

A teal silhouette of the Ottawa skyline, including various buildings, a flag, and a bridge, positioned above the text.

# SMART CITY 2.0

City of Ottawa  
Planning, Infrastructure  
and Economic Development  
November 2017

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# EXECUTIVE SUMMARY

Smart City 2.0 is Ottawa's Smart City Strategy.

The smart city concept and the implementation of smart city strategies has been gaining popularity worldwide. Cities are turning to technology and robust high-speed communication infrastructure, developed and driven primarily by the private sector, to address opportunities and challenges presented by both urbanization and globalization.

Through smart city strategies, cities are proactively using technology as a means to accelerate economic growth and compete in the global economy; this includes advancing a city's knowledge-based economy through investment attraction and business expansion, entrepreneurial support, and the development of local talent. It also means providing residents and businesses with efficient and effective municipal services, whether it be through access to services via digital platforms or through the implementation of smart and connected infrastructure.

Ottawa is already a smart city; Ottawa has a strong history of innovation and a diverse technology hub that is fuelled by top-notch talent, entrepreneurial spirit, and robust research and development capabilities. Residents of Ottawa enjoy a desirable quality of life and the City has many smart city solutions already in place. In fact, in 2010 Ottawa was named one of the top seven intelligent communities in the world by the Intelligent Community Forum.

Nonetheless, Ottawa must be proactive to maintain its smart city edge. Cities that simply implement reactive solutions to economic shifts and that are slow to embrace technological advances and change, risk being left behind and unable to compete in today's global economy.

By laying out clear goals and a series of proposed initiatives, a smart city strategy for Ottawa provides a roadmap to make Ottawa an even smarter city than it is today. It provides a plan for Ottawa to build upon its smart foundation and ensure that investments in technology are not an afterthought, but rather something that is embedded within all the city does.

Smart City 2.0 is centred on three goals of achieving a Connected City, a Smart Economy, and an Innovative Government. Together these goals and corresponding sample initiatives work collectively to make Ottawa a smarter city than it is today.

- A Connected City – Create a city where all residents and businesses are connected in an efficient, affordable, and ubiquitous way.
- A Smart Economy – Stimulate economic growth by supporting knowledge-based business expansion and attraction, local entrepreneurs, and smart talent development.
- An Innovative Government – Develop new and innovative ways to impact the lives of residents and businesses through the creative use of new service delivery models, technology solutions, and partnerships.

Corresponding sample initiatives for the Smart City 2.0 goals range from developing a Fibre Broadband Strategy, to implementing a platform for entrepreneurs and small and medium enterprises to pilot smart city solutions, to enabling a mobile-driven digital experience for residents and businesses.

The City of Ottawa's role in Smart City 2.0 is to implement and deliver smart city solutions, but also to:

- Be a leader and catalyst in bringing together all of Ottawa's smart city stakeholders, programs, and initiatives under a single strategy and common set of goals; and
- Work collaboratively with residents, businesses, and smart city eco-system players to advance and implement Smart City 2.0.

Recognizing the role of Ottawa's knowledge-based businesses and entrepreneurs as the driving force of technological advances, and valuing the city's strong smart eco-system of post-secondary institutions, utility providers, Invest Ottawa and economic development organizations, and many others, Smart City 2.0 focuses on a joint and collective approach where everyone will work together in the journey of building a better and smarter Ottawa.

# OVERVIEW

## The Rise of Smart Cities

The smart city concept is one that is being introduced and implemented worldwide.

Cities like Barcelona and Amsterdam are examples of early adopters, with the trend following quickly to other cities around the globe.

By 2020, it is estimated that \$400 billion a year will be spent building smart cities.<sup>1</sup>

The reasons for this are many, but centre on the notion that urbanization and globalization have resulted in a large number of challenges and opportunities that can be addressed through technology, high-speed communications, and the availability of data.

Some cities are using smart city tools and applications to optimize resources and improve the delivery of municipal services.

Others are using technology to address issues like traffic congestion and climate change.

Many are doing all of this and more by taking a holistic approach to smart cities; one that recognizes technology as a key driver of innovation, economic growth, and a means to compete for knowledge-based business investment and talent.

A city's approach to becoming a smart city is ultimately dependant on its own goals, challenges, and opportunities; however, at the core of all smart cities and their rise in significance is the increasing importance of technology as a means to improving and enhancing the lives of the residents and businesses a city serves.

## Why Smart Cities Matter?

The implementation of technology and smart city solutions is becoming less of a luxury and more of a necessity.

Technology is advancing at a rapid pace and it is estimated by that 2050, over 50 billion devices will be connected to the internet.<sup>2</sup>

Smart cities matter in proactively using the rise of connectivity, technology, sensors, and data to effectively and efficiently respond to the pressures of urbanization and globalization.

They also matter in reducing a city's costs and improving the services they provide.

At the same time, they provide residents and businesses with affordable access to modern and high-speed communications infrastructure and smart city tools.

When a city implements a smart city strategy, it increases its ability to stay competitive and grow its knowledge-based economy. Smart cities attract smart talent and business investment.

Ultimately, they matter as a key means to encouraging economic growth and providing residents with an improved quality of life.



# A SMART CITY STRATEGY FOR OTTAWA

## Why Now?

By all accounts, Ottawa is already a smart city. Ottawa has a strong history of innovation and is home to a diverse technology hub fuelled by top-notch talent, entrepreneurial spirit, and robust research and development capabilities. Residents of Ottawa enjoy a desirable quality of life and the City has many smart city solutions like an automated salt management system for winter salting vehicles and advanced metering technology, making Ottawa well positioned to be a leader in the development and deployment of smart grid technologies. In fact, in 2010 Ottawa was named one of the top seven intelligent communities in the world by the Intelligent Community Forum.

So, if Ottawa is already a smart city, why is a smart city strategy required?

A strategy is a plan to bring about a desired future, achieved by reaching certain goals. Indeed, Ottawa is smart but the future of the 21<sup>st</sup> century is complex and brings with it challenges and opportunities that, to be addressed in the most advantageous way, require a planned, calculated, and comprehensive approach. With the escalating “war for talent” dominating the global economy and dictating which cities succeed in attracting the most successful companies and well-paid workforce, it is important that Ottawa plan strategically to maintain its smart edge.

As the next generation of municipal infrastructure development takes place, cities slow to adopt technology will continually suffer or never catch-up at all. This was the case for many cities in the world’s last economic expansion that included the development of the telephone, rail transportation, electrical grids, and the automobile.

By laying out clear goals and a series of sample initiatives, a smart city strategy for Ottawa provides a roadmap to make Ottawa an even smarter city than it is today. It provides a plan for Ottawa to build upon its smart foundation and ensure that investments in technology are not an after-thought, but rather something that is embedded in all the city does.

## Role of the City

There are many different players in the smart city arena. A smart city strategy and its goals are not reached by one player alone; many different organizations, both public and private, contribute to building a smart city.

While the City directly delivers a variety of smart city solutions and programs, its role extends beyond this. Chief to the City’s overall role is to:

- Be a leader and catalyst in bringing together all of Ottawa’s smart city stakeholders, programs, and initiatives under a single strategy and common set of goals; and
- Work collaboratively with residents, businesses, and smart city eco-system players to advance and implement Smart City 2.0.

Economic Development and Long Range Planning of the Planning, Infrastructure and Economic Development Department will lead collaboration efforts with smart city stakeholders as well as the development and implementation of outward facing City initiatives.

Service Transformation of the Service Innovation and Performance Department will lead the development and delivery of the Digital Service Strategy component of Smart City 2.0.

As outlined, next steps will include the development of an action plan. This plan will identify a governance model for Smart City 2.0 that will further detail the roles and responsibilities of the City as well as other organizations, like Invest Ottawa and Hydro, involved in the delivery of smart city initiatives.

## Goals

Smart City 2.0 is centred on three goals of achieving a Connected City, a Smart Economy, and an Innovative Government. Together these goals, and corresponding sample initiatives work collectively to make Ottawa a smarter city than it is today.

- A Connected City – Create a city where all residents and businesses are connected in an efficient, affordable, and ubiquitous way.
- A Smart Economy – Stimulate economic growth by supporting knowledge-based business expansion and attraction, local entrepreneurs, and smart talent development.
- An Innovative Government – Develop new and innovative ways to impact the lives of residents and businesses through the creative use of new service delivery models, technology solutions, and partnerships.



