BUILDING THE SMART CITY
OTTAWA, ONTARIO

The most difficult barrier to creating a Smart City is finding the right way to take the first step. This Playbook is that first step.*

** Smart Economy in Smart Cities (Ottawa Chapter)*

ACKNOWLEDGMENTS

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The Playbook Team received strategic counsel from Brendan McGuinty and Barry Gander. Jennie Panesar and Nelda Cenci provided administrative support. City of Ottawa photos provided by Ottawa Tourism and Sandel & Associates.

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SMART CITY OTTAWA

COMMUNITY VALUE PROPOSITION

Why become a Smart City?

This is a question that must be asked as we consider the future economic growth of our city and region in a rapidly advancing digital world.

Currently, a number of urban transformation movements are taking place around the world. They go by various names—Smart Cities, Gigabit Cities, Intelligent Communities, Sustainable Cities, and so forth. Despite the different names, their goals are similar. Cities look to combine digital techniques and ultra high-speed communications to accelerate and transform the socio-economic growth.

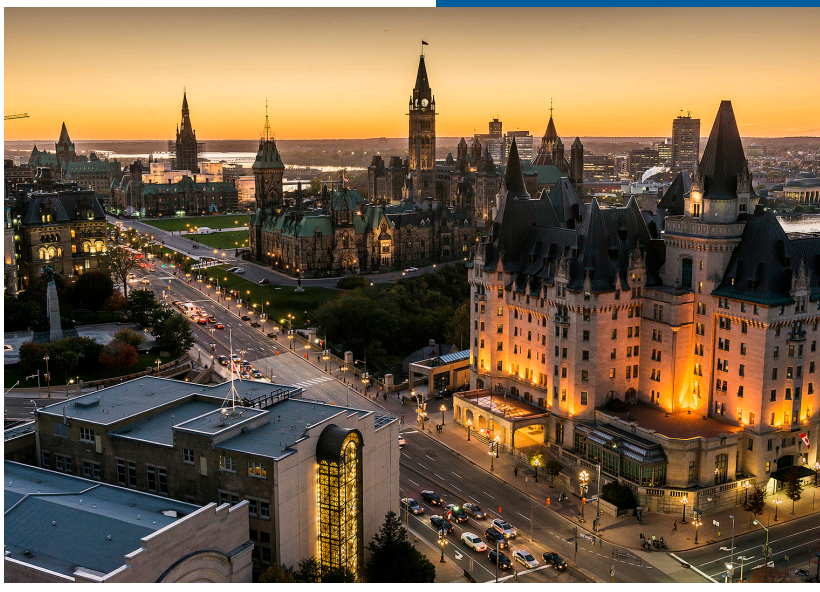
When we build our city in this way, we make it more convenient, comfortable, and prosperous. This is vital because the cities that are moving forward in this way are the winners. They attract more investment, grow faster, and are creating a more resilient and sustainable future for their citizens.

At a time when Canada's overall innovation index is declining, Smart Cities have innovation indices that are moving up, creating new jobs and opportunities for their citizens and new public sector opportunities.

Smart City also means that we are now entering into the next generation of municipal infrastructure development. One hundred years ago "smart" technologies included the telephone, rail transportation, nascent electrical grids, and the automobile. The result was an economic expansion that lasted over one hundred years. Communities slow to adopt these technologies suffered, however, and some never caught up.

One of the fundamental building blocks or "roads" for Smart City Ottawa is ultra high-speed internet access through fibre optic and wireless infrastructure. This is the new "road" upon which community digital transformation takes place and is the vital infrastructure upon which the Smart City is built.

Several recent studies indicate the relationship between next generation broadband access and economic health.



- Communities which offered a one gigabit per second fibre-based broadband service have per capita GDP 1.1 percent higher than communities with little or no gigabit service present according to a 2014 Fibre to the Home Council Americas study.[1]

- Home values also seem to increase with Gigabit availability. A FTTH Council whitepaper showed fibre may increase a home's value up to 3.1 percent, RVA LLC Market Research and Consulting says that fibre optic internet adds about $5,250 to the value of a $300,000 (USD) home, and a study in the UK found that buyers were willing to pay up to 8 percent above the market price in areas offering very fast internet speeds.

Even more important however, could be the cost to our community if we do not act now. Study after study shows that over the last hundred years, communities slow to develop new municipal infrastructure lag behind those that are the early adopters.

[1] New Study Quantifies Contribution of Fiber-fed Broadband to GDP in U.S. Communities
[2] Got Fiber? Get More For Your Home
[3] Gigabit Internet Connections Make Property Values Rise
[4] Internet speed closely linked to property value

THE HANNIBAL BRIDGE

A cautionary tale of delayed technology adoption

In the middle of the 19th Century a Midwestern U.S. city was poised to flourish. Positioned in a favorable spot on the banks of an important river, it was a magnet for commerce, trade, and capital. It was the site of a vital military installation. The largest city in its state by a factor of four, it was bigger than Los Angeles and had more people than Minneapolis and Houston combined.

And flourish it did. In ten years, its population more than doubled and it was the 7th largest US city west of the Mississippi River. That, however, would be the end of its prominence. Ten years further on, it had lost population, and today few people know much about the city unless they are fans of famous prisons.

What happened to Leavenworth, Kansas? In the simplest of terms, it failed to adopt a new technology. In the 1860's the railroad was fast eclipsing the riverboat as the better, faster, more effective means of transporting people and goods. However, there was no permanent railway bridge across the Missouri River. Leavenworth, and the much smaller Kansas City, Missouri, both knew such a bridge was vital. But leaders in Kansas City outmaneuvered Leavenworth. They passed bonds for the development of rail lines, got the U.S. Congress to authorize the location, and convinced the Hannibal and St. Joseph Railroad to build a bridge at Kansas City, rather than Leavenworth. Construction began in 1867 and 40,000 attended the opening in July 1869.

Today, Leavenworth is a pleasant town of 36,000 with a rich history. Kansas City numbers nearly half a million people and is the anchor to a metropolitan area of 2.2 million. Other factors undoubtedly played a role, but the point of divergence was the decision of where to first adopt that technology, where to build that bridge.

Source; Missouri Valley Special Collections, Kansas City Public Library, Kansas City, MO

COMMUNITY ENGAGEMENT

COMMUNITY ENGAGEMENT AND VISIONING SESSION

High impact Smart Cities are 90% sociology and 10% infrastructure

Our region's organizations, businesses, and people should begin to embrace community collaboration on a dramatically different scale

The need for many diverse public and private sector organizations to collaborate and realize Smart City opportunities for Ottawa means that our region's organizations, businesses, and people should begin to embrace community collaboration on a dramatically different scale.

As part of Ottawa's desire to move forward as a Smart City, on April 29, 2016, Invest Ottawa, Hydro Ottawa, and the City of Ottawa hosted a "Building the Smart City" workshop as input for development of a Smart City Playbook. The Playbook describes the long-term strategies, short-term tactics, concrete plays, and "Quick Start" projects from which to move forward and realize the benefits of Smart City Ottawa.

The workshop's primary goal was developing greater visibility and understanding of Smart City socio-economic and business opportunity for Ottawa.

Workshop participants focused on ten areas: 1) Digital Inclusion/Digital Literacy, 2) Education, 3) Energy, Water, and Waste Management, 4) Entrepreneurship, 5) Government Services, Civic Tech, and Citizen Engagement, 6) Healthcare, 7) High-Tech Business Development, 8) Public Safety, 9) Real Estate Development, and 10) Transportation and Mobility.

The workshop had several objectives:

- Reach an understanding of what being a Smart City means and a consensus of what it can mean for Ottawa and Hydro Ottawa.
- Explore how to go about achieving Ottawa's Smart City goals, including the roles for Hydro Ottawa, the City of Ottawa, and other elements in the public and private sectors.
- Identify potential "Quick Start" projects and begin developing plans and metrics to achieve those.
- Inform the development of longer-term strategies and plays to move forward in the various focus areas.

LONG TERM VISION AND STRATEGY

OTTAWA IN CONTEXT

The need to communicate across the vast distances of the Earth's second-largest country motivated Canadians to invent the foundational tools of modern communications. The telephone was invented in Canada, and the country was home to the world's first long distance telephone call, the first digital telephone exchange, the first radio voice transmission, and the first domestic communication satellite. The need to harvest the socio-economic benefits of Smart City for Ottawa can propel us forward again.

