Digital Community Hub (WSP)
8. Doorable (Appdigenous)
9. Digital Fredericton (City of Fredericton)

### ***Academic, Commercial and Social Oversight:***

10. University of New Brunswick
11. New Brunswick Community College
12. Fredericton Public Library
13. Rogers
14. Blue Spurs
15. Deloitte
16. Fredericton Community Foundation
17. Stan Cassidy Centre for Rehabilitation
18. Hotspot Inc.
19. Ignite Fredericton
20. United Way

## Friendship Accord

This governance structure has representation from City of Fredericton and St. Mary's First Nation. Building on this governance structure, the two communities intend to enter a Friendship Accord. The Friendship Accord is a framework for mutual governance of broader community issues of mutual interest.

A Friendship Accord “creates the opportunity to outline why and how two (or more) communities would like to build and sustain their relationship over the long term [...] to:

- strengthen the relationship and provide a framework to undertake joint work
- provide structure, although this not a legal document or a business agreement
- inspire and guide the long-term relationship
- celebrate with the broader communities and regional partners
- formalize the spirit, intent and cooperative agreement of the partnership.”<sup>2</sup>

## Program Administration

The Fredericton/St. Mary's Smart Cities Challenge initiative will be managed by the **Smart Cities Manager**, who is responsible for:

- Managing the Digital Community Hub administration and staff (including the Digital Community Hub Coordinator, Data Analyst, and Hub Content Creator; see “Human Resource Requirements in *Project Management*).
- Liaising with project committees to facilitate the successful implementation of projects.
- Managing budget oversight, and funding disbursements to the five projects.
- Reporting to Infrastructure Canada.
- Coordinating quarterly Fredericton Smart Cities Task Force meetings including report generation (quarterly progress reports, budget, issue management).
- Managing strategic marketing and communications for the Smart Cities Program as it relates to Fredericton's brand. This includes the development of an integrated marketing communications plan (encompasses the public awareness element/storytelling, leveraging partnerships with respect to marketing, public relations, refreshing GoFred brand, elevating Digital Fredericton brand, etc.).
- Cultivating and fostering stakeholder relations/partnerships.
- Managing Smart Cities Innovation Lab, and liaising with potential and existing entrepreneurs as it relates to Smart Cities app development – connecting them with partners/staff and funding.

## Privacy

There will be a Smart City Task Force Privacy Sub-Committee – chaired by the CoF Chief Privacy Officer (City Clerk) or his/her designate and will be comprised of representatives

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<sup>2</sup> “Relationship/Friendship Accords.” *CEDI*. Cando. <http://www.edo.ca/cedi/relationship-friendship-accords>

from each of the five project committees, plus a representative from St. Mary's First Nation, a privacy subject matter expert, Virtual Chief Information Security Officer/Bulletproof Security Operations Centre, and a representative each from NB-IRDT and Service Canada. The Committee will be responsible for developing privacy frameworks and their privacy policies, procedures, protocols, consent forms and data sharing agreements as necessary and submitting them for approval to the Task Force. The Privacy Sub-Committee would ensure an annual privacy audit.

## Financial Oversight

Funding received from Infrastructure Canada will be disbursed by the City of Fredericton. The Smart Cities Manager will be responsible for maintaining the budget and funding disbursements based on allocations as per the Smart Cities Challenge submission. Quarterly reports – or prescribed reporting format as per Infrastructure Canada requirements – will be presented to the Task Force by the Smart Cities Manager to inform of progress and deviations which could result in change control.

## Digital Fredericton Program & Project Governance

Due to the magnitude of the Digital Fredericton initiative, a **Program Level Leadership Team** will be assigned to the Digital Fredericton Transformation. The Leadership Team is made up of leaders across the City of Fredericton's lines of service and relevant Deloitte service lines and responsible for planning, priority setting, overseeing and delivering against the commitments inherent to achieving the Digital Fredericton vision. Each Digital Fredericton project will be governed by a project charter and statement of work when it involves partnering with external partners. Each Digital Fredericton project will have its own project team, with projects of significant size and scale including the following elements: Project Steering Committee; Executive Sponsor; Project Manager; Project Subject Matter Experts; Project Team Members; Change Management Team; Technical Leads (where appropriate); other roles defined as appropriate.

## Project Committees

The five project committees (Digital Fredericton, Digital Community Hub, Doorable, Road Home Digital Platform and Non-Profit Data Collaboration) will comprise:

- **Project Lead** – Setting and managing direction and overall project deliverables.
- **Subject Matter Experts** – Providing insight and subject matter expertise and support.
- **Team/Project Resource Support** – Providing team support, assistance and resources to support the project including administration, maintaining budget, reporting, etc.
- **Creative Lead** – Innovating and pushing the team to advance outcomes through creative thinking.
- **Additional Resources** – as deemed appropriate by the project lead.

The committees will be responsible for setting their meetings and their project plan deployment (including maintaining project schedule, budget), monitoring/controlling outcomes as per set performance measurements to receive funding disbursements, managing risks, partnerships, recording minutes and providing quarterly report inputs to the Smart Cities Manager regarding project progress and budget.

## Role, Capacity and Partner/Stakeholder Readiness

Role	Organization & Contact		Impact/Influence & Capacity/Readiness
Co-Applicant	Mike O'Brien <i>Mayor, City of Fredericton</i>		Municipal decision-making on behalf of City Council Fully committed to the success of this initiative providing significant human and financial resources.
Co-Applicant	Alan Polchies <i>Chief, St. Mary's First Nation</i>		SMFN decision-making on behalf of Band Council Fully committed to the success of this initiative providing First Nations oversight.
Digital Fredericton Transformation Partner	Greg MacQuarrie <i>Partner, Deloitte</i>		Long-term strategic partner investing \$1 M to date in helping to achieve the Digital Fredericton vision.
Technology provider	Alex Miller <i>President, Esri Canada Limited</i>		Provided over \$50,000 in technology and supporting services to develop the Digital Community Hub prototype. Committed to provide \$20,000/year in professional services to further support the development of the Digital Community Hub.
Digital Community Hub Research & Data	Dr. Jeff Rankin <i>Dean of Engineering University of New Brunswick</i>		Provided comprehensive research on smart city indicators and data sets to include in Digital Community Hub.
Digital Community Hub Project Management	Dr. Anna Robak <i>Research Manager, Innovation &amp; Future Ready, WSP Canada</i>		Provided in-kind project management services for the development of the Digital Community Hub.
Innovation Partner	Troy Harnish <i>Rogers</i>		Providing in-kind services to support Fredericton's innovation/Smart Cities agenda.
Innovation Partner	Ryan Hickey <i>eleven-X</i>		Supporting Fredericton's smart cities agenda to deploy/operate LoRaWAN wireless IoT network to enable future application development. Eleven-X is contributing half the cost of the next 1000 network connections – valued at \$12,000.
Innovation Partner	Mike LeBlanc <i>CEO, Blue Spurs</i>		Providing strategic innovation oversight with respect to the Smart Cities Challenge projects.
Smart City Task Force / Project Committee Members	<b>Project Leads</b> Digital Fredericton – Valerie Kelly Digital Community Hub – Anna Robak Appdigenous – Melissa Lunney Non-Profit Data Collaboration – Sandi MacKinnon Road Home Digital Platform – Faith McFarland		These organizations/ representatives have been selected based on their unique contributions, capacity and subject matter expertise to impact the success of projects.
User-centred design provider	Greg Phillips & Chelsea Wilson <i>Accreon</i>		Providing in-kind user-centred design valued at \$1500 for the Digital Community Hub.
Road Home Platform Early	Warren Maddox <i>Fredericton Homeless Shelters</i>	Julia Galant Daigle <i>Youth in Transition</i>	Partnering to pilot/adopt new HIFIS4 shared client management platform.

Adopters of HIFIS4	John Barrow <i>John Howard Society of Fredericton</i>	Lisa Edwards <i>Capital Region Mental Health &amp; Addictions</i>		
Doorable Early Adopters	James Blanchard, <i>City of Fredericton</i>	Sally Brooks <i>St. Mary's First Nation</i>		The City of Fredericton and St. Mary's have committed their readiness as an early adopter of the technology, and to conduct user testing. Two for-profit organizations have come on board as private sector adopters.
	Tim Woods <i>Brookside Mall</i>	Larry Shaw <i>Knowledge Park</i>		
Non-Profit Data Collaboration Early Adopters	Sandi MacKinnon <i>GFSI</i>	Alex Boyd <i>Greener Village Food Centre</i>	Betty Daniels <i>Meals on Wheels</i>	Led by GFSI, 11 NPOs are participating as early adopters in the NPO Data Collaboration Project.
	Jess Baxter <i>Alzheimer Society of New Brunswick</i>	Fiona Williams <i>Liberty Lane</i>	Julia Gallant Daigle <i>Youth in Transition</i>	
	Christin Swim <i>Skigin-Elnoog Housing Corporation</i>	Erica Young <i>Opal Family Services</i>	Jan Wambolt <i>Wil-Doo Cycle</i>	
	Karen MacAlpine <i>Fredericton Boys &amp; Girls Club</i>	Fiona Williams <i>Partners for Youth</i>	Julia Stewart <i>Fredericton Library</i>	
Non-Profit Data Collaboration Support Partners	Karina LeBlanc <i>NB Social Policy Research Network</i> <i>Pond-Deshpande Centre</i>			Strategic support partner.
NPO Data Infrastructure	Dr. Ted McDonald <i>Director, NB-IRDT</i>			Key partner of the NPO Data project equipping NPOs with tools, enabling the transfer of aggregate data to connect with provincial data infrastructure.
NPO Data Support	Dr. Jules Maitland <i>Co-Founder, Civic Tech Fredericton</i>			Supporting the NPOs on how to link data sets, utilize visualizations tech, perform analysis for better decision making, and design tech solutions to address social issues.
NPO Data Standards Coordination	Sarah Campbell <i>Research Manager, NB Social Development (Social Pediatrics)</i>			Funding \$80,000 Data Standard Specialist to develop standardization for NPO project.
HIFIS4 support	Randy Hatfield <i>Saint John Human Development Council</i>			Funding part-time HIFIS Coordinator to onboard and coordinate HIFIS4 deployment valued at \$35,000.
AbilityNB	Haley Flaro <i>Executive Director</i>			Provincial organizations for persons with accessibility challenges/Appdigenous partner.
NBCC	Dr. Marilyn Luscombe <i>NB Community College</i>			Provincial community college network and integral Appdigenous partner.