Thomas Ahearn—The Father of Innovation in Ottawa

## OTTAWA'S SMART CITY STRENGTHS

With a strong and solid history as an innovative city and global technology hub, Ottawa has many strengths and attributes that already make it a smart city. These strengths provide a concrete foundation for Ottawa to achieve the goals articulated in Smart City 2.0.

### History of Innovation

Ottawa has a long and detailed history as an innovative and smart city. This dates back to the late 1800's when Thomas Ahearn, a local inventor and entrepreneur, brought electricity and phone service to the city. He also developed the city's streetcar system and a patent for its electric heaters. Much of this work transitioned Ottawa from a lumber city to a future smart thinking city linked by technology, telecommunications, and modern transportation.

### Globally Diverse Technology Hub

Ranked as a top Canadian Tech Hub<sup>3</sup>, Ottawa is home to approximately 1,750 high-tech companies in the areas of telecommunications, software, life sciences, clean-tech, and wireless technologies. These companies range from multi-nationals to local successful entrepreneurial ventures and employ over 68,000 residents.

### Strong Entrepreneurial Spirit

From student and youth entrepreneurs to serial and seasoned entrepreneurs, Ottawa has a thriving entrepreneurial community that is supported by a variety of mentorship, accelerator, and incubation programs like those offered by Invest Ottawa and the Innovation Centre at Bayview Yards.

## Centre for Research and Development

Ottawa is a centre for both private and public sector research and development. Approximately 90 per cent of Canada's telecommunications research and development is done in Ottawa by global, national, and local high-tech companies. Many notable federal research institutions such as the National Research Council (NRC), Communications Research Centre (CRC), and Agriculture and Agri-Food Canada are located in Ottawa. Additionally, Ottawa's reputable post-secondary institutions are active in both applied and fundamental research across a variety of fields.

## Top Notch Talent

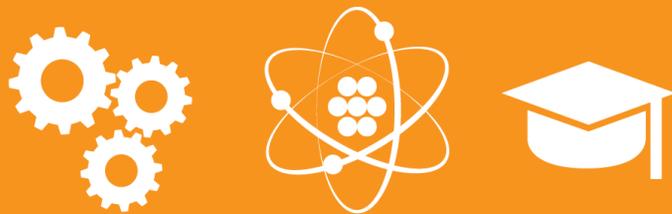
With more engineers, scientists and PhD's per capita than any other city in Canada, Ottawa has a highly educated workforce that is young, entrepreneurial and 44 per cent bilingual.<sup>4</sup> Ottawa's diverse population, which includes a 20 per cent recent immigrant population<sup>5</sup>, also brings important assets, like cultural and linguistic diversity, to the city's talent base. Moreover, the city's four post-secondary institutions graduate quality students in a multitude of smart city related disciplines and many choose Ottawa as the place of choice for their career.

## An Innovative Municipality

The City of Ottawa has long been at the leading edge of investment in innovation and service delivery. For example, the City has used advanced sensor technology in its infrastructure for more than two decades and in 2009 the City's first digital storefront (i.e. Service Ottawa) was launched.

## Enviably Quality of Life

Ottawa is an affordable, diverse, and safe city that boasts an enviable quality of life. With flourishing cultural, entertainment, and sporting scenes, residents and visitors alike enjoy all that Ottawa has to offer throughout four distinct seasons. For these reasons, and many more, Ottawa is consistently ranked high on its quality of life, including being named as the 'Best Place to Live in Canada' by MoneySense magazine's annual ranking for two years in a row.



A young, entrepreneurial workforce, with a **bilingual rate of 44%**, and more engineers, scientists, and PhDs per capita than any other city in Canada.

Information updated in 2016.

# OTTAWA'S SMART CITY ECO-SYSTEM

The implementation and delivery of a smart city strategy is driven by a city's smart city eco-system. The ability to bring the players of the eco-system together under common goals and a single strategic direction is what makes a smart city truly effective. While this is easier said than done, the core of a smart city strategy is simple; cities have challenges that require solutions and residents and businesses have needs to be met. Ottawa is well equipped to address this, primarily because of its strong smart city eco-system and the players within that contribute to smart city solutions.

There are many key stakeholder groups in Ottawa's eco-system. Including Ottawa residents and businesses as well as the City itself, these include Ottawa's knowledge-based businesses and entrepreneurs, Invest Ottawa and the city's economic development organizations, post-secondary institutions, Hydro Ottawa and utility providers, research institutions, and non-governmental, non-profit, and social enterprises.

Taken together, they provide a powerful catalyst for growth and a competitive advantage in delivering Smart City 2.0. When considering the totality of the eco-system and its potential economic benefits, it is no wonder that the Conference Board of Canada reported in its Autumn 2017 Metropolitan Outlook for Ottawa-Gatineau that real Gross Domestic Product (GDP) for the region is on track to increase by 2.5 per cent, which is the fastest rate of growth in seven years.<sup>6</sup>

## Ottawa Residents and Business

Smart City strategies are designed to improve the lives of residents and businesses through the implementation of technology. Residents and businesses play an important role in participating in the identification of problems and determination of smart city solutions.

## The City of Ottawa

The City, through its various departments and service lines, delivers a variety of smart city solutions and programs, most of which are informed by residents and businesses and developed by the private sector. Beyond this, the City's role is that of leader, strategist, and catalyst in bringing all of Ottawa's smart city eco-system stakeholders together under common smart city goals and aligned initiatives.

## Knowledge-Based Businesses and Entrepreneurs

Smart cities are highly private sector driven. It is entrepreneurs and knowledge-based businesses, ranging from multi-nationals to small medium enterprises (SMEs), who develop leading edge-smart city tools and solutions. Many companies invest heavily in research and development and take calculated financial and operational risks in doing so. Ottawa boasts one of the strongest knowledge-based economies in North America and is home to a high number of technology companies and top notch talent that will directly contribute to Ottawa's smart city goals.

## Invest Ottawa and Economic Development Organizations

Invest Ottawa is the City's arm's-length economic development agency and a primary partner in the delivery of Smart City 2.0. Housed out of the Innovation Centre at Bayview Yards, Invest Ottawa delivers a variety of programs and initiatives to support entrepreneurship, business attraction and retention, and targeted sector development. Together, these programs work to provide the city's entrepreneurs and knowledge-based businesses with the tools they need to succeed. They also ensure that Ottawa can effectively compete for talent and business investment. Specific to Smart City 2.0, Invest Ottawa will play a central role in leading initiatives within the broader entrepreneurial and knowledge-based business community that support both the development and contribution to smart city solutions. This will take the form of initiatives like the Digital Innovation Workshops and Meet Up Monday's at Bayview. Additional

economic development organizations like Ottawa's Chambers of Commerce, the West Ottawa Board of Trade, and Business Improvement Areas (BIAs) also play an important role in the city's smart economy by supporting the advancement of local business growth and talent through the many programs and services they offer.

## Post-Secondary and Educational Institutions

Ottawa's post-secondary institutions all provide academic programs, training, and research and development focused on various disciplines related to smart cities such as computer science, data science, machine learning, and business intelligence systems, to name a few. This provides the city's knowledge-based sector with smart talent and opportunities to leverage and collaborate on technology and smart city research. Ottawa's elementary and high schools also play an important role in smart cities, ensuring that students have the digital skills and literacy to both participate and engage in today's technology based world.

## Utility and Telecommunications Providers

Utility and telecommunication providers play a critical role in deploying infrastructure to improve connectivity. For example, in 2016, in collaboration with the City, Hydro Ottawa launched a street lighting conversion program that will transition approximately 58,000 streetlights to LED lighting along with other smart lighting capabilities including dimming and asset condition reports. This represents an enormous infrastructure opportunity that would potentially allow the City to deploy a connected sensor network in support of its smart city objectives. Hydro Ottawa has also developed a Grid Transformation Plan that sets out its approach to smart grid development, building on advanced metering, grid intelligence, and self-healing technologies. This includes the installation of more than 281 kilometres of dark fibre infrastructure that will be instrumented, intelligent, and interconnected. As a leading partner in Ottawa's smart energy future, Hydro Ottawa offers innovative energy services to help consumers, businesses and communities meet their energy objectives through energy management solutions, conservation, energy storage, district energy, demand response opportunities and enhanced mobile and digital technology offerings such as mobile apps. A leader in renewable energy generation, Hydro Ottawa is the largest municipally-owned producer of green energy in Ontario by a wide margin.