As capital of Canada in more ways than one, Ottawa has surged forward from this Canadian lead. Ottawa is a recognized leading city of the world, based on broadband communication development, knowledge workforce, innovation, digital inclusion, and community marketing.

Recognizing the value of its innovation assets, Ottawa's researchers have devoted much effort to comprehending the nature of innovation and perfecting its development. We trigger innovation by associating intuitive ideas. It arises from hunches and that vague, hard-to-describe sense that there exists an interesting solution to a problem that has not yet been addressed. The volume of innovation generated in a community is directly tied to the number of linkages that ideas can share—the higher the linkages between people, the greater the momentum of innovation. Ottawa therefore, must take great pains to connect its citizens.

Our main goal for Smart City Ottawa is to extract and build upon the socio-economic and commercial value of Smart City innovation. There will be challenges along the way, but now is the time to move forward.

The greatest barrier to creating a Smart City is finding the right way to take the first step. Based on our experience as a leading city, with knowledge of developments around the world, we can use the example of Smart City Ottawa to not only help develop a Smart City Playbook for our community to move forward, but also for Ottawa to lead other Smart City movements across Canada and the world.

Our main goal for Smart City Ottawa is to extract and build upon the socio-economic and commercial value of Smart City innovation

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While Smart Cites are places which are made up of digital techniques and ultra high -speed communications, a responsive Smart City Ottawa will unlock the potential to improve daily life and government services

STRATEGIC ORGANIZING PRINCIPLES

When we collaborate as a community, we generate the ideas and inspiration that creates economic growth and prosperity

When we share our ideas and opportunities with others — welcoming regional, national, and international collaboration — our community will grow even more

In today's digital economy, creating and implementing new ideas and strategies faster creates economic growth. Below are our organizing principles, strategic foundations that will allow Smart City Ottawa to accelerate its transformation from an industrial era economy into a regionally, nationally, and globally recognized Smart City innovation community.

Inclusion

To achieve the greatest degree of socio-economic and educational opportunity, we must all move forward together. Community collaboration, entrepreneurship, ultra high-speed internet access, and other Smart City technologies should extend to all of Ottawa, particularly to small businesses, schools and community centers, start-up firms, and the disadvantaged.

It is critical for our leaders and community, our Champions and entrepreneurs, to develop strategies for digital inclusion which accelerate the education and socio-economic growth process for our residents and families. We should make digital education and opportunity available to all.

Collaboration

When we work together, we share our aspirations, goals, and ideas. When we collaborate as a community, we generate the ideas and inspiration that create economic growth and prosperity. When we share our ideas and opportunities with others—welcoming regional, national, and international collaboration—our community grows even more.

Entrepreneurship

There is high potential for increasing the momentum and vibrancy Ottawa's current entrepreneurial community by building a Smart City entrepreneurial ecosystem. Increased collaboration between people and organizations is the key to building on the existing framework and taking the entrepreneurial culture of Smart City Ottawa to the next level.

We need to be willing to try new things; exploring new ideas for our community, our families, and our businesses. If we build our entrepreneurial capacity and educate our citizens about entrepreneurship, the result will be a stronger Ottawa, with greater socio-economic opportunity for our students, families, and businesses.

Leadership

The City of Ottawa has a window of opportunity to establish a leadership position in using Smart City strategies and technologies to drive economic, social and cultural growth. To do this, we must focus on innovative Plays and Quick Start initiatives that validate the viability and value of Smart City business models and technologies. We must also develop the technology sector workforce in the Ottawa region to take full advantage of the opportunities presented by Smart City; the plan for success is up to us. We must commit resources, both financial and human, and work collaboratively to develop effective marketing efforts that tell the world what we are doing.

To achieve the greatest degree of economic and educational opportunity, we must all move forward together

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Reaching our Smart City Ottawa goals is entirely up to us. It requires support for our community Champions and entrepreneurs along with committing resources to bring our Playbook to life

COMMUNITY CHAMPION STRATEGY

Developing a Smart City ecosystem is a powerful way to align organizations, resources, ICT technologies, and entrepreneurs to advance our society and to accelerate the economic development of Smart City Ottawa by developing applications and services which in turn create jobs and new opportunity.

To develop our Smart City ecosystem, we should focus in the following areas:

- *Cultivating, educating, and developing our Smart City entrepreneurs and Champions.* The potential impact on our city is significant, we need Smart City entrepreneurs who not only look at technical applications and solutions, but also look to solve pressing social, economic, educational, and urban issues.
- *Aligning our Smart City vendor community with our Smart City entrepreneurs.* We should create synergistic public-private partnerships that allow our Smart City entrepreneurs to have affordable access to technologies and resources. (And sometimes affordable will mean free.)
- *Encouraging quicker standardized data development.* Successful Smart Cities make use of standardized data to develop effective community solutions. Canadian Smart City standards bodies and entrepreneurs should collaborate together to accelerate standards adoption.
- *Creating a community Smart City proof-of-concept lab.* This lab would be supported by the vendor community and help entrepreneurs connect with the best support resources. Researchers and educators could connect with entrepreneurs sooner to create new opportunities.

Our future depends on sharing information and providing resources that enable the success of our Champions

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Our community has begun the process to identify Smart City Champions for our Playbook. Are you a Champion?

SMART CITY ECOSYSTEM STRATEGY

For Smart City Ottawa to realize the benefits of this opportunity, we must find "Champions" who will act as the stewards for each of the Plays, Quick Start projects, and for the Playbook itself.

Champions are energized individuals, passionate about a particular area of interest, acting as catalysts to create quick progress, sometimes with limited resources.

Champions can come from any walk of life, from any neighbourhood, business, or institution. They may already be in a leadership position, or be someone who works the nightshift.

Moreover, how Champions have a unique ability to move forward instinctively to make Plays and Quick Starts happen. The key is they have strong interest in a particular area and they passionately pursue the realization of that interest as challenges may arise.

To further enable the success of our communities, it is essential that we create a greater point of intersection and bring our Champions and community conversation together. We can build upon current relationships by collaborating more deeply and form community or peer-to-peer mentor relationships that will help our Plays, Quick Starts and Champions be successful sooner.

Ideally, we all "own the Playbook." It is up to each one of us to create a culture of innovation and entrepreneurship as a pathway to economic growth and prosperity for Smart City Ottawa. This Playbook will grow and evolve as the community learns to work in this new way.

Entrepreneurial ecosystems are powerful forces that advance society, communities, and economies

SMART CITY NETWORK INFRASTRUCTURE STRATEGY

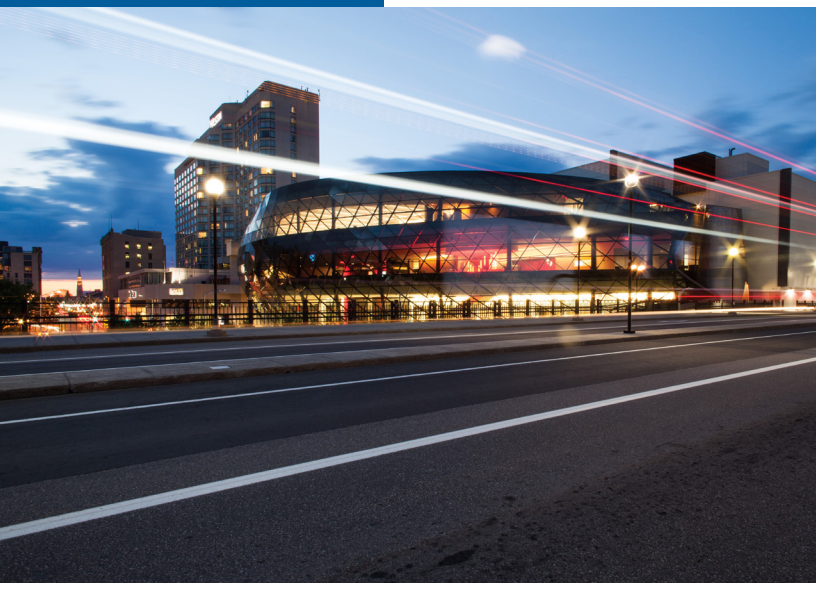
A Smart City uses information and communications technology (ICT) to enhance its livability, workability, and sustainability. Because ICT is the necessary and vital foundation upon which Smart City capacity is developed, it is essential that Smart City Ottawa have an inclusive and robust ultra high-speed communication infrastructure that serves the needs and interests of the community.