Please refer to attached supporting documentation for the aforementioned partnerships and other letters of support. Please see the proforma budget in *Financial* outlining the value of in-kind contributions/financial arrangements.

## Retaining Community Control Over Sensitive & Personal Data

Individuals of the community will be the rightful owners of their own personal information. (See *Data and Privacy* for more detail.) Community ownership of aggregate or de-

identified personal information through the Digital Community Hub will be the hallmark of the partnerships between the City of Fredericton's initiatives and others undertaken as part of the Smart Cities program. Decisions about community aggregate data availability will flow through the Fredericton Smart Cities Task Force. As well, the OCAP principle (Ownership, Control, Access, and Possession) will be the guiding principle of all personal and aggregate data obtained through the partnership with St. Mary's First Nation.

## Governance Risks and Planned Mitigations

Risk	Mitigation
Breakdown in collaboration between the City of Fredericton and St. Mary's First Nation due to diverging priorities	<ul style="list-style-type: none"> <li>• Continue to focus on developing the Friendship Accord</li> <li>• Regular joint briefings between City and St. Mary's elected officials and staff</li> </ul>
Keeping stakeholders engaged in the governance process and fulfilling their oversight responsibilities	<ul style="list-style-type: none"> <li>• Set expectations with Task Force members through written roles, responsibilities and expectations of task force members</li> <li>• Semi-annual survey of Task Force and committee members on their satisfaction and effectiveness of the governance process.</li> </ul>

## Data and Privacy

The personal privacy issues for the initiatives and projects in this proposal are as complex and challenging as the overall endeavour is ambitious, innovative, and entrepreneurial. An in-depth focus on cybersecurity and privacy will be incorporated across all layers of the Digital Fredericton transformation.

### Principles

The Fredericton Smart Cities Task Force's Privacy Committee has committed to the following 10 principles to serve as signposts as it moves to ensure privacy compliance for each project: **Respect; Anonymization; Control; Necessity; Consent; Community Ownership; Consultation; Access; Transparency, Accountability, and Open Government; Security.** See a complete description of the 10 Privacy Principles at [www.fredericton.ca/smartcity](http://www.fredericton.ca/smartcity).

### Preliminary Privacy Impact Assessment

To address the privacy issues, a preliminary privacy impact assessment (PPIA) was completed by Robert P. Doherty Access and Privacy Services (RPDAPS). Mr. Doherty has almost 25 years' experience in information access and privacy including ten years as an information access and privacy consultant and lawyer. His approach to developing and preparing a privacy impact assessment is one of common sense and attention to detail in rooting out the privacy risks of any project according to the Canadian Standards Association (CSA) ten fair information/privacy principles and relevant legislation and to provide realistic mitigation strategies that address the privacy compliance risks. As part of the development of the PPIA, the Office of New Brunswick's Integrity Commissioner was also consulted and was provided with a copy of the draft PPIA with a request for comment. Adjustments were made to the PPIA and its related materials based on the feedback received from the Office.

The PPIA examined each of the initiatives/projects according whether at this point they were compliant with each of the ten CSA privacy principles and relevant privacy legislation.

### Privacy Compliance

Our ambitious proposal creates privacy challenges for each of the projects it encompasses as they not only encounter four applicable privacy laws, but also involve organizations with varying degrees of familiarity with privacy principles and use of privacy management tools. The relevant privacy legislative obligations for the main initiatives/projects are:

- Digital Fredericton & Digital Community Hub – New Brunswick Right to Information and Protection of Privacy Act (RTIPPA)

- Doorable (Appdigenous) – Personal Information Protection and Electronic Documents Act (PIPEDA)
- Non-Profit Data Collaboration – RTIPPA and the Personal Health Information Protection and Access Act (PHIPA)
- Road Home Digital Platform – PHIPA and the Federal Privacy Act

The PPIA has taken into account the privacy obligations of the relevant legislation on each project, **reviewing and assessing the privacy compliance requirements of the ten Canadian Standards Association Fair Information/Privacy Principles each project** as well as the projects overall with respect to:

- the seven principles of Privacy by Design developed by Dr. Ann Cavoukian, former Ontario Information and Privacy Commissioner
- the letter sent to the Minister of Infrastructure Canada from the Information Commissioner of Canada and the information and privacy commissioners or their counterparts across jurisdictions in Canada.
- input from the Office of the New Brunswick Integrity Commissioner responsible for the New Brunswick Right to Information and Protection of Privacy Act (RTIPPA) and the New Brunswick Personal Health Information Protection and Access (PHIPA) Act.

The PPIA also sets out the ten privacy principles set out by the Fredericton Smart Cities Task Force's Privacy Sub-Committee.

**Applicable provisions in the relevant legislation are expressed in each of the 10 privacy principles and are assessed in the privacy impact assessment.**

Essentially the proposed data management plan is comprised of two major components:

- a privacy management framework for each project
- an information technology infrastructure and security plan and/or policy for each project

The PPIA indicates that for most projects, with the exception of Non-Profit Data Collaboration and Road Home Digital Platform, the security plan for the IT infrastructure that will be used to facilitate is in its formative stages. The exceptions are the IT infrastructure that is already in place at NB-IRDT and the Department of Health for Non-Profit Collaboration and the HIFIS4 System developed by Service Canada. The data provided to both of these organizations by non-profit organizations and homeless serving agencies will be collected securely through the IT infrastructure of these organizations, and will be housed on secure platforms there as well.

As well, there is little in the way of privacy management frameworks and the organizational tools, policies, procedures, and protocols for all projects and participating agencies. The exceptions are Non-Profit Data Collaboration and Road Home Digital Platform. Although non-profit organizations and homeless serving agencies participating in these projects appear to have limited familiarity with the need for such frameworks, their project partners (NB-IRDT, N.B. Department of Health for the Non-Profit Data Collaboration Project and Service Canada with its HIFIS4 System for the Road Home Digital Platform project) appear to have robust privacy frameworks for protecting the personal data they will receive as part of the project.

The full data management plan for all projects will be created in accordance generally with the ten CSA privacy principles' requirements, and specifically in compliance with the provisions of the relevant legislation for each project. Thus, the requirements of the following pieces of legislation are the basis of the privacy assessment for each principle, and the mitigation strategy recommended alleviating and minimizing privacy risks:

- the Right to Information and Protection of Privacy Act (RTIPPA) for each principle for Digital Fredericton, Digital Community Hub, and Non-Profit Collaboration;
- the Personal Information Protection and Electronic Documents Act (PIPEDA) for Doorable;
- the Privacy Act for Road Home Digital Platform; and
- the Personal Health Information Protection and Access (PHIPA) Act as well for Non-Profit Collaboration and Road Home Digital Platform.

The need for such a data management plan is reflected in the legislative obligations that apply to each project. The provisions that apply to determine the specific privacy compliance obligations under each principle in each piece of legislation are not identical. However, there is enough similarity among the different provisions in each relevant privacy law and the CSA privacy principles, except areas such as data matching and common or integrated service delivery, to base the obligations on the applicable principle. Because the obligation in each CSA principle is reflective of the similar legislated obligations for each principle, this was the basis, with the exception noted, of the privacy assessment and will be the basis of the data management plans developed for each project in implementing the mitigation strategies for each project. In short, the data management plans will be compliant not only with each CSA principle, but also to the specific legislative requirements of the relevant privacy laws. The only differences will be in the degree of detail that is required in each law.

## Types & Methods of Data Collection, Use, Retention and Disclosure

Personal information will primarily be collected from residents through online engagement, service use (e.g. Doorable), and dialogue. The ethnographic research will collect personal information through online one-on-one video recording and notes made by session facilitators. Other personal information collected by other projects will be done through data entry, either by project representatives or citizens engaging in online dialogue with project representatives.

The personal information will, where possible, be aggregated and de-identified and provided to the City of Fredericton for analysis, policy development and assessing service performance and determining overall service delivery needs or approaches for citizens. Personal information will be, according to the legislative authority relevant to each project, retained according to retention and destruction schedules consistent with the Municipal Records Authority (MRA), NB-IRDT, the New Brunswick Department of Health, and the federal government, and future record retention policies that are expected to be developed by the Government of New Brunswick.