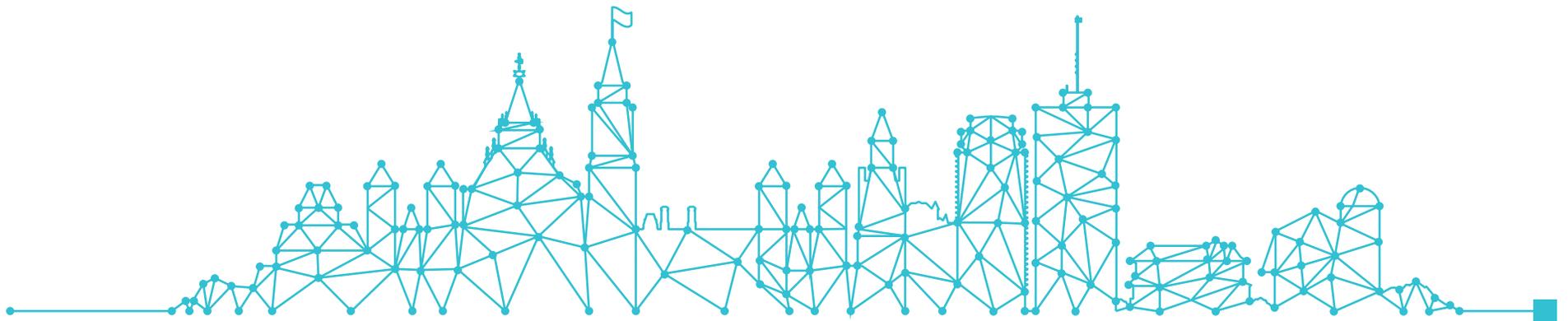


## Research and Development Institutions

Beyond post-secondary institutions, Ottawa is home to numerous research organizations and institutions of which many contribute to the development of technology and smart city solutions. For example, the NRC provides support for industrial innovation and the advancement of technology, while the Centre of Excellence in Next Generation Networks (CENGN) provides small and medium enterprises, start-ups, and researchers with access to industry guidance and a multi-vendor open-platform for validation of technologies and services.

## Non-Governmental, Non-Profit, and Social Enterprises

Many organizations in Ottawa, be they non-governmental, non-profit or charities, work tirelessly to provide residents in need with an enhanced quality of life. Specific to Smart City 2.0, these organizations will play an important role in helping the City and its partners deliver a strategy that is inclusive and provides all residents with affordable and accessible connectivity as well as the skills necessary to live and work in today's digital world.



# SMART CITY 2.0: BUILDING ON OTTAWA'S STRENGTHS AND ECO-SYSTEM

## Collaborative and Consultative Approach

Smart City 2.0 is a collaborative and consultative endeavour. The development of the strategy has been done in consultation with knowledge-based businesses, smart city eco-system stakeholders, and many more.

In April 2016, Hydro Ottawa, Invest Ottawa, and the City held a consultation workshop entitled "Building a Smart City". The workshop focused on reaching a common understanding of a smart city and exploring smart city projects and tactics. The result was a "Playbook" outlining a series of potential projects that the City, Invest Ottawa, Hydro Ottawa, and the private sector could jointly undertake to advance Ottawa as a smart City.

Building on the "Playbook", the City and Invest Ottawa, along with support from Hydro Ottawa, co-hosted a Smart City Symposium in September 2017. The purpose of the symposium was to gain additional insight into the future of Ottawa as a smart city and to receive concrete feedback on the direction and initiatives of Smart City 2.0. Symposium attendees ranged from Ottawa's post-secondary institutions, to telecommunication providers, to private sector technology companies.

Smart City 2.0 reflects the input received from both the 2016 workshop and 2017 symposium. Additionally, it reflects input received from industry and City department interviews that were conducted prior to the symposium.

Future and on-going consultation and collaboration will be key to the implementation and delivery of Smart City 2.0. This will continue through the establishment of an Smart City 2.0 Working Group, which will include players from the smart city eco-system like post-secondary institutions and knowledge-based businesses. It will also involve initiatives centred on continuous industry and community engagement like hackathons and forums as well as an on-line presence where residents and businesses will be encouraged to propose and contribute to smart city ideas and solutions.

## The Road to Becoming Smart City 2.0

Smart City 2.0 is centred on three goals where advances in technology and technology infrastructure enable:

- A Connected City – Create a city where all residents and businesses are connected in an efficient, affordable, and ubiquitous way.
- A Smart Economy – Stimulate economic growth by supporting knowledge-based business expansion and attraction, local entrepreneurs, and smart talent development.
- An Innovative Government – Develop new and innovative ways to impact the lives of residents and businesses through the creative use of new service delivery models, technology solutions and partnerships.

### A Connected City

Connectivity is at the core of Smart City 2.0. As such, one of the principal goals of the strategy is to enable a city where all residents and business are connected in an efficient, affordable, and ubiquitous way.

Leading edge and high-speed communications infrastructure has become critical to sustained economic growth, quality of life, and the delivery of efficient and effective government services. It is also central to a city's competitiveness and attractiveness as a place to live, work, and play.

Today, expectations for ease of use, availability, and affordability have made connectivity similar to utilities like hydro and natural gas.

In essence, connectivity is to today's economy what the highway system was to the old economy: a fast, accessible, and reliable way to move goods and services, and connect people.

## Centre for Excellence in Next Generation Networks (CENGN)

Located in Ottawa, CENGN works with small and medium-sized businesses, multinationals, the government, and academia to strengthen Canada's leadership in Next Generation Networking (NGN). This Centre of Excellence strives to create an ecosystem that accelerates the growth of the Canadian Information and Communications Technology sector.

### Next Generation Infrastructure

The availability of next generation network infrastructure and wireless systems are core elements of a smart city and smart economy.

Reliable high-speed internet is necessary for businesses to be competitive. It has also become increasingly important for residents as they live, learn, and participate in today's digital world.

Relative to peer communities in Montreal, Calgary, and Vancouver, the city is in good shape when it comes to broadband.

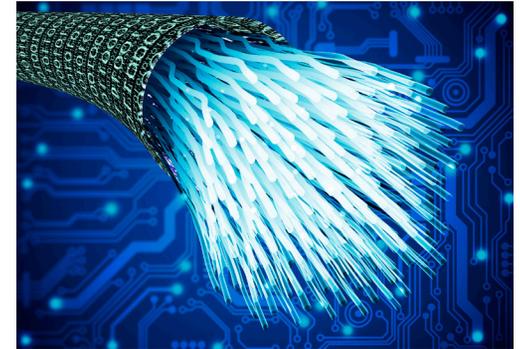
Ottawa recognized the importance of broadband early on and by 2008, virtually all of the city's MUSH sector (municipal facilities, universities, schools, and hospitals) had internet fibre. Today there is extensive fibre optic infrastructure deployment throughout the city, most of which is built, owned, and operated by telecommunications carriers.

Long-term evolution mobile wireless (4G) is also widely available. In fact, many Ottawa-based companies are leaders in wireless communications, particularly around 5th generation wireless systems (5G), which is the next anticipated evolution in mobile communications. This, together with CENGN, makes Ottawa an ideal location and prime testing site to pilot next generation network technology.

While the City does not directly deliver wireless connectivity or broadband, it is incumbent upon the City to advocate, facilitate, and support the deployment of affordable and robust connectivity for the use of all businesses and residents alike. Smart City 2.0 is the starting point in doing just this.

### Sample Initiatives for Next Generation Infrastructure

**Develop a Fibre Broadband Strategy:** Work with Hydro Ottawa and industry stakeholders to develop a fibre broadband strategy. The strategy would provide a framework for the provision of fibre optic networks, ensuring that all Ottawa residents and businesses have access to robust, affordable, and wide-spread connectivity. As a first of many steps, the strategy would assess and determine Ottawa's current state of connectivity and make specific project recommendations to address the existence of gaps.



**Support an Ottawa Internet Exchange (IXP):** Ottawa Internet service providers currently employ mainly north-to-south transit pipes to transmit data, relying on hubs in Toronto and the US. When data is moving between two points in Ottawa, or two Canadian points, this can be costly and inefficient. The City is working with its partners, including the Canadian Internet Registration Authority (CIRA) and Invest Ottawa to create an Ottawa Internet Exchange (IXP); a carrier-neutral interchange point, which would provide broader bandwidth options to interconnect Ottawa users with other Canadians in a faster, more robust, and reliable way.