A well-conceived ultra high-speed communications infrastructure has the potential to interconnect millions of devices, people and organizations while setting new standards for speed, reliability and market ingenuity. Demand for mobile and wired bandwidth is growing tremendously, with mobile data expected to grow eleven fold by 2018[1]. Existing carrier networks may struggle to keep pace.

A well-conceived ultra high-speed communications infrastructure has the potential to interconnect millions of devices, people and organizations while setting new standards for speed, reliability and market ingenuity

From a community perspective, a well-conceived infrastructure will function as an inclusive collector of regional data to facilitate Smart City apps, analytics and economic growth. Together, these technologies serve as an inclusive socio-economic development accelerator to improve the quality of life for all residents and point the way to new short-term revenue, and long-term business and educational opportunities for all. This will enable our homes, businesses, and community; to stay relevant, while our region attracts and retains talent, harvesting new commerce and economic growth.

To achieve these goals, it is important that we have both a long term strategy and short term tactics in place to maintain and update our communication infrastructure as ICT technology continually evolves. Some of the areas of technology that should be part of this strategy are:



Shared Fibre Optic Infrastructure

Similar to the emergence of the limited-access highway system across North America, disparate fibre and wireless infrastructure throughout North American cities may benefit from a shared infrastructure business model. Currently, carriers and utilities build expansive fibre networks competitively along common routes resulting in crowded and redundant infrastructure that is owned, operated, and maintained independently. In aggregate, these entities spend three to four times as much to build and maintain these redundant networks as may be necessary to accomplish the same volumes of data traffic. Each network is overbuilt to account for expected traffic growth, resulting in unused capacity.

Wireless Tower Lease Space and Fibre Backhaul

A regional collocation model for wireless towers is emerging as the most economically efficient one for both tower owners and carriers. Due to the rapid growth in mobile data, and the growing expense of shared operations and maintenance costs for towers and backhaul infrastructure, Carriers can reduce their costs by leasing space on shared towers and avoid the full burden of the capital, operations, and maintenance costs incurred when building the tower separately.

Public Wi-Fi

Wi-Fi hotspots can provide numerous benefits to the community, users, and providers. Citizens and businesses gain greater access to the web and service options. Providers have the opportunity to leverage the network for internal use, capitalize on potential ad revenue, potential revenue from paid premium services, and gain increased public brand awareness.

Smart City Infrastructure Committee

To develop the long term strategy, a Smart City Infrastructure Committee or SCIC should be created. The SCIC would be a collaborative, regional organization composed of persons from both the public and private sectors. The committee should have the full support of all of its members and their organizations.

A Champion should be chosen to lead the committee. This person should have the personal and professional skills that allow him or her to work as an inclusive facilitator across all segments of our regional communications industry.

As a first step, a general review and needs assessment should be done to align the goals and objectives of participating public and private sector infrastructure providers with the needs of the community and areas of mutual challenge.

Once the official goals, vision, and mission of the committee have been adopted, the SCIC should meet on a regular basis to engage the community and develop a long-term strategy, short-term tactics, and integrated community strategies from which to meet those objectives. Some examples of policies that could be addressed include a streamlined permitting process, a one-touch make ready policy to lower pole attachment costs for all providers, and a common GIS data base that contains locations for all Smart City ultra high-speed infrastructure.

Moreover, by engaging members in a regular ongoing conversation around policy, planning, procedure, and the economics related to the development of ultra high-speed infrastructure, Ottawa's Smart City infrastructure will develop and enable our residents, businesses, and organizations to embrace new business, cultural, and educational opportunities that will accelerate Ottawa's socio-economic growth.

[1] Cisco Visual Networking Index Forecast Projects Nearly 11-Fold Increase in Global Mobile Data Traffic from 2013 to 2018

This person should have the personal and professional skills that allow him or her to work as an inclusive facilitator across all segments of our regional communications industry

NEXT STEPS

PUTTING THE PLAYBOOK IN ACTION

The hardest part in building our Smart City is taking the very first step

The hardest part in building our Smart City is taking the very first step. Now we have done that. Regional leaders convened to craft an inclusive Smart City vision and collaboratively created the Ottawa Playbook. Now we begin putting the Playbook into action.

The Playbook represents a holistic plan from which to move forward. Its Plays are a combination of long-term strategies, short term tactics, and Quick Start projects. It requires, however, a steward and various Champions who will lead and work with the community to put the individual plays into motion and produce measurable results.

The foundation for that stewardship and the power of our Playbook lies in the strength of our network. In order to pursue projects that are truly oriented toward the community, we need the support of citizens, businesses, community organizations, and governmental organizations to ensure our success.

Action Steps

- Select a steward for the Smart City Ottawa Playbook. This person should have the personal and professional skills that allow him or her to work across the various Playbook focus areas.

- The steward and Playbook activation capacity should reside within an Ottawa organization with a profound, abiding interest in the success of the Playbook.

- The steward and Ottawa Playbook team should convene to further identify needed Playbook resources and develop a plan to identify Champions, initiate Quick Start projects and put into motion longer-term plays. Once that planning is complete, the Playbook--and initial plans for implementation--should become a broadly available community asset.

Benefits and Outcomes

- The thoughtful selection of the steward for the Playbook will dramatically further the Smart City community engagement process.

- As our Quick Start projects and Plays develop and gain community visibility, residents, and public and private sector organizations will step forward to take ownership and build further capacity.

- As our Quick Start projects and Plays produce measurable results, new public and private sector opportunities will arise.

Now we begin putting the Playbook into action

SHORT AND LONG TERM TACTICS

THE PLAYS

When a Champion and a Play are brought together, the potential for Smart City impact is even greater

The Plays are our short and long-term tactics. They are the foundation for the future growth of Smart City Ottawa. Some Plays put our tactics and strategies into immediate action by creating exciting pilot projects, or Quick Starts, across our community.

When we build our future around our Plays, we give ourselves, our Champions, and entrepreneurs, the opportunity to make our best ideas manifest—the ideas which hold the greatest promise for digital inclusion, economic growth, and educational opportunity. When we bring a Champion and a Play together, the potential for Smart Ottawa impact increases dramatically.

Plays also give us greater regional and national visibility. As we promote our community to attract entrepreneurs, new residents, and new business opportunity, others will see and experience our pilot projects, and with it the new business and educational opportunities those Plays bring.

Using input from the Building the Smart City Workshop, the Plays were built around the following focus areas:

DIGITAL INCLUSION/DIGITAL LITERACY

Anchor Institution Action Plan - Enhance the ability of communities with lower socioeconomic status to participate more fully in the digital economic, political, and cultural environment.

Redefine the Public Library - Use digital technology and virtual assets to redefine and reenergize the concept of public library in Ottawa.

Digital Tools – Increase accessibility and usability of public spaces, potentially supplemented by digital infrastructure by putting digital tools more readily in the hands of residents.

EDUCATION

Digital Technology for K-12 - Incorporate digital technology education more effectively and systemically in K-12 schools.

ENERGY, WATER, AND WASTE MANAGEMENT

Benchmark Open Data – Benchmark open data between building owners and participating city departments to improve efficiencies.

Sensor-Connected Trash Bins – Make waste removal more timely and efficient through sensor-connected trash bins.

HEALTHCARE

Connected Health Living Lab - Choose a discrete targeted geographical footprint in Ottawa to research and explore population health solutions that leverage sensors, connectivity, and data analytics.

Tele-Health Pilot – Explore extending the service reach of health care practitioners through immersive and real-time connections.

TRANSPORTATION AND SMART MOBILITY

Connected Light Rail – Reenergize the economic and social benefits for Ottawa's O-Train light rail transit extension program through the addition of high speed wireless access.

PUBLIC SAFETY

Connected Public Safety Pilot – Improve integrated information flows among community members and agencies beginning with a small, connected community public safety pilot.

Connected LED Lighting – As LED street lighting technology continues to develop, it is possible to include roadway sensors, lighting controls and wireless capacity as well, making these retrofits even more beneficial.