The total life cycle of the personal information collected on all projects will be consistent with these policies, but as noted above, apart from the City of Fredericton and the data

life cycle policies that are part and parcel of NB-IRDT and Service Canada, there will be a need to provide resources for the development of such policies.

## Security and Privacy Considerations

From the beginning, privacy and security considerations, particularly those of the seven principles of Privacy by Design, have been and will be dominant in the development of IT infrastructure that will serve each of the projects. The City of Fredericton, in particular has already in place robust privacy and security protections built into its existing infrastructure. Plans for additional IT infrastructure, as noted in Appendices D & E of the PPIA also will include industry standard privacy and security features to protect personal information. In the initial engagements with citizens, there was little if any privacy and security concerns raised as the focus was initially on designing a vision for the future of a city that epitomized a future digital Fredericton that connected and provided services that meet the needs of the citizens of the city most effectively.

## Adhering to Principles

### Governance

A proposed governance structure has been developed for this initiative that recognizes the homogeneous participation in each project at all levels. Thus, project leads, technical, academic, social innovation, and privacy expertise will be part and parcel of the decision-making process as projects roll out their programs. As well, there will be a privacy checkpoint for all projects that will review progress in the development of the various mitigation strategies designed to ensure privacy compliance with the ten CSA Privacy principles and relevant legislation. A commitment has also been made to engage with residents about the plans for each project prior to each project becoming fully operational, including how their personal information that they provide in the implementation of each will be protected.

### Ownership and Control

The concept of community ownership of aggregate data and individual control of personal data through the use of well-structure informed consent forms, and audits of collection, use, and disclosure of personal information on each project is important. It has been and will be dominant through the planning and implementation process for the overall initiative. It is also the intent and goal to provide as much relevant open aggregate data through the Digital Community Hub open online portal. This will not only allow reporting on the progress of each project attaining its goals, but also in providing aggregate data and analysis that encourages economic development in the community. As well, the project recognizes and will implement the First Nations Information Governance Centre Principles of Ownership, Control, Access, and Possession (OCAP) in dealing with personal and community based aggregate information of St. Mary's First Nation, a full partner in the Smart Cities initiative.

## Consent

Consent will be the hallmark of each project in requesting citizens to provide their personal information in identifying their service needs and to engage in dialogue with the City. While at this point, there is a variety of consent forms, or no consent form at all for some projects, the future will be marked by use of a solid informed consent form that provides specific information about the purpose of collection, the limits on future use and disclosure, and the retention periods and security protecting personal information they provide. Residents will have the option to opt-out of consent at any time, in accordance with the consent principle developed. For more information, refer to the PPIA, section 8c “Consent” on page 38.

A solid consent form guidance document with a template that can be adjusted to the uniqueness of each project has been prepared for use by each project. As well, to encourage projects to limit their collection of personal information only to that information that is necessary for the effective delivery of the project, a draft data collection template has been developed for use by each project.

## Data Minimization and De-Identification

All Smart Cities Challenge projects will retain personal information only within their IT infrastructures for use to deliver services to client or user base. Some de-identification will be possible (and would be done at the earliest opportunity where appropriate) through the use of unique numerical identifiers for this data. However, on the whole, the identifying information will continue to be needed for providing effective services, or confirming identity. For disclosure outside of the individual projects, all personal information will be aggregated or de-identified. This will provide snapshots of the effectiveness of particular services as well their progress in meeting service delivery goals and where appropriate will enhance the data sets on the Digital Community Hub. Other uses would include being able to map an “accessible” city in the use of the Doorable app for the accessibility community, particular research projects through NB-IRDT through data obtained through the “Crosswalk” process, and service delivery analysis for the Road Home Digital Platform. This will all be done by developing appropriate software or approaches to aggregating or de-identifying data with appropriate privacy protections within each application.

## Accessibility

At the heart of the initiative is the Digital Community Hub, which will be used as a conduit to providing meaningful data on an open government online portal. This should encourage development of improved service delivery options, real time census data, and economic development and entrepreneurial innovation. This goal will be achieved through open source data gathered by City of Fredericton researchers, and aggregated data from most of the Smart Cities projects. In particular ethnographic research, feedback from accessible app users of Doorable, and aggregate data from the Road Home Digital Platform with respect to homeless individuals will also be used. The Digital Community

- Hub is the portal and the community engagement sessions that will encourage dialogue

about different approaches and economic development opportunities will be one of the key mechanisms. These mechanisms will take the informational seeds on the Digital Community Hub and provide opportunities for them to grow in fertile environments.

## Security

As noted earlier, the information technology infrastructure for the majority of projects (Digital Fredericton, Digital Community Hub, and Doorable) is still in the conceptual or early development stage. However, in the course of providing information for assessment in the PPIA, these projects have discussed or provided evidence of concrete plans to incorporate industry standard privacy and security features in the development of information technology infrastructure for the project. The test ultimately will come when a final privacy impact assessment examines the degree to which these features have been included. Non-Profit Data Collaboration and Road Home Digital Platform, based upon documentation reviewed for these projects, have acceptable privacy and security features in their information technology infrastructure resident in NB-IRDT and the HIFIS4 Platform.

## Open and Big Data Strategies

At the heart of this proposal is the objective of capturing a real-time snapshot of the city and its citizens and determining their program and service needs, and the current capacity to address those needs physically and socially. Existing data sets from national counts or surveys, or no data sets at all, are inadequate to provide that determination either because of time lags, privacy, or no data at all because marrying needs with physical, social, and geographic access has been difficult.

While each of the projects will collect and retain personal information of residents to improve personal experiences with programs and services, that personal data will be de-identified or aggregated as well. There are privacy risks and challenges in that overall process that require mitigation strategies as noted in the PPIA. But there are also tremendous opportunities to address that data deficit. Policy and decision makers using analytical tools with the aggregate and de-identified personal information should be able to improve service choices for residents.

## Data and Privacy Risks and Planned Mitigations

The PPIA developed for this proposal used a common-sense approach to identifying privacy risks for its main initiatives. It identifies privacy risks based on the ten CSA privacy principles and proposes practical mitigation strategies for projects where, although guided in the past by confidentiality approaches to personal information, would have limited privacy and security data management frameworks. The strategies identified are realistic relative to the current privacy expertise of the organizations and individuals guiding these projects, and to the required development of frameworks. Resources will be made available to guide these projects to achieve their privacy objectives.

The need for such frameworks has not only been readily recognized by the project proponents, but embraced in the expressed desire to ensure that the projects will be “doing it right” when it comes to establishing a privacy culture within not only the project, but within their organization.

The privacy risk assessment for the 10 CSA principles involves also a variety of existing compliance by projects. There are mitigating strategies suggested relative to compliance with all of these principles, but for some, mitigation will only involve using preparatory work already done to mitigate the risk (e.g. consent guidance, data element template to determine the “necessity”). See the table below for identified risks and their mitigations. The scoring for each of these risks is available in the PPIA.

Risk	Mitigation
Lack of accountability	<ul style="list-style-type: none"> <li>Putting in place overall governance structure for the initiative and formally/publicly identify individual/position responsible for privacy on each project.</li> </ul>
Lack of clear identified purpose of data collection/use, etc.	<ul style="list-style-type: none"> <li>Develop and use a consent form that clearly identifies the specific purpose(s) for the collection, use and disclosure of personal information.</li> </ul>
Lack of meaningful consent	<ul style="list-style-type: none"> <li>Develop and use a consent form that clearly identifies the specific purpose(s) for the collection, use and disclosure of personal information, as well as the length of time it will be retained and what security there will be around it; review this annually by an independent third party; for NPO and Road Home develop/use a specific informed consent form for future collections of personal information by clients.</li> </ul>
Failing to ensure appropriate respect for First Nations data and community privacy	<ul style="list-style-type: none"> <li>All stakeholders will collaborate closely with St. Mary's First Nation</li> <li>Projects follow OCAP principles</li> </ul>
Collecting more personal information than is necessary to achieve project goals	<ul style="list-style-type: none"> <li>Modify and use a data element collection template that requires explanation of why each data element is necessary for Digital Fredericton, Digital Community Hub and “Doorable”; review by a third party annually.</li> </ul>
Failure to limit use, disclosure to what is necessary	<ul style="list-style-type: none"> <li>Develop and use a thorough informed consent form for clients interacting with the project that specifically limits further use and disclosure other than for the identified purposes of collection “except as authorized or required by law”; third party monitoring on an annual basis.</li> </ul>
Failure to limit retention	<ul style="list-style-type: none"> <li>Put the resources in place and develop an overall records retention policy for the FSC Program that is consistent with the Municipal Records Authority.</li> </ul>
Incomplete/data/inaccurate information	<ul style="list-style-type: none"> <li>Ensure that from a policy/protocol perspective that staff involved in project are reminded to verify and update client information; scheduled reminders for users to confirm information.</li> </ul>

<p>Data breach/inadequate safeguards leading to identification of residents and related risks including lack/loss of trust</p>	<ul style="list-style-type: none"> <li>• Follow Privacy by Design Principles.</li> <li>• Establish privacy and security infrastructure that incorporates what privacy and security features are required to ensure that personal information is protected relative to its sensitivity and vulnerability (+ server integrity/data back-ups).</li> <li>• Establish and follow privacy framework including all protocols &amp; policies noted in PPIA; security audits; conduct full privacy impact assessment.</li> </ul>
<p>Failure to be open and transparent about management of personal information</p>	<ul style="list-style-type: none"> <li>• Continue the openness and transparency philosophy adopted for this initiative by ensuring that privacy features of the program are promulgated successfully through websites and open forums.</li> </ul>
<p>Failure to provide individuals access to their own information</p>	<ul style="list-style-type: none"> <li>• Establish and promulgate procedures on web sites and other communication venues whereby individual citizens are informed of how they may obtain their own personal information that the organization holds on them.</li> </ul>
<p>Failure to communicate clearly about how to challenge compliance</p>	<ul style="list-style-type: none"> <li>• Publish openly to whom and how individuals may complain about their privacy rights being compromised.</li> </ul>

## Implementation Phase Requirements

We have identified that the primary legislative requirements that relate to our projects relate to privacy (detailed in *Data and Privacy*.)