**Support a 5G Testbed:** Build on Ottawa's expertise in 5G and work with Invest Ottawa and CENGN in positioning the city as an ideal location to pilot and test next generation technology.

**Wireless Tower Lease/Attachment and Fibre Backhaul:** A regional collection model for wireless towers is emerging as the most economically efficient for carriers and tower owners. Due to the rapid growth in mobile data and the increasing expense of shared operations and maintenance

of costs for towers and infrastructure, carriers can reduce costs by leasing space on shared towers and avoid the full burden costs when building towers separately.

**Smart Community Pilots:** Pilot smart city technology and amenities in Ottawa communities. This will allow for the demonstration and development of smart city applications at the residential, business, and entrepreneurial level, while at the same time allowing the community the unique opportunity to evaluate technology and observe socio-economic impacts. For example, the City and the NRC will work together to advance smart technologies at the community-level. Together they envision partnering with land developers and technology providers to incorporate and monitor smart features within new residential developments. Embedding advanced technologies within new developments permits the collection of valuable data that will feed back into the community; helping to refine and improve on services. According to anecdotal conversations with the local development community, the homebuyer of the future will base decisions on where to buy around level of connectivity. Recent research suggests that there is a correlation between home values and connectivity; values are higher in communities that are well-connected and responsive to the needs of residents.

### *Sensors and Data*

A connected city is a city where data, collected by sensors and various sources, can be accessed and shared by everyone.

The premise behind this is that shared data encourages community participation in smart city solutions. Equally important, it also facilitates knowledge-based business growth by providing third parties with data that enables the development of digital applications and smart city solutions. Essentially, it enables socio-economic growth by providing access to data to those trying to analyze and solve problems.

Smart City 2.0 endeavors to build upon and expand how the City and its partners collect data through sensors and the Internet of Things (IoT). As an example, the City is already a leader in LED light sensors and Hydro Ottawa's ongoing deployment provides an opportunity to substantially expand the data stream that the City has access to.

Beyond this, Smart City 2.0 also recognizes that the increase in availability of data, which results in large and complex data sets known as big data, is only useful when it can be analyzed to predict or determine trends and solve problems. This is referred to as data analytics and Ottawa is a leader in this field. This leadership is evident in Ottawa's post-secondary institutions, the city's knowledge-based business sector, and at the federal government level. Both Carleton University and the University of Ottawa offer degrees and courses in the field as well as conduct research. Most recently, Algonquin College announced it received funding for a Big Data Analytics Centre, the first of its kind at the college level in Canada. Lastly, the federal government has invested in Data Analytics Centres at the NRC and CRC and has recently taken steps to become a leader in the data revolution. All of this positions Ottawa to further advance its leading position in data analytics and potentially leverage this expertise for export.





**Invest Ottawa** delivers economic development programs and initiatives that increase entrepreneurial momentum, wealth, and jobs in Ottawa. Its goal is to make Ottawa the most innovative City in Canada. Invest Ottawa is instrumental in supporting the city's entrepreneurs, advancing knowledge-based sector development and marketing Ottawa as a strong destination for business investment.

### *Sample Initiatives for Sensors and Data*

**Expand Sensor Deployment:** Explore ways to utilize existing sensors, the deployment of new sensors, and IoT to enhance and improve data collection.

**Connected LED Lighting:** Develop a LED lighting enhancement test corridor to evaluate and demonstrate new LED lighting technologies as they are developed. As LED street lighting technology advances, it is possible to include roadway sensors, parking cameras, lighting controls, and wireless capacity as well.

**Advance Ottawa's Leading Position in Data Analytics:** Explore ways and initiatives to advance Ottawa's leading position in data analytics. This will include leveraging the City's data for use by the smart city eco-system, and investigating how to export this skill and expertise on a global level.

### *Bridging the Digital Divide*

A city is only a truly smart city when everyone can participate in today's digital world.

With greater reliance on technology becoming the norm, there exists a real concern that the growing digital divide will be exacerbated.

The digital divide refers to the gap between socio-economic and demographic groups, as well as regions, that have access to modern network infrastructure and those who either have restricted or no access at all.

To be able to fully prosper in a smart economy, Ottawa needs to take steps to ensure all residents and businesses have equal and affordable access to broadband technology. This means the City should not only take an active role in facilitating the deployment of affordable widespread broadband, but also ensure that residents and businesses have the proper skills and tools to utilize technology.

Much has already been done in Ottawa to bridge the digital divide. For example, in early 2017 Ottawa Community Housing advanced lower cost and affordable internet access to its tenants through two service providers. As well, the Ottawa Public Library currently provides free Wi-Fi and computer workstations at all of its 33 branches and there is free public Wi-Fi in twenty-five City buildings which includes recreation centres, City Hall, Ben Franklin Place, and the ByWard Market building.

Moving forward, an important step in bridging the digital divide will be to look at options for broadband as a utility as well as to explore establishing a minimum standard for connectivity.

### *Sample Initiatives for Bridging the Digital Divide*

**Explore Broadband as a Utility:** Explore and examine options and implications for broadband to become a utility.

**Explore a Minimum Connectivity Standard:** Work with industry partners to explore a minimum standard of connectivity.

**Investigate Further Options for Low-Cost Broadband:** Continue to explore business models and options for low-cost broadband by, for example, potentially leveraging existing real-estate like street lights and utility poles.

**Extend Public Wi Fi:** Extend existing public Wi-Fi hubs throughout the city to underserved communities and high-traffic public and tourist locations.

**Increase Availability of Public Digital Tools:** Increase the accessibility and usability of public spaces, potentially supplemented by digital infrastructure by putting digital tools more readily in the hands of residents. For example, integrate digital elements into public signage or explore digital public kiosks that allow the public to find information on transit and other municipal services, tourist attractions, restaurants, transit, etc.

**Explore Opportunities around Digital Inclusion and Literacy:** Enhance the ability of communities and residents to participate more fully in the digital economic, political, and cultural environment. Support community-based programming and engage with organizations already undertaking these efforts.

**Continue to Advance Innovation and Technology at the Ottawa Public Library:** Use digital technology and virtual assets to expand the concept of public library in Ottawa.

## A Smart Economy

A smart economy is an important component of a smart city.

While the availability of next generation infrastructure provides businesses with the foundation they need to innovate and conduct efficient operations, additional economic development efforts assist in stimulating innovation, talent, and entrepreneurship.

Ottawa has strong footing as a smart economy; it is home to a vibrant and diverse knowledge-based economy that is fueled by a highly educated workforce, strong entrepreneurial spirit, and leading research and academic institutions.



The City's Economic Development Strategy, Partnerships for Innovation, and the work of Invest Ottawa, lay the ground work to support and advance Ottawa's knowledge-based sectors as well as encourage entrepreneurship and innovation.

## Student Living Lab Pilot

Economic Development and Long Range Planning has partnered with Carleton University to pilot two large-scale experiential and multi-disciplinary learning opportunities for students, whereby students address real world problems faced by communities and organizations in Ottawa. The program aims to change the way students, City staff, faculty and community members work together to co-create solutions to our city's most complex problems.

Smart City 2.0 incorporates and builds upon Partnerships for Innovation and the efforts of Invest Ottawa, by positioning Ottawa to effectively drive economic growth and compete for talent and business in today's global marketplace.

### *Knowledge-Based Sector Support and Advancement*

Ottawa's knowledge-based sectors are important to Ottawa's future as a smart city.

The City and Invest Ottawa work in partnership to attract knowledge-based businesses to the city and to support the advancement and expansion of knowledge-based businesses that call Ottawa home.

Together both organizations provide a comprehensive and complementary portfolio of programs and services that range from assistance in site-selection, cutting through red tape, building partnerships, and connecting companies to international business opportunities.