REAL-ESTATE DEVELOPMENT

Smart Gigabit Neighbourhood Pilot – Demonstrate and include Smart City tech amenities which leverage neighbourhood socio-economic development and connected living.

ENTREPRENEURSHIP

Smart City Entrepreneur Development – Commit to funding and forming programs, events, and activities that improve the number and quality of Smart City entrepreneurs.

Smart City Entrepreneurial Ecosystem Measurement – Create a world class Smart City entrepreneurial ecosystem measurement system.

We should ensure that ultra high-speed Internet access is widely available throughout Ottawa

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Quick Starts are facilitating efforts that can be put into action quickly to either demonstrate a Smart City idea or concept

Smart City Proof of Concept Lab – Provide residents, businesses, organizations, and vendors with the ability to quickly develop, test, and demonstrate creative Smart City product concepts.

COMMUNITY INFRASTRUCTURE

Community Wireless – Deploy public Wi-Fi in a variety of public spaces.

High Speed Fibre Deployment – Ensure that high-speed fibre is widely available throughout Smart City Ottawa.

QUICK STARTS

Quick Starts are facilitating efforts that can be put into action quickly to demonstrate a Smart City idea or concept.

Smart City Sensors – Work with tech companies and vendors to deploy Smart City sensors for the entrepreneurial community.

Smart City Social Impact Hackathon – Take advantage of Smart City coding talent to accelerate social impact. Possible target areas are digital main street, community housing, market area, public safety, and challenged neighbourhoods.

Smart City Domain Names – Make use of new Smart City Domain Names for Plays and Quick Start neighbourhood pilots where applicable.

Internet Exchange – Use an Internet Exchange IX to develop greater and more efficient access to content and service providers, and to foster the development of Smart City services.

DIGITAL INCLUSION AND LITERACY

PLAY | *Use digital technology and virtual assets to redefine and reenergize the concept of public library in Ottawa*

Traditionally, public libraries were gathering places. They occupied large spaces—room enough for shelves and racks for books, magazines, and other elements of the collection. They required considerable staff, both to assist patrons directly with the labyrinth of materials, and to take care of the movement of materials on and off the shelf and in and out of the library door.

With much of the collection now digital or virtual, library spaces can be smaller or they can devote less room to storage and more room to people and activity. With less need to physically handle and account for materials, library staff can redirect their efforts and priorities as well.

In short, the library as a physical space and as a service can be reimagined. They can be more numerous. They can be put in non-traditional spaces. They can be open, both physically or virtually, extended and unusual hours. They can become an even greater hub for community activity and socioeconomic inclusion, a place for digital literacy training and education, and a community technology space for access and lifetime learning.

Underserved areas or areas currently underutilizing library resources receive additional access to digital library assets and service without large expenditure or resource reallocation

Action Steps

- Identify area(s) with below average library availability or usage.
- Establish one or more non-traditional library facilities in that area(s). Use a city building, recreation center, church, hospital retail space, etc. (Location ideally able to be served by dark fibre.)
- Orient services to open-access and digital. Provide wired and wireless ultra high-speed internet connections, charging capabilities, monitors with flash computers, and "technical" and "reference" help desk staffing with extended hours and capabilities. Encourage other non-traditional meetings and uses. While these locations should be more than "pop-up" libraries, they do not have to be as large, or as fully functioning as traditional locations.
- Seek sponsorship/partnership with telecom/hardware/software providers who would benefit from greater digital usage and involvement.
- Do surveys/research/counts to determine how such non-traditional locations affect library usage rates, digital literacy, and patron satisfaction.

With much of the collection now digital or virtual, library spaces can be smaller or they can devote less room to storage and more room to people and activity

Benefits and Outcomes

- Underserved areas or areas currently underutilizing library resources receive additional access to digital library assets and service without large expenditure or resource reallocation.
- The low capital requirement and Quick Start elements allows concept to be evaluated quickly, revised as necessary, and implemented in other areas of Ottawa.

DIGITAL INCLUSION AND LITERACY

PLAY | *Anchor institution action plan*

Full participation as a citizen is more and more dependent upon being able to connect to the digital world. To find a place to live and work, to shop for goods and services, to do well in school, to understand issues of politics and policy, to access healthcare and transportation, to fully enjoy cultural and entertainment events increasingly requires the "digital trio" of skills, equipment, and high-speed internet access.

Persons or groups currently without the economic means to acquire that digital trio are at risk of falling even further behind economically and being more isolated in the political and cultural landscape.

Community Anchor Institutions (CAIs) can play a vital role in mitigating that situation. To maximize that impact, however, requires that we have a broad definition of what constitutes a CAI and that they work in a coordinated, strategic fashion.

Groups currently without the economic means to acquire that digital trio are at risk of falling even further behind economically

Action Steps

- Inventory CAIs within specific geographic areas of Ottawa and the region. Libraries and schools are obvious anchor institutions, but any location where people gather, either formally or informally, should be seen as a potential digital CAI. This includes hospitals and other healthcare facilities, public housing, parks and recreation centers, places of worship, retail and entertainment districts, and others.
- Assess the abilities of these entities to currently or potentially participate as digital CAIs. Among other items, this assessment should include current and potential connectivity—both wired and wireless, space availability and appropriateness, and categories of individuals and groups currently served and those within the proximate geography. This assessment should also look at the receptivity of the institutions stakeholders to both provide and/or take advantage of access to the digital trio.
- Develop strategies and tactics for sharing, aggregation, and collaboration among various CAIs.
- Create paths of funding to optimize the potential for anchors that meet the criteria of location and willingness, but who lack sufficient financial resources.

Develop strategies and tactics for sharing, aggregation, and collaboration among various Community Anchor Institutions

Benefits and Outcomes

- Expanding the definition and use of CAIs in the planning and implementation of this strategy offers multiple benefits:
    - o Potential users have a greater chance of being physically and/or sociologically close to a provider.
    - o The success of the initiative is not dependent upon any specific budget or institutional priority.
    - o Sharing and learning across disciplines will encourage innovation and creativity in providing solutions.

DIGITAL INCLUSION AND LITERACY

PLAY | *Digital engagement in public spaces*

Digital tools in the hands of residents can help increase the accessibility and usability of public spaces. Digital tools in the hands of residents, potentially supplemented by digital infrastructure, can help increase the accessibility and usability of public spaces.

How people interface with the digital world and the physical world is a rapidly evolving issue, with cities adopting digital kiosks to help with wayfinding and public Wi-Fi for easy connectivity. Augmented reality technology is giving new meaning to historical and architectural landmarks and creating new social experiences in public spaces. Colorful LED lighting adds a different visual texture to buildings, parks, and monuments. There are new elements constantly on offer that remake the physical landscape of the city, but it is not always clear how these elements advance city goals around civic engagement or usage of public space beyond the initial "cool factor" they bring with them.

Digital tools can improve how citizens interact with one another in public spaces

Provide for free high-speed public Wi-Fi in public parks, heavily trafficked areas, or underutilized spaces that might benefit from more traffic

Action Steps

- Conduct a thoughtful analysis of what outcomes the city and residents want in terms of digital engagement in public spaces, and evaluate options based on desired outcomes. Some possibilities include:
    - Free high-speed public Wi-Fi in public parks, heavily trafficked areas, or underutilized spaces that might benefit from more traffic.
    - Integrate digital elements into public signage or wayfinding to communicate real-time information to users of the space, e.g., weather, pollutants, traffic, events. This could be explicit, i.e., scrolling words, or done through lighting or other creative methods.
    - Kiosks that serve as giant public touchscreens to find information about nearby attractions, restaurants, news, transit, or emergency services.
    - Public computer portals for individuals who do not have computer access at home.
    - Commission public art installations that reflect real-time data from the community.
    - Create, or engage the community to create, apps that use smart phones to help deliver a more engaging experience or better connect people in city parks.

Benefits and Outcomes

- The primary benefits may be taking a thoughtful approach to the desired use of public space, as well as how citizens interact with one another in public spaces. Once those priorities are set, it will be easier to evaluate how different tactics may support them.