We recognize the **Duty to Consult** with First Nations on a broad range of issues. A key motivator for the City of Fredericton and St. Mary's First Nation to submit a joint proposal was to develop a closer relationship between our neighbouring communities. This process is the launching point for pursuing a Friendship Accord that will set a framework of governance and collaboration and establish processes for consultation for this and other initiatives of shared interest. The projects in this proposal are governed by the Smart Cities Task Force, which includes representatives from both the City of Fredericton and St. Mary's First Nation.

We recognize the **Community Employment Benefits (CEB)** initiative is designed to provide employment and/or procurement opportunities for: apprentices; Indigenous peoples; women; persons with disabilities; veterans; youth; recent immigrants; and small-medium-sized social enterprises.

As part of our vision to become a more inclusive, connected community supporting diversity, we will be participating in the CEB with respect to the following target groups:

- **Youth / Indigenous Peoples** – Appdigenous has committed to giving preference to qualified candidates who are chronically economically disadvantaged including, in particular, young indigenous individuals. Through this project – starting the summer of 2019 – six indigenous students and one project coordinator will be hired to undertake a research study to determine the number of wheelchair push button doors in Fredericton. Doorable will also partner with the Joint Economic Development Initiative (JEDI) to hire indigenous students for the programming and product development.
- **Small to Medium-Sized Social Enterprises** – Through Digital Fredericton's 'Connected Community' layer and the Digital Community Hub, citizens and entrepreneurs will be able to access open data to designs solutions to address community problems. As part of the Digital Fredericton project funding, we intend to procure and invest in new apps / startup companies to fuel procurement and more products from startups like Doorable, which will lead to job creation.
- **Women** – As part of our efforts to support social SMEs, an emphasis will be put on targeting and supporting female entrepreneurs. Already, Fredericton and St. Mary's First Nation have set the stage by supporting Melissa Lunney, Doorable Founder.

As part of the Smart Cities Challenge requirements, it is understood that specific CEB targets and a community employment benefits approach will need to be established when project funding is awarded.

Although the nature of the projects included in this proposal would suggest that a **Climate Lens Assessment** is not necessarily applicable, we have identified a potential for environmental issues to be addressed through future potential projects based on the

insights we develop on what matters most to residents. Some digital tools may be developed to have a positive environmental impact (e.g. to increase renewable energy use, recycling, reduce greenhouse gas emissions, etc.) In developing the IoT network, we are deploying urban sensors to monitor environmental conditions, such as flooding, air quality and localized weather conditions. Generating this data will allow us to engage the community in environmental solutions and identify how we can adapt to climate change and minimize our environmental footprint.

## Implementation Phase Risks and Planned Mitigations

Risk	Mitigation
Traditional procurement processes used do not consider the opportunities presented by the Community Employment Benefits initiative.	The governance structure provides direct control over initiatives that impact procurement and the task force will be advised of the objectives of the CEB and provide governance over its implementation.
Failure to adequately consult First Nations	Implement Friendship accord to provide a governance structure for systematic oversight of issues of mutual interest.

# Financial

## Comprehensive Project Budget

### Revenue Including Own-Source and Partner Contributions

#### Funding

##### Own Source Revenue

- City of Fredericton Capital Budget for Digital Fredericton Core Systems
- City of Fredericton Capital Budget for IoT sensors and new use cases
- City of Fredericton Operating Funds - Staff Salaries for Smart Cities
- City of Fredericton - IT Investments in New Cybersecurity
- e-Novations Comnet Inc. - Investment in free community WIFI

##### Direct Partner Contributions

- Confidential partner In-kind Investment in Innovation and data connections
- ESRI - In-kind professional services contribution for Digital Community Hub

##### Infrastructure Canada - Milestone Outcomes Based Payment

##### Total Funding

	2019	2020	2021	2022	2023	Total
City of Fredericton Capital Budget for Digital Fredericton Core Systems	\$ 1,040	\$ 500	\$ 500	\$ 500	\$ 500	\$ 3,040
City of Fredericton Capital Budget for IoT sensors and new use cases	-	25	25	25	-	75
City of Fredericton Operating Funds - Staff Salaries for Smart Cities	150	150	150	150	150	750
City of Fredericton - IT Investments in New Cybersecurity	100	100	100	100	100	500
e-Novations Comnet Inc. - Investment in free community WIFI	375	-	-	-	-	375
	<b>1,665</b>	<b>775</b>	<b>775</b>	<b>775</b>	<b>750</b>	<b>4,740</b>
Confidential partner In-kind Investment in Innovation and data connections	100	100	100	-	-	300
ESRI - In-kind professional services contribution for Digital Community Hub	20	20	20	20	20	100
	<b>120</b>	<b>120</b>	<b>120</b>	<b>20</b>	<b>20</b>	<b>400</b>
Infrastructure Canada - Milestone Outcomes Based Payment	1,925	3,320	1,895	1,480	1,380	10,000
<b>Total Funding</b>	<b>\$ 3,710</b>	<b>\$ 4,215</b>	<b>\$ 2,790</b>	<b>\$ 2,275</b>	<b>\$ 2,150</b>	<b>\$ 15,140</b>

## Detailed Project Expenditures

Expenditures for Outcomes	2019	2020	2021	2022	2023	Total
<b>Digital Fredericton</b>						
<b>Core e-government services</b>						
Utilities and Customer Billing		1,000				1,000
Work Management and Field Service Delivery			1,200			1,200
Digital Talent Strategy	150					150
HR Scheduling		875				875
Talent and Performance Management			1,425			1,425
Citizen Experience Strategy	240					240
Customer Relationship Management / 311 services				1,000	1,000	2,000
	390	1,875	2,625	1,000	1,000	6,890
<b>Customer Experience Strategy</b>						
Ethnographic Research (2 segments per year)		50	50	100	50	250
First Nations specific ethnographic research (2 segments - directed by SMFI)	50	50	50			150
Idea creation and user centred prototype design from ethnography insights	20	20	20	20	20	100
Digital Inclusion Tools application and technology development and innovat	125	250	-	250	125	750
Fist Nations specific digital tools resulting from ethnography			250	-		250
	195	370	370	370	195	1,500
<b>NPO data collaboration</b>						
Establish core systems and digital processes and acquire resources and talen	140					140
On-board early adopters		215				215
Build capacity and share data			175			175
Expand project and build data analysis capacity				175		175
Link data & connect aggregate data to Dashboard Community Hub					175	175
	140	215	175	175	175	880
<b>Road Home</b>						
Initialize digital core systems for shared client intake and case management						
Build Digital Inclusion Infrastructure and provide user technology	60	-	4	4		68
Provide technology resources for First Nations shelter	30		1	1		32
Upgrade free Public WIFI in Downtown Public Spaces and on Transit Buses	300	-				300
Create personalized digital inclusion tools - "Digital Street Guide"		125				125
	390	125	5	5	-	525



**Doorable**

- Application and hardware development and technology platform
- Deploy hardware and software
- Map accessible City
- Create "Doorable" on-line community
- Integrate IoT parking sensor data to application

**Dashboard, Digital Community Hub**

- Project mobilization with Data Analyst, Digital Community Hub Coordinator
- Technology procurement and platform development
- Build content and create user base
- Release #1 - Accessible & Supportive**
- Release #2 - Cultural Connectedness**
- Release #3 - Economic Inclusion & Dashboard**
- Release #4 - NPO and Community Hub**

**Transformation Management**

- Transformation and communications team consulting services
- Privacy Officer (Virtual Privacy Officer - Annual Review)
- Smart Cities innovation lab space
- SMFN dedicated lead for ethnography and technology initiatives
- Project Management - City Staff Dedicated to project
- Cybersecurity (Virtual CISO and Security Operations Monitoring)