Today, Ottawa's knowledge-based businesses are diverse and include 1,750 companies and 68,000 employees in the areas of life sciences, software, digital media, communications technology, clean tech and aerospace, defense and security.<sup>7</sup>



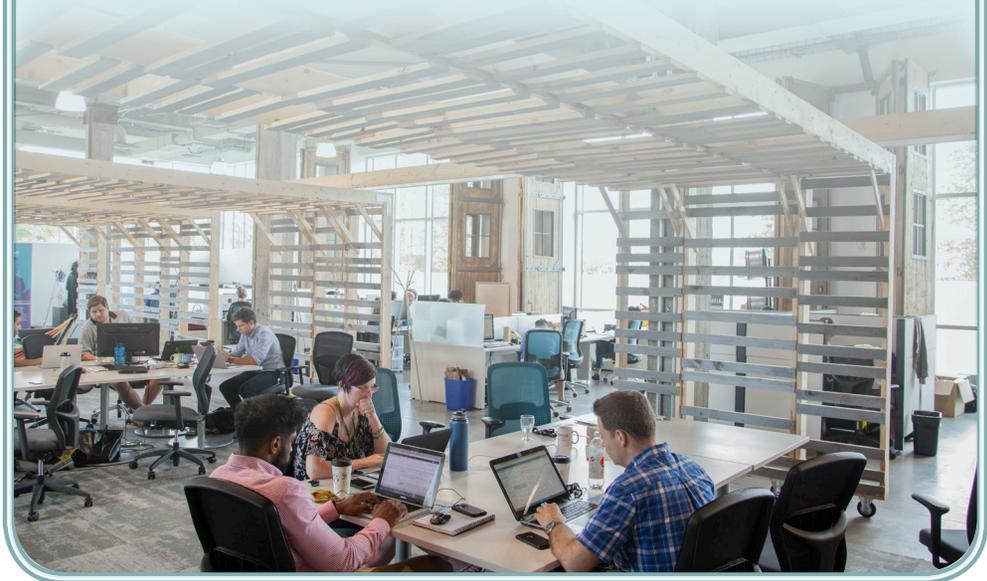
Forward thinking cities recognize that these numbers need to grow in order to increase productivity and economic output.

Today, traditional approaches to business expansion and attraction are no longer enough. Cities require innovative thinking to make themselves attractive to leading-edge companies. For Ottawa and Smart City 2.0, this includes building on Invest Ottawa's "Why Ottawa?" campaign and thinking outside the box to strategically market the city as premiere destination for business investment and expansion.

Recognizing that smart city technology is driven by the private sector, Smart City 2.0 also focuses on supporting the advancement of specific knowledge-based sector initiatives like precision agriculture and autonomous vehicles.

It also focuses on exploring ways to best engage Ottawa's knowledge-based businesses in delivering smart city solutions, knowing that today's problems may require more creative solutions than in the past and that cities need to keep pace with changing and evolving technologies.

**Innovation Centre at Bayview Yards** is the first of its kind in Ottawa. It is a one-stop shop that provides all the necessary tools and supports for Ottawa's entrepreneurs and start-ups to embark on the path to commercial success. Tools and supports include: incubation and meeting space; a cohesive suite of technical and business programs, services and support; product design, development and prototyping tools and technologies; customer and market linkages; and access to investment.



## **Sample Initiatives for Knowledge-Based Sector Support and Advancement**

**Advance Marketing Efforts for Ottawa as a Destination for Business Investment:** Build on Invest Ottawa’s “Why Ottawa?” campaign and explore ways to strategically and innovatively market Ottawa as a global destination for business investment and expansion. Work to establish a place brand for Ottawa so all smart-city partners and economic development organizations market the city with a common message.

**Precision Agriculture Node:** Agriculture is experiencing a revolution as a result of technology and the IoT, leading to the digitization of the agri-food sector. This transition, referred to as “precision” or “smart” agriculture has resulted in an increase in demand for tools to maximize crop yield while reducing environmental impacts. Precision agriculture represents a significant economic opportunity for Canada, with global demands for food projected to grow up to 70 per cent by 2050 according to the Food and Agriculture Organization of the United Nations.<sup>8</sup> As a result of the city’s central location, farming industry, Information and Communication Technology (ICT) sector and federal assets, Ottawa is well-positioned to take a leadership role in helping to advance Canada’s agri-food industry through smart technologies. Ottawa will look for opportunities to partner with stakeholders and attract key investors from across sectors, with the goal of establishing itself as a precision agriculture node.

**Support an Autonomous Vehicle Testbed:** Earlier this year, Ontario became the first province to set a regulatory framework to permit testing of self-driving vehicles, an emerging technology where the province is keen to be a leader. In October Ottawa launched its autonomous vehicle test track on active city streets, integrating live City services. The test area is fully equipped with the latest GPS and telecommunications technology and is coordinated with City traffic systems and street lighting.

## **Talent Attraction and Retention**

A smart city can only succeed if it can attract, develop, and retain a strong pool of knowledge-based talent. Today’s workforce is highly mobile and lured by challenging opportunities worldwide, making it important for Ottawa to continue to deliver talent development, attraction, and retention tools. The attraction and development of smart talent is the impetus behind knowledge-based sector growth, innovation, and entrepreneurship and a city’s ability to participate in a smart economy.

Initiatives within Smart City 2.0 leverage Ottawa’s already strong talent base—which includes the second highest concentration of scientists and engineers in North America<sup>9</sup> and the highest number of residents with a post-secondary education in Canada<sup>10</sup>—with a blend of innovative and collaborative approaches to develop and attract talent, providing our private and public sectors the smart workforce they need.

**Innovation Pilot Program** provides entrepreneurs and start-ups with the opportunity to pilot their program or services within the City’s various departments and business lines. City staff provide entrepreneurs with valuable feedback with the intent of improving their product or service prior to commercialization. To date, over 20 companies have been successfully enrolled in the program, working in a variety of industry spaces, including but not limited to cybersecurity, gamification, public safety, traffic operations, social media communications, resettlement services, and workflow support.

For example, in April 2017 Invest Ottawa officially launched its “Work in Ottawa” campaign. The campaign promotes Ottawa technology employment opportunities via digital ads, newsletters, and other content mediums to prospective talent in states like California, Florida, New York, and Texas. Marketing Ottawa as a premiere destination to live, work, and play, the campaign’s primary goal is help Ottawa technology companies promote open positions.

Another example includes the City’s Student Living Lab Pilot, which provides Ottawa post-secondary students the ability to apply academic skills to real-world problems and participate in a work-integrated learning opportunity.

The City’s and Invest Ottawa’s efforts in talent attraction and retention complement the activities of our partners in the post-secondary arena as well as organizations like the Local Employment Planning Council.

### ***Sample Initiatives for Talent Attraction and Retention***

**Build on the “Work in Ottawa” Campaign and Market Ottawa as a Strong Destination for Talent:** Build on Invest Ottawa’s “Work in Ottawa” Campaign and continue to market Ottawa to prospective talent as a city of opportunity and a premiere destination to live, work, and play.

**Create a Talent Attraction and Retention Committee:** Develop a formal Talent Committee comprised of Ottawa’s post-secondary institutions, Invest Ottawa, the Local Employment Planning Council, and other talent stakeholders, to address Ottawa’s current and future talent attraction and retention needs. The Committee would coordinate impactful initiatives around, for example, work-integrated learning and employer engagement and would promote Ottawa’s strong quality of life.

**Develop K-12 Digital Literacy Program:** Work with Ottawa’s educational stakeholders to incorporate digital technology education more effectively and systemically in K-12 schools.





## **Entrepreneurship**

Entrepreneurship is an important component of economic prosperity and Smart City 2.0; it encourages innovation, strengthens productivity, and invests in talent.

The City, Invest Ottawa, and Ottawa's many economic development partners offer entrepreneurial support by way of programs and advisory and incubation services.

The Innovation Centre at Bayview Yards is Ottawa's flag-ship incubator that provides a one-stop shop in entrepreneurial support. Leveraging more than \$30 million from the City and province, the Innovation Centre has become a dynamic hub that is instrumental in equipping Ottawa's most promising entrepreneurs and start-ups with the capabilities required to succeed.

Complementing the Innovation Centre, the City's Innovation Pilot Program provides aspiring entrepreneurs the ability to pilot a product or service within a City department with the goal of receiving feedback before commercialization.

With the success of the Innovation Centre and the Innovation Pilot Program, Smart City 2.0 strives to build upon Ottawa's entrepreneurial momentum through existing program expansion and new programs.

With continued support, tools, and conditions to flourish, entrepreneurs will also play a significant role in developing and contributing to smart city solutions.