EDUCATION

PLAY | *Incorporate digital technology education more effectively and systemically in the K-12 schools*

The quality of its ICT workforce is important to Ottawa's future growth as a high tech center

Students with greater technical knowledge will more fully be able to participate in and understand the value of Smart City technology

Just as an enhanced ability to read, write, and calculate was important to young citizens at the time of time of the second industrial revolution, so will a deeper understanding of digital technology be vital as we move through the third industrial revolution.

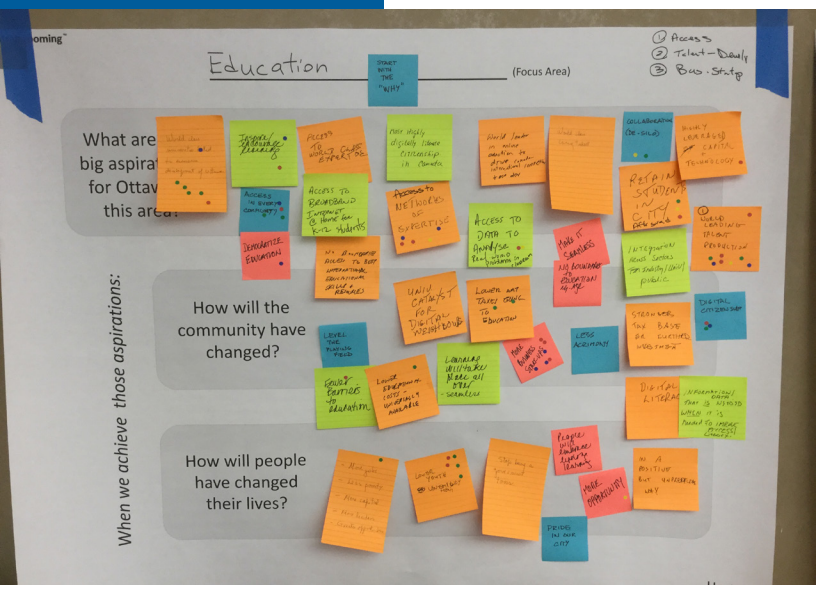
Using Snapchat on a smartphone, downloading podcasts to an iPod, or gaming on a tablet does not equal technical proficiency. Instead, formal schooling needs to provide both general education—how digital technology works—and specific knowledge and skills, e.g., coding.

Short Term Action Steps

- Inventory and assess current state of technology education in K-12, including both curricular and extra-curricular options.
- Collaborate with area high-tech businesses to help determine appropriate classes and areas of study and to use as teaching and laboratory resources.
- Begin pilot programs at various grade levels in schools that represent a mix of socio-economic groups.
- Track and publicize outcomes, including influence on other elements of education, i.e., do students who take technology classes do better or worse in other parts of their schooling.

Benefits and Outcomes

- The quality of its ICT workforce is important to Ottawa's future growth as a high tech center. Stronger integration of technological education in the school curriculum can play a significant role in ensuring that workforce is available.
  - Because many ICT and computer science positions do not require baccalaureate degrees, students who do not have the resources or proclivity for longer schooling, can get a head start on entering the workforce in meaningful, well-paying jobs.
  - Tech businesses who partner with the initiative can both shape curriculum for real-world applicability and have greater knowledge of both individual and group capabilities.
  - Students with greater technical knowledge and expertise will more fully be able to participate in and understand the value of Smart City technology and applications.



ENERGY, WATER & WASTE MANAGEMENT

PLAY | *Demonstrate simple framework for energy and water management as a neighbourhood pilot*

In the normal day-to-day process of conducting business, our region's larger buildings are big consumers of public sector resources. These buildings require energy to light, heat, and cool building activities and supporting infrastructure. Large amounts of water are also consumed in support of the same business, office, or residential activities. This in turn produces large amounts of waste and waste water. Currently, city departments use different data collection methods and billing systems to administer these different systems. Building owners collect different reports and bills to manage operational expenses.

If data were openly shared between building owners and participating city departments, it would be possible to not only create a more compelling economic and operational view of which buildings are performing more efficiently, but also enable the supporting city departments to administer and operate their respective systems more efficiently and cost effectively. By sharing and bench marking data the overall resource impact and cost savings to the city and the economic benefits to the businesses could be substantial.

Benchmark data will allow building owners to improve their economics while optimizing delivery of energy, water, and waste disposal services

The overall resource impact and cost savings to the city could be substantial

Action Steps

- Develop a business plan to share benchmark data between building owners and participating city departments. This would include:
    - Building classification codes, business type, square footage, and number of occupants.
    - Energy, water, and waste tonnage for each building.
    - Truck route data to optimize waste removal routes.
    - Entrepreneurs in the process of developing the business case and benchmark delivery model.

Benefits and Outcomes

- Benchmark data will allow building owners to improve their economics while optimizing delivery of energy, water, and waste disposal services.
- On-demand waste removal will improve traffic congestion and save truck fleet operational costs.
- There will be better conservation of city and building resources, more effective water leak detection, and less pollution.

ENERGY, WATER & WASTE MANAGEMENT

PLAY | *Sensor connected trash bins*

Sensors embedded in public trash bins can help keep public spaces clean with timely pickup and can help the city be more resource efficient

Ottawa city government is responsible for emptying around 5,300 trash bins. These trash bins are emptied on fixed days and times along fixed routes. But these trash bins do not fill up along that same set schedule, leading to full trash bins that stay full while other bins are being emptied. By applying small sensors with wireless radios, we can monitor which trash bins need to be emptied and adjust the pickup routes dynamically in order to take out the garbage as efficiently as possible. Moreover, over time, the data from those trash bins may be used to help the city be predictive and proactive in managing the city's waste.

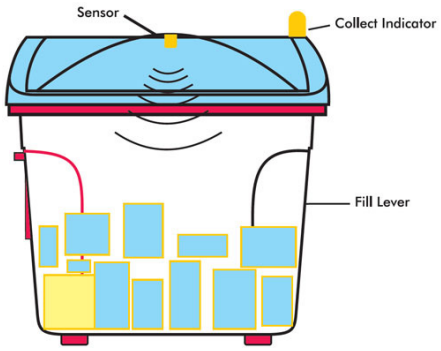
Cleaner parks, sidewalks and other public spaces are the primary benefit, along with cost and energy savings gained by more efficient routes

Action Steps

- Research and evaluate options based on vendor information (there are a number of connected waste vendors with products in the field), a survey of peer cities, and through Smart City resource networks.
- Try to understand vendor pain points and look at potential for public-private partnership.
- Model cost and potential savings for a connected trash solution in Ottawa.
- Engage with residents and entrepreneurs to understand where more timely trash pickup could have the biggest impact in order to identify a pilot geography.

Benefits and Outcomes

- Cleaner parks, sidewalks, and other public spaces, along with cost and energy savings gained from routes that are more efficient.
- Connected trash bins also offer an opportunity for the city to build a wireless network, or dedicate a slice of the existing network, to support Internet of Things applications. The trash collection data would provide another opportunity for the city to think about how it uses and makes available the data it collects, especially as more data points connected to city infrastructure become available.



HEALTHCARE

PLAY | *Connected health living lab*

Choose a discrete targeted geographical footprint in Ottawa to research and explore population health solutions that leverage sensors, connectivity, and data analytics.

The explosive growth of health-related smart phone applications and health monitoring hardware is a sign of peoples' expectations about how new technology and better data can help improve health outcomes. In order for communities to meet those expectations, health practitioners, stakeholders, and consumers need to understand and use their ICT assets in a coordinated way. Coordinating assets requires connecting interventions—the steps individuals or doctors take to improve health—with outcomes—whether or not those interventions actually make people healthier. Connected, coordinated health care is consistent with other emerging trends in health as well, such as compensating caregivers based on a patient's overall health, rather than for each particular service rendered. While the complexity and enormity of the health care system makes this daunting at scale, there is an opportunity to focus resources in a relatively small area with an identifiable population and clear need to understand how "smart health care" might improve access and outcomes.

With an identifiable population and clear need to understand how "smart health care" might improve access and outcomes

Action Steps

- Assemble local/regional health care stakeholders to understand what assets and expertise are available to support such an effort and who might play a leadership role.
- Identify potential location(s) based on need, service area of key partners, available resources, and technical feasibility. This could be an addition to a real estate development project(s) currently in the pipeline with assets committed or as a retrofit.
- Create a conceptual model that includes:
    - o Widespread wireless/Wi-Fi connectivity throughout the area.
    - o Physical touchpoints within the campus for health information and service, e.g., walk-in clinics, telemedicine sites, monitoring or assessment stations, health records access points.
    - o Data integration of personal devices and public sensors, e.g., smart phone, fit bit, activity monitors, campus amenity usage, air quality, to look at the "population health" of the population.
- Identify a Champion and create timeline for next steps.