*Cashflow*

	2019	2020	2021	2022	2023	Total
<b>Doorable</b>						
Application and hardware development and technology platform	315	102				417
Deploy hardware and software	190	85	55			330
Map accessible City	135					135
Create "Doorable" on-line community		80	173			253
Integrate IoT parking sensor data to application			15			15
	<b>640</b>	<b>267</b>	<b>243</b>	<b>-</b>	<b>-</b>	<b>1,150</b>
<b>Dashboard, Digital Community Hub</b>						
Project mobilization with Data Analyst, Digital Community Hub Coordinator	345					345
Technology procurement and platform development	60	60	60	15	10	205
Build content and create user base						-
<b>Release #1 - Accessible &amp; Supportive</b>		210				210
<b>Release #2 - Cultural Connectedness</b>			245			245
<b>Release #3 - Economic Inclusion &amp; Dashboard</b>				245		245
<b>Release #4 - NPO and Community Hub</b>					280	280
	<b>405</b>	<b>270</b>	<b>305</b>	<b>260</b>	<b>290</b>	<b>1,530</b>
<b>Transformation Management</b>						
Transformation and communications team consulting services	350	130	130	130	130	870
Privacy Officer (Virtual Privacy Officer - Annual Review)	20	15	15	15	15	80
Smart Cities innovation lab space	10	20	20	20	20	90
SMFN dedicated lead for ethnography and technology initiatives	75	75	75	75	75	375
Project Management - City Staff Dedicated to project	150	150	150	150	150	750
Cybersecurity (Virtual CISO and Security Operations Monitoring)	100	100	100	100	100	500
	<b>705</b>	<b>490</b>	<b>490</b>	<b>490</b>	<b>490</b>	<b>2,665</b>
	<b>2,865</b>	<b>3,612</b>	<b>4,213</b>	<b>2,300</b>	<b>2,150</b>	<b>15,140</b>
<b>Cashflow</b>	<b>845</b>	<b>603</b>	<b>- 1,423</b>	<b>- 25</b>	<b>-</b>	<b>-</b>

## Contributions from Other Sources

As outlined above in the comprehensive budget, the City of Fredericton will directly contribute \$3.1 million in capital funding, along with \$1.25 million in operating funds for dedicated staff salaries and increased operating investments in cybersecurity.

The City's wholly owned subsidiary, e-Novations Comnet Inc. plans to contribute \$375,000 towards community digital infrastructure that will directly benefit this Smart Cities journey.

Our technology partners have also committed to in-kind investments of services and expertise:

- Confidential partner, \$100,000 per year in-kind investment in innovation
- Eleven-X Inc., half of the cost for the next 1000 connections on our IoT network for the next two years as in-kind contributions. This will total up to \$12,000 in connectivity fees.
- Esri Canada Inc., \$20,000 per year professional services support of the development of the Digital Community Hub.

## Leverage Other Financial Sources

Many of the connected community applications will be developed by third parties as a repeatable business model. Doorable, Hullo and LiveKool each have a planned commercial business model supporting their social technology products. The Smart Cities funding will help seed the ideation, prototyping and preliminary market testing and development of these products.

Having validated the business use case with proven user adoption, many of the third parties will seek investor funding and access other government investment initiatives for technology innovation and business development including:

- The New Brunswick Innovation Foundation (NBIF)
- Atlantic Canada Opportunities Agency (ACAO)
- Opportunities New Brunswick (ONB)
- Business Development Bank of Canada (BDC)

This is not the first time the City of Fredericton has acted in the capacity as early adopter to bring technology innovations to market. The City has partnered with many start-ups including HotSpot Parking and Beauceron Security.

Working with the City of Fredericton as a first customer, HotSpot Parking was able to understand the problem and test solutions to build a repeatable business process. HotSpot then leveraged their experience and track record with the City to secure private equity funding including investments from NBIF and BDC. HotSpot has also leveraged funding from ACOA to develop and grow a sustainable business model. HotSpot now has over 30 major customers throughout Atlantic Canada and Ontario with 10 full time staff.

“It would not have been possible to attract funding and investment without the City of Fredericton as our first customer. The City shared their expertise to help us understand the problem and allowed us to test our prototypes and build a repeatable business model. This in-kind investment and direct access allowed us create a business from which to attract significant public and private investment”

**Phillip Curley | CEO, HotSpot Parking**

## Financial Tools and Accounting Methodologies

The project will use traditional job cost reporting with monthly cashflow management to monitor and control project revenues and expenditures.

Accounting for the project will be handled within the City's financial accounting system and by the City's finance department and accounting staff. The overall project will be assigned a unique cost centre within the City's financial system and each of the project streams will be assigned a project job code within that cost centre.

All expenditures related to the project will be coded to the cost centre and project job code. The comprehensive budget will be further broken down into planned monthly cashflows. As part of the City's regular reporting process, the actual expenditures by job will be compared with the planned cashflow monthly. Any variance greater than \$1,000 or 5% will be investigated as to the cause, and planned spending remaining to year end will be re-evaluated.

These two methods follow established processes on existing systems with experienced personnel and allow for detailed tracking and proactive course adjustments. The process is controlled within existing internal controls and has Council oversight.

Procurement will be subject to the New Brunswick Public Purchasing Act. Procurement will use the City's purchasing agents and established policies and financial systems.

Because Smart Cities funding is outcome-based using predetermined milestones, the City will provide upfront cash-flow requirements using own source revenues committed to this project. Early milestones have been set that allow for the project to be cashflow positive using this combination of City annual funding commitments and outcome-based payments.

Where funding is allocated specifically for staffing through St. Mary's First Nation and other activities under the direction and control of St. Mary's, these payments will be made semi-annually in advance to St. Mary's for disbursement within those established management systems.

## Methods, Sources, and Assumptions Used for Estimating Costs

We use several sources and methods to estimate costs:

### **1. Wherever possible we used experience from similar recent projects to estimate the cost of initiatives in this project plan.**

Our estimates for Customer Experience Strategy, ethnographic research, and user-centred design are based on the cost of our finalist phase pilots of ethnographic research and user-centred design workshops. Each were conducted by professional consultants and costs for the scope of these activities are proven.

Throughout the finalist phase, we have also worked with Doorable to develop a complete functional version of the software application. The application was created by our ecosystem partner at BlueSpurs on the AWS serverless development platform as outlined in our technology strategy. Through this process of development, we can reasonably estimate the costs to develop other version 1 Digital Inclusion Tools.

We also worked with Esri to develop several features and functions of the Digital Community Hub. Our estimates for future development are provided by Esri and based on their clear understanding of our goals, and the amount of in-kind professional services taken to develop the prototypes.

We have experience delivering other key elements of our proposal including core government systems as outlined below.

### **2. Industry standard cost estimates, primarily for human resource costs.**

Several of the estimated costs are for additional human resources to fill strategic roles in the development of Smart Cities data, digital content creation, analysis and administration. The costs of these positions are estimated from industry standard salary scales for these types of human resources.

### **3. Cost estimates from vendors for specific items contained in this proposal.**

In building our cost estimates for core e-government services we have received cost estimates from our strategic partners at Deloitte and Oracle. These cost estimates are based on both on our recent experience implementing core financial and HR systems at the City of Fredericton, and also from their knowledge base of similar projects deployed by their teams.

#### 4. We use agile development to minimize financial risks, fix total costs upfront and manage project to budget.

In order to minimize financial risk, we will use an agile approach to projects. This method helps to establish project estimates and resources first then work progresses in short sprints to develop, test, and implement solutions iteratively.

Using an agile approach involves focusing on shorter “sprints” with targeted functionality, allowing teams to develop prototypes to confirm requirements when needed. Consistent reviews by management are conducted at the end of each Sprint. This means issues will surface early and can be addressed immediately. When functionality is accepted by users it can be deployed. Because agile involves a process focus, it removes silos between teams and brings together all groups involved.

We chose an agile approach because:

- It allows **quicker delivery**, which can decrease the cost and accelerate the achievement of desired outcomes.
- It helps **build strong relationships** to fully understand current pain points to ensure both the technology and the people are ready for the digital transformation.
- It enables **accelerated delivery of high-priority features** and opportunities at regular intervals throughout the engagement for leaders and stakeholders to view demonstrations of key processes in the system.
- It enables **faster adoption** with increased knowledge transfer throughout engagement delivery.
- It enables **increased transparency and feedback**, offering opportunities for leaders and stakeholders to give input to the solution and identify issues as they arise.
- It allows for more **predictable costs** and allows for course corrections early.

#### 5. We use detailed cost breakdowns of project subcomponents to estimate total cost and match them with milestones.

The detailed breakdowns of smaller project sub-components and intermediate steps allow for much more accurate costing of the overall project plan.

The following pages contain the detailed breakdown of costs by project area. These detailed breakdowns are the basis for cost estimations and used for preparing monthly cash-flow projections by project.

Together these techniques provide effective and consistent controls over budget and scope and provide routine opportunities for evaluation and course correction.

## Financial Risks and Planned Mitigations

Risk	Mitigation
Cost and budget overruns	Use detailed cost breakdowns with monthly monitoring against planned annual cashflows for budget control. Use agile development to set project cost and build most important features first using iterative development to control project costs.
Procurement delays and red tape	Engage purchasing agents early in the process to advertise expression of interest calls to establish a pool of preselected partners.
Additional cost of administrative overhead	Use existing process and procedures and existing accounting systems to minimize creation of new reporting, controlling and administrative functions.
Lack of internal controls over external organizations	Where possible, have all expenditures paid through existing City finance and administrative controls. Where external agencies disburse funding directly, provide payments in installments and report on payments and monitor outcomes of projects through the Task Force Governance structure.
Cash-flow requirements due to outcomes-based payments	Seed projects with own source revenues enough to generate early proven deliverables, and track performance measures using progress to ultimate outcomes with earlier stage gates.
Financial burden of expenditures that fail to produce outcomes and trigger payments	Use performance measure that are broken down into early indicators of success to reduce the time between costs and evaluation of success. Provide written roles and responsibilities of the Task Force that outline their role to detect early failures and advise course corrections. Ensure that the Task Force is functioning effectively to receive and evaluate quarterly reports and has clear mandate to seek remediation and course correction.
Financial impact of cybersecurity or privacy breach	Use routine threat risk assessment, threat hunting and cyber security monitoring to reduce risks, and use annual privacy review to identify potential problems before they occur. Assess the need for cyber and privacy insurance to insurance against the financial risks from breaches.
Escalating pace of technology change that results in investments in outdated solutions	Use loosely coupled solutions in a service-oriented manner so continued development can occur even of not all requirements are known at the onset. Taking an Agile approach to solution development will also facilitate extensibility among technologies both current and future.