As the seat of the federal government and home to a diverse technology hub, Ottawa has a competitive advantage in directly engaging local entrepreneurs and SMEs in catalyzing government innovation.

Smart City 2.0 endeavours to leverage this advantage through initiatives that connect Ottawa entrepreneurs with government projects.



## Sample Initiatives for Entrepreneurship

**Invest Ottawa Digital Innovation Workshops:** As a key element of its next five-year strategic plan, Invest Ottawa will aim to enable, broker and project manage collaborative digital innovation, technology development and adoption opportunities that:

- Create new opportunities for Ottawa start-ups, SMEs and multinational firms to help address key public sector pain points, co-create solutions, and supply them to the Government of Canada and other potential customers in global markets; and
- Enable government to collaborate on and adopt 'Ottawa-made' digital prototypes, innovations and solutions that address key challenges, seize new opportunities, and increase the productivity, efficacy and impact of public service delivery on citizens.

The program leverages Ottawa's unique strengths and opportunities as the seat of the federal government and technology hub and facilitates matchmaking between Ottawa technology entrepreneurs and companies and government needs. The program will start at the federal level and will then explore implementation at the other two levels of government.

**Expanded Innovation Pilot Program:** Given the success of the Innovation Pilot Program, Economic Development and Long Range Planning will look to expand the program's scope and resources to provide entrepreneurs with additional opportunities to pilot their projects and services.

**Implement Phase 2 of the Innovation Centre and Explore the Creation of an Innovation District at Bayview Yards:** Along with the implementation of Phase 2 of the Innovation Centre, the City would explore the creation of an Innovation District at Bayview Yards that would see the development of a defined geographic area, centred around the Innovation Centre, that would give rise to a compact innovative eco-system focused on the co-location of entrepreneurs, start-ups, and leading-edge companies. The concept behind the district is that co-location fosters collaboration, creativity and knowledge-transfer. The district would be Light Rail Transit (LRT) accessible, technically-wired and offer mixed-use housing, office, and retail space; making it a place to live, work, and play.

## Digital Service Strategy

will set the strategic framework for how the City of Ottawa intends to continually innovate and evolve its service delivery model.

## Innovative Government

The continuing evolution in client service expectations and the rate of technological advances, both driven by a shift toward a more digitally connected world, are happening more quickly than ever before. For municipal government, this means responding to a rapidly changing environment where new innovations such as autonomous vehicles, connected homes, and in-context mobile services will change how residents interact with City services – requiring greater agility and innovation from their local government. To keep pace with change, this will require the creative use of new service delivery models, solutions, and partnerships. The City of Ottawa has long been at the forefront of making investments in innovation – whether in terms of service delivery and the launch of the City's first "digital storefront" in 2009 (i.e. ServiceOttawa) or with the use of advanced sensor technology in our City's infrastructure for more than two decades.

Today, the City continues its commitment to finding new and innovative ways of delivering services to residents and businesses. This means investing not only in new technologies, but also in fostering innovation as a core capability within the organization. It also means working differently with partners and stakeholders, leveraging the creativity and innovation of the external eco-system.

## **Digital Service Strategy**

The Digital Service Strategy (DSS) is the next phase in the evolution of service delivery at the City of Ottawa. Currently in development, the DSS will provide the City with the long-term vision for digital government, centred on three key themes: 1) Delivering a mobile client experience; 2) Analytics-driven, responsive operations; and 3) Intelligent infrastructure.

As a first phase, the DSS will focus on visible, high impact digital services, empowering citizens with a personalized experience driven by mobile solutions that connects them to the City based on their needs and lifestyles—when and where they need it. In a digital world, mobility is everywhere—an extension of what connects people to the world around them. For the City, this creates opportunities to engage citizens in new and innovative ways – re-defining how residents, visitors, and businesses interact with City services.

### **Key Theme 1: Delivering a Mobile Client Experience**

Delivering a mobile client experience will be the focus for the next five years of the strategy—resident-facing, mobile-driven, digital delivery. More mobile solutions to interact with the City using customizable features such as personal notifications and account information—all delivered through a suite of enhanced digital channels (e.g. mobile apps, etc.) available “anywhere, anytime” to drive a seamless digital experience. In parallel, more services will be available online to provide speed-of-access to common transactions such as payments, permit applications, and service requests – with real-time information for better client visibility on their interactions with the City. Innovation will be embedded in the overall digital service delivery experience, fostered through an eco-system of local partners including universities, research institutions, and business and community groups.

### **Key Theme 2: Analytics-Driven, Responsive Operations**

As more services are “digitized”, the City will continue to increase its use of data analytics to drive even more responsive operations. With residents and a City workforce that are increasingly engaging digitally through online forms, electronic transactions, email notifications, and other shared digital content, more insight will be gained faster, providing the City with increased decision-support analytics to respond more rapidly

in how it delivers services to residents. The longer-term vision includes exploring machine-learning, artificial intelligence, and more advanced predictive analytics to further optimize resource allocation, scheduling, maintenance, asset management, and other areas to further exceed client expectations.

The City also has an open-data catalogue that is free for use by the public to foster greater engagement and innovation. The Open Data Program provides dozens of datasets of value to residents and businesses, in order to provide new and improved ways to deliver services online. By making municipal data publically available, the City can enhance civic participation and leverage the expertise of the local community. As an example, OC Transpo was one of the first transit service providers in Canada to provide real-time data related to its service, which allowed a whole eco-system of app developers to innovate and create tools for residents to better manage their commutes. The sharing of information also increases the City’s transparency and accountability to the public at large. Smart City 2.0 endeavours to build upon Ottawa’s open-data program.

### **Key Theme 3: Intelligent Infrastructure**

In order to enable the digital client experience, the City will continue to leverage its existing information technology and IoT infrastructure. The City has made considerable investments over time on (1) digitally connected assets through the deployment of devices in the ‘field’, including on roadways, water mains, fleets, and transit, and (2) core IT service delivery platforms—all of which are part of an evolving architecture that will be enhanced to deliver on the City’s digital vision. The following examples represent a few of the investments the City has made in the use of advanced technology to connect its infrastructure.

- OC Transpo was one of the first transit service providers in Canada to provide real-time data related to its service, which allowed a whole eco-system of app developers to innovate and create tools for residents to better manage their commutes.
- LRT is the single largest infrastructure investment in the City’s history. Ottawa’s LRT will also boast some of the most advanced technology available today.

- Traffic Operations operates a sophisticated control system that monitors the key points in Ottawa’s road network and provides centralized control of traffic lights to assist in the smooth flow of traffic.
- Approximately 235,000 remotes for smart water meters have been deployed as part of the Automated Meter Reading project.
- Ottawa Fire Services (OFS) is running a pilot with APX for real-time, mobile building information sharing. OFS currently uses traffic pre-emption, although only for big trucks, not the smaller vehicles. They also benefit from LED lights where lighting near night fires is an issue and to help identify a 911 location.
- Since the 1990’s, Ottawa has been experimenting with using sensor technology within infrastructure to update the City on the condition of its assets. More recently, this has been expanded to include smart metering for water and energy consumption.

The net outcome of the overall strategy will be to enable an enterprise-wide digital store front that will provide citizens with access to a more comprehensive portfolio of online City services, delivered through a mobile experience with rich functionality that can be continuously expanded as the City progresses on its digital journey.