Benefits and Outcomes

- Potential for improved health outcomes within a population of high need.
- Provides benefit/use case for expansion of connectivity.
- Creates growth in the health ICT sector, and potentially draws in additional partners.
- Create a sensor-driven, interdisciplinary Smart City proof of concept lab within the region, yielding greater diversity and more opportunities for vendor engagement and experimentation.

Data integration of personal devices and public sensors can look at the "population health" of the local population

HEALTHCARE

PLAY | *Tele-health pilot*

Telehealth, or telemedicine, allows health care practitioners to extend the reach of their service through the immersive, real-time experience made possible by high-bandwidth, low-latency internet connectivity.

Telehealth generally involves the use of real-time, high-definition video to facilitate patient-doctor connections that otherwise might not happen. Patients who live in remote or rural areas, those without good access to transportation, people whose mobility is impaired or face health risks in a trip to the hospital, or youths who need services brought to them—any of these may benefit from a next generation telehealth solution. Applications range from mental and behavioral telehealth (e.g., online counseling or therapy) to tele-dermatology (which may include haptic feedback—actually allowing a doctor to feel remotely the contours of a patient's skin) to tele-radiology, which mainly means transferring large image files to be read offsite. Telehealth, of course, is not new; but better networks and connectivity offer compelling new possibilities. A telehealth pilot may be part of the Connected Health Living Lab, but it could stand alone, also.

Telehealth generally involves the use of real-time high-definition video to facilitate patient-doctor connections that otherwise might not happen

Action Steps

- Identify existing assets and practitioners in telehealth, both longstanding and exploratory, and catalogue the use and reception of telehealth in Ottawa.
- Determine a clinical area of need for focus.
- Survey existing users of telemedicine to understand where better networks might help improve the product.
- Identify a potential pilot project and Champion, create a work plan and budget, and begin to solicit resources.

Benefits and Outcomes

- By simply inventorying Ottawa's telehealth assets, the health care community will likely identify areas of strength and opportunity. This exercise will also help to uncover populations of need who might benefit from telehealth solutions. Of course, if the pilot is successful, citizens should benefit from better quality of care, better access or both.

TRANSPORTATION & SMART MOBILITY

PLAY | *Connected light rail*

Ever since the advent of rail transportation, the heart of many communities has been the metro and Union Station. They served as the nexus of people, information exchange, and community pride for many cities. Smart City Ottawa has the opportunity to reenergize these important economic and social benefits for Ottawa's O-Train light rail transit extension program through the addition of high speed wireless access at all station and within individual light rail cars. Furthermore, the addition of ultra high-speed fibre within the O-Train light rail corridor can connect individual O-Train transit districts thereby providing greater capacity and information services capability.

Convenient high speed wireless access for on- or off-board passengers and increased demand for public transportation

When our light-rail and transit districts are connected in this way we realize several powerful benefits: 1) Convenient high speed wireless access for on- or off-board passengers and increased demand for public transportation 2) Transit corridor wireless capability can be a powerful collector of community analytics and provider of real-time transit information, and 3) Fibre optic cable laid along metro right of ways provides a very low cost means of building fibre route backbone to/for other adjacent private and public sector service providers.

Action Steps

- Perform a community visioning session for the wireless/wired and informational aspects of the O-Train light rail expansion program and transit districts, its aspirations, amenities and benefits.

- Allow entrepreneurs to participate in developing Apps for the transit corridor. Make real-time train arrival information more accurate and available on personal devices.
- Build high-speed points of presence between the transit districts and its "last mile" (e.g., employment centers, entertainment districts, government offices) to accelerate future functionality and economic impact.
- Work closely with riders, the community, entrepreneurs on building transit-friendly neighbourhoods.

Benefits and Outcomes

- Improved ridership through real-time communications and schedule information.
- Improved transit community engagement through use of public spaces, Apps and analytics.
- Increased demand for adjacent mixed-use developments and residential spaces.
- Using Wi-Fi-enabled transport services helps to encourage more people to use transit services.
- Reduced strain on car/truck/bus oriented infrastructure.

Work closely with riders, the community and entrepreneurs to build transit-friendly neighbourhoods

PUBLIC SAFETY

PLAY | *Public safety pilot*

There are a wide array of connected public safety solutions now available to law enforcement, therefore the city and citizens must engage in thoughtful dialogue about how to incorporate these solutions into a community.

Smart City applications touch public safety in many ways.

Smart lighting solutions that dim lights to save energy when there are not people nearby can shine brightly as crowds gather or when certain triggers of violent activity cause them to so.

Shot detection technology can identify the noise created by gunshots and help identify where they come from.

Police-worn body cameras can capture interactions between citizens and law enforcement. Video sensors can help detect everything from traffic violations such as running red lights to identifying where there is activity that maybe there should not be.

When law enforcement can quickly and accurately collate real-time data from multiple sources, it can respond much effectively when an emergency occurs or predict where it needs to deploy future resources. There are some tradeoffs, however, between police access to data and increased reporting versus the needs and privacy concerns of individual citizens.

Empowering citizens to help address public safety challenges is a call that is well-received within the civic tech community

Action Steps

- Take inventory of next generation tech being used or evaluated by the police.
- Look at how data are managed to effectively support public safety work, including how data are siloed or leveraged within city government and where there are gaps that prevent more effective policing.
- Convene a citizens' task force to evaluate the public impact of police technology.
- Identify the greatest public safety needs within the community and which technology solutions may help to effectively address those.
- Look for a public safety pilot project based on need and an evaluation of projects in other cities facing the same need.
- Consider a hackathon or open innovation challenge to citizens around a key area of need. As part of the challenge, identify the assets the city and partner can bring to the table (for example, providing the connectivity or data warehousing to support a tech initiative).

Benefits and Outcomes

- Clearly, there is benefit in identifying an area of need and finding/deploying a solution to meet that need. But the environmental work around the pilot project is likely to provide as much or more ongoing value.
- Establishing clear communication and helping to set expectations between law enforcement and citizens can lay the groundwork for a fruitful, ongoing relationship.
- Empowering citizens to help address public safety challenges—a call that is well-received in the civic tech community—can help build greater assets and capacity in terms of civic engagement.
- Creating a map of active projects and explorations will help identify opportunities for collaboration and better usage of resources.

Identify the greatest public safety needs within the community and which technology solutions may help to effectively address those

PUBLIC SAFETY

PLAY | *Connected LED Lighting*

Develop a LED lighting corridor to demonstrate new LED lighting technologies

Work closely with LED lighting suppliers and entrepreneurs to provide ideas for Smart Lighting features

For years, cities have made use of traditional roadway lighting systems despite the energy waste inherent in such systems. Recently, rapid changes in LED (light emitting diode) lighting technology have given rise to a LED retrofit revolution. Across the globe, municipalities are switching out their older street lighting to new, more energy-efficient, longer lasting LEDs.

The City of Ottawa has over 68,000 streetlights that use older technology. These fixtures account for 17% of the City's electrical use and cost $7.2 million annually for electricity (2014 figures). Replacing existing street lights with LED's can produce as much as a 50% reduction in energy usage and substantially lower maintenance costs.

As LED street lighting technology continues to develop, it is possible to include roadway sensors, lighting controls and wireless capacity as well, making these retrofits even more beneficial.

Action Steps

- Develop a LED lighting corridor to evaluate and demonstrate new LED lighting technologies as they are developed. Include Ottawa's technology companies. Work closely with LED lighting suppliers and entrepreneurs to evaluate and provide additional ideas and specifications for Smart Lighting features that provide safety and convenience benefits beyond efficient street and sidewalk illumination.

Benefits and Outcomes

- Increased accuracy and granularity of data on public lighting energy usage, both per light and in any given geographic area.
- More efficient and effective lighting controls resulting in more useful and consistent light output and prolonged life expectancy
- A substantial reduction in energy consumption and maintenance costs.
- An opportunity for Ottawa's technology companies and entrepreneurs to participate in the development of products, services and Apps for the lighting corridor.