## Project Costs with Timelines

### Road Home

Phase	Phase Duration	Milestone	Milestone Date	Cost Breakdown
HIFIS4 Deployment	Ongoing	HIFIS Coordinator		In-Kind
	Sept-Nov/19	Onboard 5 agencies: (Fredericton Homeless Shelters Inc., John Howard Society of Fredericton, Capital Region Mental Health & Addictions, Youth in Transition, Liberty Lane)	Dec 1/18	
	Jan1-Mar 1/19	Complete data transfer from HIFIS3 to HIFIS4	Mar 1/19	grant
Training	Feb1-July 1/19	Create training capacity for HIFIS, SPDAT (train the trainers) & develop user manual	July 1/19?	grant
Technology	July 1-Nov 1/19	Deploy digital infrastructure/user tech to agencies above (fibre, hardware/software, licensing)	July 1/19	\$60,000
	2019	Upgrade free public WiFi	2019	\$150,000
Service Coordination	July1/19-July1/20	Onboard 3 additional agencies & coordinate services (St. Mary's First Nation shelter, Gignoo, Women in Transition)	July 1/20	
Technology	July 1-Nov 1/20	Deploy digital infrastructure (fibre, hardware, licensing) – First Nations shelter	July 1/20	\$30,000
	2020	Upgrade free public WiFi	2020	\$150,000
Service Coordination	July1/20-July1/21	Onboard 1 additional agency & coordinate services: - Fredericton Downtown Health Clinic	July 1/21	
	Feb 1/19-July1/21	Coordinate intake & assessment & triage model among 9 agencies, identify opportunities for improvement (OFIs)	July 1/21	
Technology		Digital inclusion infrastructure & tech resources (First Nations)	July 2/21	\$4,000 \$1,000
App Development	July 1/19-April1/21	Create personalized digital inclusion applications/tools (i.e. digitized street survival guide)	April 1/21	\$125,000
Digital Community Hub	Aug 1/20-April 1/21	Coordinate high level aggregate data based on indicators to 'city performance dashboard' and personal level resources	April 1/21	
Technology		Digital inclusion infrastructure & tech resources (First Nations)	July 1/22	\$4,000 \$1,000
Sustainability Plan		Coordinate plan among agencies.	2023	
Total				\$525,000

## Non-Profit Data Collaboration

#	Phase	Phase Duration	Milestone	Milestone Date	Cost Breakdown
	Admin-HR	July1/19–Mar31/20	Recruit, hire, orientate 3 staff <ul style="list-style-type: none"> <li>• Project Manager (GFSI)</li> <li>• Process design consultant (GFSI)</li> <li>• Data analyst (IRDT)</li> </ul> Develop communication/ engagement plan	July 1, 2019	\$ 140,000
Loop 1 – early adopters	Project Management: process design, data-sharing agreements & onboarding	April 1/20 – Mar 31/21	<ul style="list-style-type: none"> <li>• Privacy and data sharing agreements signed with 10-NPOs</li> <li>• Project protocols and organizational targets refined and approved</li> <li>• data management assets and practices of 10 NPOs mapped</li> <li>• 10 NPOs trained in in-house data analysis</li> <li>• Phase 1 of process tool-kit developed</li> </ul>	April 1/20	\$ 100,000 (GFSI)
	Data security & Privacy Standards	April 1/20-Mar 31/21	<ul style="list-style-type: none"> <li>• 10 NPOs privacy impact assessments completed, common data standards defined</li> <li>• data sharing agreements created and signed</li> <li>• 10 NPOs privacy and ethics compliance completed</li> </ul>	April 1/20	\$ 80,000 (IRDT)
	Build NPO capacity	April 1/20-Mar 31/1	<ul style="list-style-type: none"> <li>• data sharing agreements signed</li> <li>• privacy/confidentiality guidelines/templates implemented</li> <li>• trained to link/analyze/explore in-house data</li> <li>• NPO successes and gaps identified</li> </ul>		\$ 15,000 (NPO)
	United Way & Fredericton Community Foundation	July 1/19 – Mar 31/20	<ul style="list-style-type: none"> <li>• Creation/updated online funding applications with new data standards</li> <li>• Consulted with partner agencies</li> </ul>	Mar 21/20	\$ 20,000 (UW & FCF)
Loop 2	Project Management: data-sharing agreements, onboarding 10 new Agencies	April 1/21 – Mar 31/22	<ul style="list-style-type: none"> <li>• onboarded 10 new agencies</li> <li>• privacy and data sharing agreements signed</li> <li>• project protocols and organizational targets develop and approved</li> <li>• data management assets and practices mapped</li> <li>• 10 NPOs trained in data analysis</li> <li>• Testimonials and case studies from NPOs of improvements made based on data</li> <li>• Process tool-kit completed</li> </ul>	April 1/21	\$ 80,000 (GFSI)
Loop 2	Data Security & Privacy Standards	April 1/21-Mar 31/22	<ul style="list-style-type: none"> <li>• 10 NPOs privacy impact assessments completed, common data standards defined</li> <li>• 10 NPOs privacy and ethics compliance</li> <li>• data transferred to IRDT</li> <li>• de-identify and data cleaning</li> <li>• NPO data aggregated and anonymize to the community level</li> <li>• link data to GNB data portals &amp; Digital Community Hub</li> </ul>	April 1 /21	\$ 80,000 (IRDT)
Loop 2	Build NPO capacity	April 1/21-Mar 31/22	<ul style="list-style-type: none"> <li>• data sharing agreements signed</li> </ul>	April 1/21	\$ 15,000 (NPO)

			<ul style="list-style-type: none"> <li>• privacy/confidentiality guidelines/templates implemented</li> <li>• trained to analyze/explore in-house data</li> <li>• trained to analyze/explore community-level data</li> <li>• NPO successes and gaps identified</li> </ul>		
Loop 3	Project Management: data-sharing agreements, onboarding	April 1/22 – Mar 31/23	<ul style="list-style-type: none"> <li>• privacy and data sharing agreements signed with 10-NPOs</li> <li>• data management assets and practices mapped</li> <li>• trained 10 NPOs on data analysis</li> </ul>	April 1/22	\$ 80,000 (GFSI)
Loop 3	Data security, Linking, & Privacy Standards	April 1/22- Mar 31/23	<ul style="list-style-type: none"> <li>• 10 NPOs privacy impact assessments completed, common data standards defined</li> <li>• Testimonials and case studies from NPOs of improvements made based on data</li> <li>• 10 NPOs Privacy and ethics compliance</li> <li>• transfer data to IRDT</li> <li>• de-identify and data cleaning</li> <li>• NPO data aggregated and anonymize to the community level</li> <li>• link data to GNB data portals &amp; Digital Community Hub</li> </ul>	April 1/22	\$ 80,000 (IRDT)
Loop 3	NPO Capacity Building	April 1/22- Mar 31/23	<ul style="list-style-type: none"> <li>• data sharing agreements signed</li> <li>• Privacy/confidentiality guidelines/templates implemented</li> <li>• train to analyze/explore in-house data</li> <li>• train to analyze/explore community-level data</li> <li>• NPO successes and gaps identified</li> </ul>	April 1/22	\$ 15,000 (NPO)
Loop 4	Project Management: data-sharing agreements, onboarding	April 1/23 – Mar 31/24	<ul style="list-style-type: none"> <li>• privacy and data sharing agreements signed with 10-NPOs</li> <li>• develop and sign off on project protocols and organizational targets</li> <li>• trained 10 NPOs on data analysis</li> <li>• data management assets and practices mapped</li> <li>• testimonials and case studies from NPOs of improvements made based on data</li> </ul>	April 1/23	\$ 80,000 (GFSI)
Loop 4	Data Security & Privacy Standards	April 1/23- Mar 31/24	<ul style="list-style-type: none"> <li>• 10 NPOs privacy impact assessments completed, common data standards defined</li> <li>• 10 NPOs Privacy and ethics compliance</li> <li>• transfer data to IRDT</li> <li>• de-identify and data cleaning</li> <li>• NPO data aggregated and anonymize to the community level</li> <li>• link data to GNB data portals &amp; Digital Community Hub</li> </ul>	April 1/23	\$ 80,000 (IRDT)
Loop 4	NPO Capacity Building	April 1/23- Mar 31/24	<ul style="list-style-type: none"> <li>• data sharing agreements signed</li> <li>• privacy/confidentiality guidelines/templates implemented</li> <li>• train to analyze/explore in-house data</li> <li>• train to analyze/explore community-level data</li> <li>• NPO successes and gaps identified</li> </ul>	April 1/23	\$ 15,000 (NPO)
	Total				\$879,000

## Digital Fredericton

Agile approach with Sprint outline.