### **Sample Initiatives for Innovative Government**

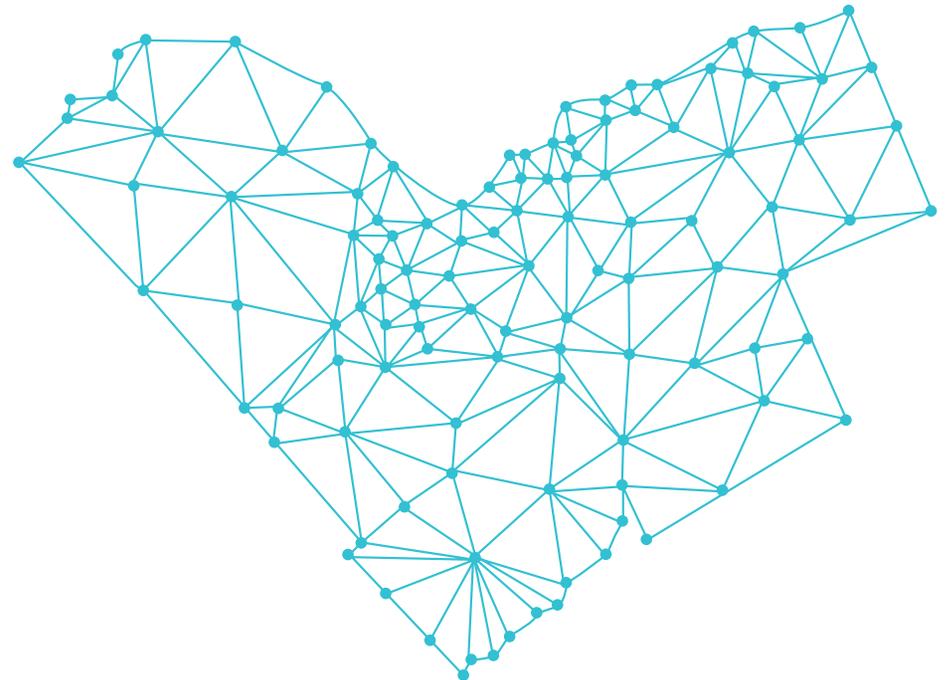
**Enable a Mobile-Driven Digital Experience:** Develop and deploy mobile functionality through a suite of online channels (e.g. app(s), chat bots, web) in order to enable greater “anywhere, anytime” ease-of-access to the City.

**Enhance Ottawa’s Open Data Program:** Continually expand the quality and quantity of data in the City’s Open Data program to facilitate the development of smart city solutions by both the City and Ottawa’s smart city eco-system. Enhance access to this information with the addition of Application Program Interfaces (APIs) that allow members of the community to interact with City data in real-time.

**Implement Additional Service Delivery Analytics:** Implement service delivery analytics to drive better performance, identify new functionality, and enable service enhancements.

**Explore Pilot(s) for Artificial Intelligence, Predictive Analytics, and Machine Learning:** Explore pilot(s) for artificial intelligence, predictive analytics, and machine learning to determine applicability and scalability in operations.

**Engage Ottawa’s Knowledge-Based Sector and Eco-System in the Delivery of Smart City Solutions:** Explore ways, through workshops and other forums, on how best to engage Ottawa’s knowledge-based sectors in determining and delivering smart city solutions. This will include, for example, studying various global smart city procurement models where the private sector is asked to propose innovative solutions to City problems rather than responding to traditional request for proposals.



# ADVANCING SMART CITY 2.0

The advancement and implementation of Smart City 2.0 will be done in collaboration with the City's many partners and stakeholders. The focus will be on working together. This will be done through the establishment of a Smart City 2.0 Working Committee and through initiatives that will draw upon resident and community collaboration.

## Relationship to Other City Plans

Smart City 2.0 incorporates, builds upon, and complements the efforts of the City's:

- Term of Council Priorities of EP1-Promote Ottawa, EP2- Support the Growth of the Local Economy, and SE2- Improve Access to City Services through Digital Service Delivery;
- Strategic Plan Priorities of City Building, Continuous Improvement, and Digital Strategy and Service Enhancements; and
- Economic Development Strategy, Partnerships for Innovation, 2015-2018.

Moving forward, the vision and goals of Smart City 2.0, will be imbedded in updates of future City plans and strategies, including the:

- Official Plan;
- Transportation Master Plan; and,
- Asset Management Strategy.

## Smart City 2.0 Working Group

The delivery and implementation of Smart City 2.0 will include the formation of a Smart City 2.0 Working Group that will have representation from both the City's Planning, Infrastructure and Economic Development and Service Innovation and Performance Departments as well as Invest Ottawa and Hydro Ottawa. Membership will also consist of business and community leaders from various sectors and areas of the city, entrepreneurs, and Ottawa's post-secondary institutions. The Group will serve in an advisory capacity to the City, Invest Ottawa, and Hydro Ottawa to ensure that

the implementation of technology in building a Connected City, a Smart Economy and an Innovative Government continues to meet the needs of Ottawa. It will also assist in ensuring that the City is responding in the best way possible to opportunities and challenges that may arise outside the current scope of Smart City 2.0.

## Continuous Engagement

Continuous engagement will be key to the success of Smart City 2.0. It is Ottawa's residents and businesses who are on the ground, throughout the city, experiencing the challenges and opportunities of everyday life. Residents, community groups, and businesses are best positioned to recommend and help develop digital solutions for the city.

### Sample Initiatives for Continuous Engagement

**Hackathons:** Leverage and connect with existing hackathon groups to generate ideas and think outside of the box to solve technological, social, and economic problems in Ottawa.

**Meet Up Monday's at Bayview:** Encourage entrepreneurship and digital transformation by leveraging disruptive tech-communities like Open Data Ottawa, Ottawa Civic Tech, and Machine Learning Ottawa.

**Smart City Website and Engagement Tools:** Develop a Smart City 2.0 web presence and engagement tools where residents and businesses can receive updates on the strategy as well as submit ideas for consideration.

**Key Performance Indicator (KPI) Framework:** Create a KPI framework and dashboard so that the City and its smart city eco-system partners can assess the success of the implementation of Smart City 2.0.

# NEXT STEPS

As a first next step, staff in Economic Development and Long Range Planning and Service Transformation will work with Invest Ottawa and Hydro Ottawa to establish the Smart City Working Group. As well, an action plan will be developed to guide the implementation of Smart City 2.0. At a high-level, the action plan will include:

- The prioritization of initiatives within the strategy and timelines for implementation;
- A key performance indicator (KPI) framework to measure the success of Smart City 2.0 and a dashboard to provide on-going progress reports to residents, businesses, and partners;
- A governance model for Smart City 2.0, detailing the roles and responsibilities of the key groups involved in the delivery of the strategy; and
- The development of a web-presence and digital platform, as well as forums such as hackathons, to actively engage residents, businesses, and smart city partners in the co-creation and implementation of Smart City 2.0.



# APPENDIX 1 – LIST OF SAMPLE INITIATIVES

| Goal           | Initiative Name                                     | Description  |
|----------------|---|--|
| Connected City | Develop a Fibre Broadband Strategy                  | Work with Hydro Ottawa and industry stakeholders to develop a fibre broadband strategy. The strategy would provide a framework for the provision of fibre optic networks, ensuring that all Ottawa residents and businesses have access to robust, affordable, and wide-spread connectivity. As a first of many steps, the strategy would assess and determine Ottawa’s current state of connectivity and make specific project recommendations to address the existence of gaps.  |
|                | Support an Ottawa Internet Exchange (IXP)           | Ottawa Internet service providers currently employ mainly north-to-south transit pipes to transmit data, relying on hubs in Toronto and the US. When data is moving between two points in Ottawa, or two Canadian points, this can be costly and inefficient. The City is working with its partners, including the Canadian Internet Registration Authority (CIRA) and Invest Ottawa to create an Ottawa Internet Exchange (IXP); a carrier-neutral interchange point, which would provide broader bandwidth options to interconnect Ottawa users with other Canadians in a faster, more robust, and reliable way.   |
|                | Support a 5G Testbed                                | Build on Ottawa’s expertise in 5G and work with Invest Ottawa and CENGN in positioning the city as an ideal location to pilot and test next generation technology.   |
|                | Wireless Tower Lease/ Attachment and Fibre Backhaul | A regional collection model for wireless towers is emerging as the most economically efficient for carriers and tower owners. Due to the rapid growth in mobile data and the increasing expense of shared operations and maintenance of costs for towers and infrastructure, carriers can reduce costs by leasing space on shared towers and avoid the full burden costs when building towers separately.  |
|                | Smart Community Pilots                              | Pilot smart city technology and amenities in Ottawa communities. This will allow for the demonstration and development of smart city applications at the residential, business, and entrepreneurial level, while at the same time allowing the community the unique opportunity to evaluate technology and observe socio-economic impacts. For example, the City and the NRC will work together to advance smart technologies at the community-level. Together they envision partnering with land developers and technology providers to incorporate and monitor smart features within new residential developments. Embedding advanced technologies within new developments permits the collection of valuable data that will feed back into the community; helping to refine and improve on services. According to anecdotal conversations with the local development community, the homebuyer of the future will base decisions on where to buy around level of connectivity. Recent research suggests that there is a correlation between home values and connectivity; values are higher in communities that are well-connected and responsive to the needs of residents. |
|                | Expand Sensor Deployment                            | Explore ways to utilize existing sensors, the deployment of new sensors, and the IoT to enhance and improve data collection.   |
|                | Connected LED Lighting                              | Develop a LED lighting enhancement test corridor to evaluate and demonstrate new LED lighting technologies as they are developed. As LED street lighting technology advances, it is possible to include roadway sensors, parking cameras, lighting controls, and wireless capacity as well.  |