REAL ESTATE DEVELOPMENT

PLAY | *Smart Gigabit Neighbourhood Pilot*

During the Building the Smart City Workshop, the idea of using neighbourhoods as Smart Gigabit pilot areas was a theme repeated across several focus areas.

The Smart Gigabit Neighbourhood pilot has several advantages: it is geographically confined, and therefore easier to manage, the cost to provide ultra high-speed or Gigabit connectivity is lower, and metrics are simplified. Also, by its very nature it is more inclusive and allows for greater community participation.

A neighbourhood with ultra high-speed fibre and wireless connectivity could allow for the demonstration and development of Smart City applications at the residential, business, and entrepreneurial level, while at the same time providing a unique opportunity for the community to evaluate applications, business models and observe socio-economic impact.

Neighbourhood pilots are more inclusive and allow for greater community participation

The community can evaluate applications, business models and observe socio-economic impact

Action Steps

- Engage the community and envision the Smart Gigabit Neighbourhood pilots.
- Assess the creative, economic, and entrepreneurial potential of the pilots, making additional use of crowd sourcing.
- Build a plan, budget, and next steps to move forward.
- Design and build the Smart Gigabit Neighbourhood pilot.
- Monitor and assess the community, economic, and educational benefits of the neighbourhood pilot.

Benefits and Outcomes

- Well-conceived and thoughtful Smart Gigabit Neighbourhood pilots give the community the ability to observe potential future Smart City services and see how Smart City data could be obtained and used.
- Smart Gigabit Neighbourhood pilots help public and private sector stakeholders more rapidly make progress towards tangible, incremental results that build credibility and justify further public or private sector investments.

ENTREPRENEURSHIP

PLAY | *Smart City entrepreneur development*

Smart City entrepreneur development is the commitment to fund and form programs, events, and activities that improve the number and quality of a region's Smart City entrepreneurs. This leads to more ventures, more funding, more jobs, and a healthier economy and society.

Strengthening Ottawa's Smart City entrepreneurial culture is critical to the region's goal of creating a high momentum Smart City innovation environment. Research and experience show that entrepreneur development and the learning and collaboration that it causes are a fundamental part of a strong entrepreneurial ecosystem. Without entrepreneur development, programming, and investments, economic outcomes stall.

Strengthening Ottawa's Smart City entrepreneurial culture is critical to the region's goal of creating a high momentum Smart City innovation environment

Action Steps

- Catalogue formal and informal entrepreneur development programs and activities.
- Identify potential Champions for the region's different entrepreneurial sectors.
- Create an overall ecosystem map that inventories Entrepreneur Development, Venture Development, and Economic Development.
- Use the ecosystem map to:
    - Inform the region about current and planned ecosystem initiatives.
    - Help entrepreneurs connect to one another and to other ecosystem players.
    - Identify opportunities for expanding entrepreneur development.
    - Fund community champions that create mentoring, education, collaboration, competitions, recognition and other activities that increase innovation momentum.

Benefits and Outcomes

- Regular and frequent Smart City entrepreneur development programming will cause large-scale participation by the community. Public sector entities, universities, utilities, entrepreneurs, ecosystem champions, investors, economic development, real estate, and other ecosystem players need to increase collaboration and relationships. This will increase innovation momentum.
- As its entrepreneurial culture grows, Ottawa will be recognized as a leader in Smart City innovation and economic development.

ENTREPRENEURSHIP

PLAY | *World class Smart City entrepreneurial ecosystem measurement system*

Create a set of metrics that measure Smart City ecosystem momentum and economic outcomes.

A Smart City Entrepreneurial Ecosystem Inventory provides a baseline to measure and track improvement. Developing a set of shared metrics that informs stakeholders will increase the pace of innovation and economic growth. Year over year improvement will result in a continuous increase in innovation momentum. Annual measurement will be the basis for reporting and celebrating accomplishments.

Action Steps

- Fund the development of a measurement framework.
- Create a baseline by gathering information and populating the metrics framework.
- Identify information gaps that need to be addressed.
- Assign responsibility for tracking outcomes.
- Measure outcomes annually.

Benefits and Outcomes

- Establishing a World Class Smart City Ecosystem Measurement System will increase collaboration and evolution across the region. It will also provide outcomes information that will enhance fund raising opportunities and reporting.
- Regions, communities, universities, and organizations nationwide are working on developing approaches and doing research in this area. Ottawa can be a community model that will be recognized and used by others.

Developing a set of shared metrics that informs stakeholders will increase the pace of innovation and economic growth

ENTREPRENEURSHIP

PLAY | *Smart City proof-of-concept lab*

Smart City ideas become more powerful when the business model and socio-economic impacts are aligned

Research existing labs or entrepreneurial workspaces in the region, and develop plans to fill any gaps

Proof-of-Concept labs provide residents, businesses, organizations, and vendors with the ability to quickly develop, test, and demonstrate creative Smart City product concepts by a wide variety of participants at a single location. When related organizations, resources, and vendors are thoughtfully aligned with a community Proof-of-Concept Lab, the foundation is set for a wealth of Smart City ideas to become reality.

A Proof-of-Concept lab often characterizes several distinct processes with different objectives. Once a Smart City concept has been created, a prototype is developed which is then used to demonstrate to prospective customers or investors.

A Proof-of-Concept lab can also provide seed funding to novel, early stage Smart City ideas that most often would not be funded by any other conventional source.

Action Steps

- Align with interested socio-economic research, education, and planning organizations.
- Work with the vendor community to develop a member subscription model to generate revenue to support the lab.
- Develop a panel of technology and socio-economic beta testers.
- Research existing labs or entrepreneurial workspaces in the region, and develop plans to fill any gaps.

Benefits and Outcomes

- Quicker solutions to market and accelerated innovation.
- Ability to share best practices.
- Lower costs for all participants.
- Boosts Ottawa's leadership position by focusing on socio-economic impact.

COMMUNITY INFRASTRUCTURE

PLAY | *Public Wi-Fi hotspots in select neighbourhoods or community locations*

One foundation of the Smart City is pervasive ultra high-speed connectivity whether we are inside or outside. High-speed community wireless capability, combined with ultra high-speed fibre is a game changer for our community and for businesses and residents.

As more and more high-speed wireless devices proliferate, it is crucial that we also have high-speed wireless capability at strategic locations across our community to support small business, students, entrepreneurs, and disadvantaged persons.
In the early stage, high-speed wireless capability should include all educational and community outreach organizations. It should also include seamless access from the university campus, to the main street area, to shopping malls and entertainment areas.

Action Steps

- Assess dense city areas, neighbourhoods, public spaces or underserved public areas which would benefit from Wi-Fi.
- Identify the essential infrastructure to support the wireless network.
- Develop branding, marketing, and advertising strategy for the public Wi-Fi network. Include a "branded" strategy that allows individual business to co-brand their business with the public network Wi-Fi network.
- Work with service providers to accelerate Wi-Fi offloading.
- Develop and submit a RFP for the public wireless network.

Benefits and Outcomes

- Improved access to public spaces.
- Students, entrepreneurs, and small businesses will benefit.
- Real-estate market will benefit from access to high-speed wireless.
- Innovative retail sales applications will benefit businesses and sales organizations.
- Provides for a secondary access method for public safety and community communications.

Public Wi-Fi provides for a secondary access method for public safety and community communications

Include a "branded" strategy that allows individual business to co-brand their business with the public Wi-Fi network

COMMUNITY INFRASTRUCTURE

PLAY | *Ultra high-speed fibre deployment*

Ultra high-speed fibre deployment helps us to insure that fibre is widely available throughout Smart City Ottawa by tracking existing assets and working with stakeholders to steadily increase the fibre footprint.

Realizing the community impact that robust internet connectivity can yield requires significant effort and commitment beyond simply laying fibre. As excitement grows around the potential for spin-off activity and for growing an ecosystem to support innovation, creativity, vibrant places, and entrepreneurship, it is easy to forget the fibre itself that acts as a catalyst for this growth. Smart City Ottawa needs to ensure a tight focus remains on identifying, expanding, and activating commercial and residential assets within the city and ensuring that they are accessible and affordable to entrepreneurs, residents, businesses, and anchor institutions.