#	Phase	Phase Duration	Milestone	Milestone Date	Cost Breakdown
1	Work Management & Field Service Delivery				
	July 1/19-Feb 7/20 (30 wks)	Pework (2 wks)	<ul style="list-style-type: none"> <li>Product selection finalized</li> <li>Product licensing (annual)</li> <li>Internal team identification</li> </ul>		\$50,000
		(4 wks)	<ul style="list-style-type: none"> <li>Develop workplan</li> <li>Create status report templates</li> <li>Develop instance &amp; integration strategy</li> <li>Develop test strategy</li> <li>Develop high level change management plan</li> <li>Confirm user stories</li> </ul>		\$150,000
		Sprint 1 Sprint 1 Spring 2 (4 wks)	<ul style="list-style-type: none"> <li>Project financials</li> <li>Project costing</li> <li>Inventory</li> </ul>		\$200,000
		Sprint 3 (4 wks)	<ul style="list-style-type: none"> <li>Field service core manage cloud &amp; field service mobility cloud</li> <li>Maintenance management</li> </ul>		\$150,000
		Sprint 4 (4 wks)	<ul style="list-style-type: none"> <li>Field service customer communication &amp; field service routing</li> <li>Smart location cloud</li> </ul>		\$150,000
		Testing (4 wks)	<ul style="list-style-type: none"> <li>Systems integration testing &amp; user acceptance testing</li> </ul>		\$150,000
		Deploy (4 wks)	<ul style="list-style-type: none"> <li>Process redesign &amp; capability development</li> </ul>		\$150,000
		Deploy (4 wks)	<ul style="list-style-type: none"> <li>Product cutover/support &amp; transition</li> </ul>		\$100,000
	Phase 1 Sub-total				\$1,200,000
2	Utilities & Customer Billing				
	July 1-Dec 20/19 (25 wks)	Pework (2 wks)	<ul style="list-style-type: none"> <li>Product selection finalized</li> <li>Product licensing (annual)</li> <li>Internal team identification</li> </ul>		\$100,000
		Sprint 0 (2 wks)	<ul style="list-style-type: none"> <li>Develop workplan</li> <li>Create status report templates</li> <li>Develop instance &amp; integration strategy</li> <li>Develop test strategy</li> <li>Develop high level change management plan</li> <li>Confirm user stories</li> </ul>		\$50,000
		Sprint 1 (3 wks)	<ul style="list-style-type: none"> <li>Accounts receivable</li> <li>Contracts cloud service</li> <li>Development</li> </ul>		\$300,000
		Sprint 2 (3 wks)	<ul style="list-style-type: none"> <li>Order management cloud</li> </ul>		\$125,000
		Sprint 3 (3 wks)	<ul style="list-style-type: none"> <li>Advanced collections</li> </ul>		\$125,000

	Testing (4 wks)	<ul style="list-style-type: none"> <li>Systems integration testing</li> <li>User acceptance testing</li> </ul>	\$100,000
	Deploy (4 wks)	<ul style="list-style-type: none"> <li>Process redesign &amp; capability development</li> </ul>	\$150,000
	Deploy (4 wks)	<ul style="list-style-type: none"> <li>Product cutover/support/ transition</li> </ul>	\$50,000
Phase 2 Sub-total:			\$1,000,000
<b>3 Talent &amp; Performance Management</b>			
July 1/21-Feb 11/22 approx. (30 wks)	Pework (4 wks)	<ul style="list-style-type: none"> <li>Product selection finalized</li> <li>Product licensing (annual)</li> <li>Internal team identification</li> </ul>	\$50,000
	Sprint 0 (2 wks)	<ul style="list-style-type: none"> <li>Develop workplan</li> <li>Create status report templates</li> <li>Develop instance &amp; integration strategy</li> <li>Develop test strategy</li> <li>Develop high level change management plan</li> <li>Confirm user stories</li> </ul>	\$100,000
	Sprint 1 (4 wks)	<ul style="list-style-type: none"> <li>Talent acquisition</li> <li>Succession management</li> </ul>	\$250,000
	Sprint 2 (4 wks)	<ul style="list-style-type: none"> <li>Learning cloud service</li> </ul>	\$250,000
	Sprint 3 (4 wks)	<ul style="list-style-type: none"> <li>Performance management</li> </ul>	\$250,000
	Testing (4 wks)	<ul style="list-style-type: none"> <li>Systems Integration testing</li> <li>User acceptance testing</li> </ul>	\$250,000
	Deploy (4 wks)	<ul style="list-style-type: none"> <li>Process redesign &amp; capability development</li> </ul>	\$150,000
	Deploy (4 wks)	<ul style="list-style-type: none"> <li>Product cutover/support/ transition</li> </ul>	\$125,000
Phase 3 Sub-total			\$1,425,000
<b>4 CRM/Portal</b>			
July 1/20-Aug/21 (56 wks)	Pework (4 wks)	<ul style="list-style-type: none"> <li>Product selection finalized</li> <li>Product licensing (annual)</li> <li>Internal team identification</li> </ul>	\$400,000
	Sprint 0 (8 wks)	<ul style="list-style-type: none"> <li>Develop workplan</li> <li>Create status report templates</li> <li>Develop instance &amp; integration strategy</li> <li>Develop test strategy</li> <li>Develop high level change management plan</li> <li>Confirm user stories</li> </ul>	\$400,000
	9 sprints (4 wks/sprint x9 sprints=36 wks)	<ul style="list-style-type: none"> <li>Citizen portal</li> <li>Enterprise contact center</li> <li>Interface cloud service</li> </ul>	\$900,000 \$100,000/sprint)
	Testing (4 wks)	<ul style="list-style-type: none"> <li>Systems Integration testing</li> <li>User acceptance testing</li> </ul>	\$200,000
	Deploy (4 wks)	<ul style="list-style-type: none"> <li>Product cutover/support/ transition</li> </ul>	\$100,000
Phase 4 Sub-total			\$2,000,000

<b>5 Customer Experience Strategy (cycle repeated annual: ethnography, insights, ideation, prototyping, tools)</b>				
July 1/19-July 1/23	2019	• Citizen experience strategy		\$ 240,000
	2021	• Ethnography research (2 segments per year)		\$100,000
	2022			\$100,000
	2023			\$100,000
	2019	• First Nations specific ethnographic research (2 segments directed by SMFN)		\$50,000
	2020			\$50,000
	annually	• Ideation & prototyping based on insights		\$20,000/year =\$100,000
	2019	• Digital inclusion tools, application/tech development and innovation		\$125,000
	2020			\$250,000
	2021			\$125,000
	2022			\$125,000
	2023			\$125,000
	2021	• First Nations specific digital tools resulting from ethnography		\$125,000
	2022			\$125,000
Phase 5 Sub-total:				\$1,740,000
<b>6 Digital Talent Strategy</b>				
July 1-Sept 18/20 (12 wks)	Sprint 1 (8 wks)	• Digital employee talent proposition • Define • Skills identification • Skills gap		\$100,000
	Sprint 2 (4 wks)	• Talent modelling • Governance		\$50,000
Phase 7 Sub-total:				\$150,000
<b>7 HR Scheduling</b>				
July 1-Dec 24/20 (26 wks)	Pework (2 wks)	• Product selection finalized • Product licensing (annual) • Internal team identification		\$150,000
	Sprint 0 (2 wks)	• Develop workplan • Create status report templates • Develop instance & integration strategy • Develop test strategy • Develop high level change management plan • Confirm user stories		\$50,000
	Sprint 1-3 (6 wks)	Scheduling		\$375,000
	Testing (4 wks)	• Systems Integration testing • User acceptance testing		\$100,000
	Deploy (4 wks)	• Process redesign & capability development		\$150,000
	Deploy (4 wks)	• Product cutover/support/ transition		\$50,000
Phase 8 Sub-total:				\$875,000

## Transformation Management

Smart Cities Program				
Digital Fredericton TMO	2019			\$325,000
	2020			\$125,000
Marketing/communications, & Consulting	2021			\$125,000
	2022			\$125,000
	2023			\$125,000
	annual	<ul style="list-style-type: none"> <li>Virtual Privacy officer</li> </ul>		\$20,000 \$15,000 \$15,000 \$15,000 \$15,000
	2019	<ul style="list-style-type: none"> <li>Smart cities collaboration space</li> </ul>		\$10,000
	2020			\$20,000
	2021			\$20,000
	2022			\$20,000
	2023			\$20,000
	annual	<ul style="list-style-type: none"> <li>SMFN lead for ethnography and tech initiatives</li> </ul>		\$375,000 (\$75,000/year)
	annual	<ul style="list-style-type: none"> <li>Smart Cities project management – dedicated staff</li> </ul>		\$750,000 (\$150,000/year)
		<ul style="list-style-type: none"> <li>Cybersecurity (virtual Chief Information Security Officer &amp; security operations monitoring)</li> </ul>		\$500,000 (\$100,000/year)
Sub-total				\$2,620,000