| Goal           | Initiative Name   | Description   |
|----------------|---|---|
| Connected City | Advance Ottawa's Leading Position in Data Analytics                           | Explore ways and initiatives to advance Ottawa's leading position in data analytics. This will include leveraging the City's data for use by the smart city eco-system, and investigating how to export this skill and expertise on a global level.   |
|                | Explore Broadband as a Utility  | Explore and examine options and implications for broadband to become a utility.   |
|                | Explore a Minimum Connectivity Standard                                       | Work with industry partners to explore a minimum standard of connectivity.  |
|                | Increase Options for Low-Cost Broadband                                       | Explore business models and options for low-cost broadband by, for example, potentially leveraging existing real-estate like street lights and utility poles.   |
|                | Extended Public Wi-Fi   | Extend existing public Wi-Fi throughout the city to underserved communities and high-traffic public and tourist locations.  |
|                | Increase Availability of Public Digital Tools                                 | Increase the accessibility and usability of public spaces, potentially supplemented by digital infrastructure by putting digital tools more readily in the hands of residents. For example, integrate digital elements into public signage or explore digital public kiosks that allow the public to find information on transit and other municipal services, tourist attractions, restaurants, transit, etc.  |
|                | Explore Opportunities around Digital Inclusion and Literacy                   | Enhance the ability of communities and residents to participate more fully in the digital, economic, political, and cultural environment. Support community-based programming and engage with organizations already undertaking these efforts.  |
|                | Continue to Advance Innovation and Technology at the Ottawa Public Library    | Use digital technology and virtual assets to expand the concept of public library in Ottawa.  |
| Smart Economy  | Advance Marketing Efforts for Ottawa as a Destination for Business Investment | Build on Invest Ottawa's "Why Ottawa?" campaign and explore ways to strategically and innovatively market Ottawa as a global destination for business investment and expansion. Work to establish a place brand for Ottawa so all smart-city partners and economic development organizations market the city with a common message.   |
|                | Precision Agriculture   | Agriculture is experiencing a revolution as a result of technology and the IoT, leading to the digitization of the agri-food sector. This transition, referred to as "precision" or "smart" agriculture has resulted in an increase in demand for tools to maximize crop yield while reducing environmental impacts. Precision agriculture represents a significant economic opportunity for Canada, with global demands for food projected to grow up to seventy per cent by 2050 according to the Food and Agriculture Organization of the United Nations. As a result of the city's central location, farming industry, ICT sector and federal assets, Ottawa is well-positioned to take a leadership role in helping to advance Canada's agri-food industry through smart technologies. Resultantly, Ottawa will look for opportunities to partner with stakeholders and attract key investors from across sectors, with the goal of establishing itself as a precision agriculture node. |

| Goal          | Initiative Name  | Description  |
|---------------|--|--|
| Smart Economy | Autonomous Vehicle Testbed   | Earlier this year, Ontario became the first province to set a regulatory framework to permit testing of self-driving vehicles, an emerging technology where the province is keen to be a leader. In October Ottawa launched its autonomous vehicle test track on active city streets, integrating live City services. The test area is fully equipped with the latest GPS and telecommunications technology and is coordinated with City traffic systems and street lighting.  |
|               | Build on the “Work in Ottawa” Campaign and Market Ottawa as Destination for Talent                             | Build on Invest Ottawa’s “Work in Ottawa” Campaign and continue to market Ottawa to prospective talent as a city of opportunity and a premiere destination to live, work, and play.  |
|               | Create a Talent Attraction and Retention Committee   | Develop a formal Talent Committee comprised of Ottawa’s post-secondary institutions, Invest Ottawa, the Local Employment Planning Council, and other talent stakeholders, to address Ottawa’s current and future talent attraction and retention needs. The Committee would coordinate impactful initiatives around, for example, work-integrated learning and employer engagement and would promote Ottawa’s strong quality of life.  |
|               | Develop K-12 Digital Literacy Program  | Work with Ottawa’s educational stakeholders to incorporate digital technology education more effectively and systemically in K-12 schools.   |
|               | Invest Ottawa Digital Innovation Workshops   | <p>As a key element of its next five-year strategic plan, Invest Ottawa will aim to enable, broker and project manage collaborative digital innovation, technology development and adoption opportunities that:</p> <ul style="list-style-type: none"> <li>• Create new opportunities for Ottawa start-ups, SMEs and multinational firms to help address key public sector pain points, co-create solutions, and supply them to the Government of Canada and other potential customers in global markets; and</li> <li>• Enable government to collaborate on and adopt ‘Ottawa-made’ digital prototypes, innovations and solutions that address key challenges, seize new opportunities, and increase the productivity, efficacy and impact of public service delivery on citizens.</li> </ul> <p>The program leverages Ottawa’s unique strengths and opportunities as the seat of the federal government and technology hub and facilitates matchmaking between Ottawa technology entrepreneurs and companies and government needs.</p> |
|               | Expanded Innovation Pilot Program  | Given the success of the Innovation Pilot Program, the City’s Economic Development and Long Range Planning will look to expand the program’s scope and resources to provide entrepreneurs with additional opportunities to pilot their projects and services.  |
|               | Implement Phase 2 of the Innovation Centre and Explore the Creation of an Innovation District at Bayview Yards | Along with the implementation of Phase 2 of the Innovation Centre, the City would explore the creation of an Innovation District at Bayview Yards that would see the development of a defined geographic area, centred around the Innovation Centre, that would give rise to a compact innovative eco-system focused on the co-location of entrepreneurs, start-ups, and leading-edge companies. The concept behind that district is that co-location fosters collaboration, creativity and knowledge-transfer. The district will be Light Rail Transit (LRT) accessible, technically-wired and offer mixed-use housing, office, and retail space; making it a place to live, work and play.   |

| Goal                  | Initiative Name   | Description  |
|-----------------------|---|--|
| Innovative Government | Enable a Mobile-Driven Digital Experience   | Develop and deploy mobile functionality through a suite of online channels (e.g. app(s) chat bots, web) in order to enable greater “anywhere, anytime” ease-of-access to the City.   |
|                       | Enhance Ottawa’s Open Data Program  | Continually expand the quality and quantity of data in the City’s Open Data program to facilitate the development of smart city solutions by both the City and Ottawa’s smart city eco-system. Enhance access to this information with the addition of Application Program Interfaces (APIs) that allow members of the community to interact with City data in real-time.                          |
|                       | Implement Additional Service Delivery Analytics   | Implement service delivery analytics to drive better performance, identify new functionality, and enable service enhancements.   |
|                       | Explore Pilot(s) for Artificial Intelligence, Predictive Analytics, and Machine Learning      | Explore pilot(s) for artificial intelligence, predictive analytics, and machine learning to determine applicability and scalability in operations.   |
|                       | Engage Ottawa’s Knowledge-Based Sector and Eco-System in the Delivery of Smart City Solutions | Explore ways, through workshops and other forums, on how best to engage Ottawa’s knowledge-based sectors in determining and delivering smart city solutions. This will include, for example, studying various global smart city procurement models where the private sector is asked to propose innovative solutions to city problems rather than responding to traditional request for proposals. |
| Continuous Engagement | Hackathons  | Leverage and connect with existing hackathon groups to generate ideas and think outside of the box to solve technological, social, and economic problems in Ottawa.  |
|                       | Meet Up Monday’s at Bayview   | Encourage entrepreneurship and digital transformation by leveraging disruptive tech-communities like Open Data Ottawa, Ottawa Civic Tech, and Machine Learning Ottawa.   |
|                       | Smart City Website and Engagement Tools   | Develop a Smart City 2.0 web presence and engagement tools where residents and businesses can receive updates on the strategy as well as submit ideas for consideration.   |
|                       | Key Performance Indicator (KPI) Framework   | Create a KPI framework and dashboard so that the City and its smart city eco-system partners can assess the success of the implementation of Smart City 2.0.   |

# ENDNOTES

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