Establish a small "Fibre Action Committee" with responsibility for monitoring fibre assets in the community and identifying opportunities to expand those assets

ISP's can more readily commit to fibre installation when the city is a partner in the information gathering and business case process

Action Steps

- Create a small "Fibre Action Committee" with responsibility for cataloging fibre assets in the community and identifying opportunities to expand those assets.
- Build an inventory of downtown buildings and building owners along with fibre availability and usage within each building. Concentrate inventory on priority areas as needed.
- Work with local internet-service providers, to measure residential demand and understand where aggregated demand can support deployment.
- Explore pairing high-demand and low-demand neighbourhoods to avoid service gaps and a digital divide.
- Prioritize affordable business class gigabit service to the educational, entrepreneurial, and digital inclusion communities.

Benefits and Outcomes

- Ready access to fibre infrastructure is the backbone that enables much of the Playbook activity. A Fibre Action Committee will be able to report progress and create accountability.
- ISP's can more readily commit to fibre installation when the city is a partner in the information gathering and business case.

QUICK START

PLAY | *Work with tech companies to deploy advanced sensor technologies for Ottawa's entrepreneurial communities*

Advanced sensor systems to improve and automate processes within a city will play a leading role in developing Smart City Ottawa. From smart design of buildings, which capture rain water for later use, to intelligent control systems, which can monitor infrastructures autonomously, the possible improvements enabled by sensing technologies are immense. The city has begun to work in this direction.

For example, in the last few years the City of Ottawa installed over 200,000 new water meters that have wireless transmitters, automating meter reading.

City garbage trucks now have GPS locators as well as on board cameras. The GPS allows the control center to monitor routes and schedules while the cameras facilitate incident investigations.

Supervisory Control and Data Acquisition data (SCADA) is provided to the City's open data system thereby allowing researchers and citizens to access environmental data such as water quality or storm water data. In one case, a developer built an app to allow citizens to test water and deliver the data automatically to environmental services.

By expanding collaboration around current city planning and open data, entrepreneurs can utilize the latest sensor technologies to accelerate this trend creating more opportunities and long term cost savings for the city.

The possible improvements and cost savings enabled by Smart sensing technologies are immense

Engaging entrepreneurs can accelerate this trend, creating new companies and lowering infrastructure expenditures

Action Steps

- Work with local public sector organizations to identify and catalogue pain points.
- Engage the local entrepreneurial community to solve civic problems or create civic efficiencies using sensor technologies.
- Work with Smart City sensor vendors to develop synergistic public-private partnerships.

Benefits and Outcomes

- By engaging entrepreneurs, innovative persons can make use of out-of-the-box thinking processes to create solutions to civic problems using sensor technologies.

QUICK START

PLAY | *Smart city social impact hackathon*

A hackathon is a social coding event that brings together computer programmers and other interested people to improve upon or build new software programs. Traditionally, hackathons involved coding only, but now we recognize them as effective Smart City community tools for solving all kinds of problems, whether technological, social, or economic.

Smart City Hackathons can also be an effective community engagement tool to address existing community or business challenges. Examples include, but are not limited to, economic development, energy, analytics, water, and waste management. In this way, residents, businesses, students, and community organizations could provide effective out-of-the-box thinking and creative solutions that provide additional value, opportunity, revenue streams, and cost savings to Smart City Ottawa.

Smart City Hackathons are recognized as effective community tools for solving all kinds of problems, whether technological, social, or economic

Action Steps

- Develop Smart City social impact hackathon brigades in local neighbourhoods, colleges and universities.
- Work with community, public sector, and business organizations to identify and catalogue pain points.
- Work with technology vendors to understand the capabilities of the latest strategies and technologies and to help sponsor events.

Benefits and Outcomes

- Civic problems can be identified and solved faster at lower cost.
- Solutions lead to new companies and investment opportunities.
- Smart City Hackathons attract talented young persons into our city.

QUICK START

PLAY | *Make use of new top level domain names for Smart City Ottawa pilot projects*

Domain names establish a unique internet identity. An organization can choose a domain that corresponds to its name, helping internet users to reach it easily. For example, everyone is familiar with common domain names such as .com. .gov, .edu or .org.

However, municipal top level domains (TLDs) provide for a unique opportunity for residents, businesses and government alike. For example, the NYC City Council might have said it best, "having a .NYC TLD will make our community more governable, provide opportunites for small businesses, raise city revenue and make navigating the internet easier for our residents, prospective tourists, and businesses."

For example NYC has implemented a neighbourhoods.nyc top level domain. This makes it easy for residents, businesses, and tourists to navigate within that neighbourhood.

As Smart City Ottawa advances, top level domains could be used to designate Plays or Quick Starts: for example, smartcity.plays.ottawa. Starting with a top level domain pilot would give residents and businesses a chance to see the top level domain in action and determine the best way to implement the domain names for their community.

Top level domain names show a pathway from which to educate citizens and accelerate the economic development of our city

Action Steps

- Acquire a top level domain name to educate and demonstrate economic impact potential.
- Align the top level domain names with other Smart City Ottawa Plays or Quick Starts.

Benefits and Outcomes

- Top level domain names make it easier for citizens to navigate the web and explore their city. When TLDs are applied specifically to Plays, Quick Starts or neighbourhood pilots, it makes it much easier for residents and businesses to participate in Smart City Ottawa. For example smartcity.plays.ottawa.
- When we engage our community in this way, Smart City Ottawa's pilot project will benefit, be more successful and productive as a result of citizen feedback. Citizens will learn of how to apply TLD's in ways which help to accelerate the economic development of their community.

QUICK START

PLAY | *Internet exchange point IX*

Just imagine each time you send a file to a friend across the street in Ottawa, it goes to Toronto first, before it is reaches your friend across the street in Ottawa

Inefficient routing causes a delay or latency problem across Ottawa. Smart City applications, Internet of Things, Netflix, Cloud services or even YouTube thrives on low latency

An Internet Exchange Point, or IX, allows service provider to interconnect directly, via the exchange, rather than through one or more third-party networks. The advantages of the direct interconnection are numerous, but the primary reasons are cost savings, latency, and bandwidth.

Just imagine, each time you send a file to a friend across the street in Ottawa, it goes to Toronto first before it is received by your friend across the street in Ottawa!

Traffic passing through an exchange is typically settlement free, whereas traffic to an ISP's upstream provider is billable. The direct interconnection, often located in the same city as both networks, avoids the need for data to travel to other cities (such as Toronto or Montreal) to get from one network to another, thus reducing latency. This is why the OttIX (Ottawa Internet eXchange) was formed, with the intention of bringing Internet service providers, large corporate entities, and educational institutions in the Ottawa area closer together.

Moreover, inefficient routing causes a delay or latency problem across Ottawa. Smart City applications, Internet of Things, Netflix, Cloud services, or even YouTube thrives on low latency.

Action Steps

- Locate a site for the IX that is common and well known to local service providers.
- Select a neutral third party to operate and maintain the IX for the mutual benefit of all ISP's.

Benefits and Outcomes

- Faster downloads and better internet efficiency.
- More efficient content distribution.

sgix Singapore Internet Exchange

WORKSHOP ATTENDEES

Aaron Burry, General Manager Community & Social Services, City of Ottawa
Brian Hurley, President & CEO, Purple Forge Corporation
Bryce Conrad, Chief Executive Officer, Hydro Ottawa Holdings
Byron Holland, President & Chief Executive Officer, Canadian Internet Registration Authority (CIRA)
Cathy Malcolm Edwards, Managing Director, 1125 @Carleton
Colleen Connelly, Manager Service Planning, Transit Services OC Transpo, City of Ottawa
Dave Miller, Information Technology Manager, Ottawa Carleton District School Board
Councillor Jan Harder, City Councillor and Planning Chair, City of Ottawa
Councillor Lieper, City Councillor, City of Ottawa
Councillor Wilkinson, City Councillor, City of Ottawa
Dan Chenier, General Manager, Parks, Recreation & Cultural Services, City of Ottawa
Daniel Steeves, CIO Ottawa Police, Ottawa Police Service
Danielle McDonald, Chief Executive Officer, Ottawa Library
Doug Robertson, Manager Parking Services, City of Ottawa
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