## Digital Community Hub

#	Phase	Phase Duration	Milestone	Milestone Date	Cost Breakdown
1	Project Mobilization Admin-HR	July 1-Aug 1/19	Develop skill requirements and advertise posting (2 weeks) for data analyst, digital community hub coordinator, content creator	Aug 1/19	\$345,000
		Aug 1-31	Screen, interview candidates, select/sign contracts and set start dates (Oct 1 latest).		
	Admin-Technology Procurement	July 1-Sept 1/19	Develop RFP package, tender/award project for platform development.	Sept 1/19	\$60,000
2	Platform Development	Sept 15/19-Feb 15/20	Develop Digital Community Hub platform ensuring compliance with data & security requirements (conduct user testing where required) for: 1. Smart City Dashboard 3. Personal Digital Inclusion	Feb 15/19	
3	Data Sharing Agreements	Oct 1-Nov 1	Sign 5 partnership agreements (Ability NB, Age Friendly Committee, CAGH, Appdigenous, NB-IRDT)	Nov 1/19	
4	Ethnography, Data Input & Testing	Aug 1-Oct 1/19	Via Digital Fredericton – conduct ethnographic research for 2 segments	Oct 1/19	
		Oct 1-Dec 1/19	Collect & input segment baseline data for dashboards	Dec 1/19	
		Early Feb/20	Pilot /user-centred design testing for 3 segments	Feb 19/20	
3	Data Sharing Agreements	Nov 1/19-Feb 1/20	Sign 5 data sharing agreements: TBA	Feb 1/20	
5	Release #1	Feb 19-Mar 31/20	Develop/deploy communications campaign / launch dashboard. Personal/2 segments +performance: <ul style="list-style-type: none"> <li>older adults community hub + integrate LiveKool</li> <li>accessibility challenged (accessible community hub w/ data &amp; map)</li> <li>Smart City Performance Level</li> <li>First Nations segment</li> </ul>	April 1/20	\$245,000
6	Data Renewal Process	April 1-June 1/20	Create process for data refinement and identification	June 1/20	
2	Platform Development	Feb 19-Sept 1/20	Develop dashboard platform for Personal Interactive Level	Sept 1/20	\$60,000
7	Census 1		Establish 1,000 users / annual survey / produce community census	Nov 1/20	
4	Ethnography, Design Testing & Data Input	Aug 1/20-Feb 19/21	2 segments + 1 SMFN segment	Feb 19/21	
5	Release #2	Feb 19-Mar 31/21	Personal/3 segments + interactive: <ul style="list-style-type: none"> <li>Road home community hub (homeless segment including digital street guide)</li> <li>Cultural /Newcomers community hub + integrate Hullo</li> </ul>	April 1/21	\$245,000

			<ul style="list-style-type: none"> <li>• SMFN</li> <li>• +Personal interactive level</li> </ul>		
2	Platform Development	Feb 19— Sept 1/21	Develop dashboard platform for Organizational Level	Sept 1/21	\$60,000
4	Ethnography, Design Testing & Data Input	Aug 1/21-Feb 19/22	2 segments + SMFN	Feb 19/22	
2	Platform Development	Feb 19-Sept 1/22	Develop dashboard platform for Organizational Level	Sept 1/22	\$15,000
7	Census 2		Establish 2,000 users / annual survey for community census	Nov 1/21	
5	Release #3	Feb 19-Mar 31/22	Personal/3 segments (TBA) +community hub of interest and integrate user experience tech, applications and data	April 1/22	\$245,000
4	Ethnography, Design Testing & Data Input	Aug 1/22-Feb 19/23	2 segments + SMFN	Feb 19/23	
7	Census 3		Establish 5,000 users / annual survey / produce community census	Nov 1/22	
5	Release #4	Feb 19-Mar 31/23	Personal Level – 3 segments + organizational level	April 1/23	
4	Ethnography, Design testing & Data Input	Aug 1-Dec 1/23	2 segments + SMFN	Dec 1/23	
7	Census 4		Establish 10,000 users / annual survey / produce community census	Nov 1/23	\$245,000
2	Platform Development		Continued dashboard development for sustainability	Sept 1/23	\$10,000
8	Sustainability		Create project sustainability plan		
					\$1,530,000

## Doorable

Phase	Phase Duration	Milestone	Cost Breakdown	Milestone Date
Mgt Team & Talent Acquisition	Feb 15- July 15/19	*Mgt team currently in place. Recruit technical staff, installers, CRM staff		July 15/19
Testbed of Users Created	Feb 15- June 30/19	250 downloads of Doorable app. Ver1.0		June 30/19
Sustainability Plan (See Attachment)	Feb 15- Dec 31/19	The Smart Cities funding, which in effect subsidizes 1000 installs of Doorable tech, generates sufficient revenue to undertake the development and growth of the technology as described in the budget. Costs unmet by the launch project are met by install purchases from organizations and businesses as well as through services offered to subscribers.		Dec 31/19  ("Sold" installs and subscriber services)
Research Strategy: Baseline Fredericton	May 6- Oct 11/19	Conduct inventory of all button accessible doors in Fredericton, and make available via Hub	\$135,000	Oct 11/19
Commercial Subscribers Testbed (subsidized installs)	May 19- Sept30/19	Sign 5 commercial customers and install hardware (testers) Private sector subscriber consultative group established		June 30/19
Intellectual Property	June 1- Aug 30/19	Develop patentable design schematics on DOORABLE hardware (Release 2)		Aug 30/19
Hardware Development: Web-based Black Box (Version 2) & Testing	June 1- Aug 30/19	Develop Version 2 of Doorable hardware with both wireless and internet connectivity allowing Doorable Release 2 of the User App to be a web capable (future proofing the hardware)	\$92,000	Aug 30/19
Mobile application design and implementation: Installer application version 1	July 1- Aug 30, 19	Develop Installer App to populate Data base of "Doorable" accessible doors on the "back end" and initialize device	\$35,000	Aug 30/19
Advisory Board	July 3- Aug 3/19	Constitute advisory board		Aug 3/19
SaaS Model	Aug 1- Dec 31/19	Create pricing structure for basic level of content management associated with Subscriber app.		Dec 31/19
Public Building Retrofits (Phase 1)	Sept 1- July 1/19	Fit all public buildings owned/ operated by Fredericton/St. Mary's with Doorable technology (HW Release 2)	\$150,000	July 1/20
Non-Profits-Retrofit Installations (Phase 2)	Sept 1- Oct 15/19	Fit NPOs participating in Smart Cities Proposal with Doorable (HW Release 2)		Oct 15/19
Hardware Upgrades in Test Sites	Sept 1- Oct 30/19	Conduct testing at Bluetooth enabled door (by Aug/19, the future proofed web capable units will be ready)	\$150,000	Oct 30/19
Commercialization/ Market Entry Strategy		(See Appendix - Business Model)		
User Education & Awareness Campaign	Ongoing	Enable online support of user community		July 15/19

Software (backend cloud server-data storage)	Sept 1- Nov 1/19	Develop back end software to support User App and Version 2 of Firmware	\$38,000	Nov 1, 2019
Mobile Application Design & Implementation: User Application Version 1.1	Sept 1- Nov 30/19	Release Version 1.1 (release 2) to User group.	\$40,000	Dec 13/19 Release date
Research Strategy: User Experience	Sept 1 – Nov 30/19	Create set of revisions driven by user experience		Nov 30/19
Mobile Application Design & Implementation: Subscriber Application Version 1	Sept1/19- Jan 24/20	Release #1 Subscriber App including content management and push features.	\$85,000	Jan 24/20
User Feedback System	Nov 16- Dec 13/19	Build integrated feedback system into User App and Subscriber App.		Dec 13/19
Doorable Community: Online user-user dialogue/community building	Mar31/20- Mar 1/21	Fully develop platform for user-user, user-subscriber dialogue on issues, projects, specific issue-based initiatives, project building.	\$172,500	Mar 1/21
Market Research – Subscriber Community	June1- Sept 1/20		\$80,000	Sept 1 /20
Mobile Application Design & Implementation: Subscriber Application Version 2	June 1- Dec 1/20	Fully develop platform for services to subscribers, including a fee for service model for content management, push services for interested users and a range of content offerings. Licensing options may be available and developed for large subscribers (i.e. GNB)	\$60,000	Dec 1/20
Mobile Application Design & Implementation: User Application Version 2.0	Nov 1/20- Mar 1/21	Major release of the User app synchronized with the release of Doorable Community.	\$55,000	Mar 1/21
Data storage and processing	Sept 1/20	Data storage and processing of subscriber data, Open data and User special research data	\$42,500	Sept 1/20
10,000 Users	Nov30/20	10% of Greater Fredericton residents		Nov 30/20
MRR SaaS: Fully featured Subscriber services	Dec 1/20- Ongoing	Develop subscriber app features, test/price/deploy		Dec 31/20
20,000 Users	Mar31/21	20% of Greater Fredericton residents		Mar 31/21
New Market Entries: - 2 new NB cities - 2nd province	Mar31/21- Mar31/22			Mar 31/22
60,000 users		Definable percentage of population market in 2 NB cities		Mar 31/22
120,000 users		Definable percentage of population market in 2nd province adopting the technology		Mar 31/23
National Reach	Mar31/22- Mar 31/23	Distribute/sell fully deployed and tested Doorable technology		Mar 31/23
<b>Total</b>			<b>\$1,135,000</b>	