

# Waterfront Toronto Establishes Critical Infrastructure for Capturing a Host of loE-Driven Benefits



Images Courtesy of Waterfront Toronto

## EXECUTIVE SUMMARY

### Objective

- Revitalize 2,000 acres of underutilized, vacant, and former industrial brownfields along Toronto’s Waterfront into complete, sustainable, mixed-use communities
- Use revitalization of Waterfront as engine for economic growth by attracting residents and new businesses

### Strategy

- Create sense of community in the virtual space through collaboration tools
- Create state-of-the-art Innovation Centre to accelerate Waterfront Toronto’s vision and economic development objectives
- Engage and share ideas with other communities around the world

### Solutions

- Fiber-optic open-access ultra-broadband network and community-wide Wi-Fi designed to support community development, sustainable infrastructure, and improved quality of life

### Potential Impact

- Facilitate telehealth improvements that reduce hospitalizations cut costs
- Increase public safety and security through video analytics and real-time sentiment analysis
- Decrease area’s carbon footprint and encourage conservation through metering and reporting water/energy consumption
- Promote increased sense of community and vibrant interactive engagement
- Bridge the digital divide by extending network benefits to everyone

## Background

In January 2014, Cisco released the results of an in-depth analysis of the economic benefits of the Internet of Everything (IoE) for the public sector. Cisco’s model revealed that some \$4.6 trillion in “Value at Stake” would result from the adoption of IoE capabilities across 40 key public sector use cases over the next 10 years, including smart water, smart buildings, smart energy, smart parking, and more (<http://bit.ly/1aSGIzn>).

As a next phase of its analysis, Cisco engaged Cicero Group, a leading data-driven strategy consulting and research firm, to undertake a global study of IoE capabilities across these 40 use cases – how the best public sector organizations are “connecting the unconnected,” as Cisco terms it. To that end, Cicero Group conducted interviews with dozens of leading public sector jurisdictions – federal, state, and local governments; healthcare organizations; educational institutions; and non-governmental organizations (NGOs) – to explore how these global leaders are leveraging IoE today.

The research examined real-world projects that are operational today, are being delivered at scale (or through pilots with obvious potential to scale), and that represent the cutting edge of public sector IoE readiness and maturity. The aim of the research was to understand what has changed in terms of the jurisdictions’ people, processes, data, and things, and how other public sector organizations can learn from (and replicate) the trail blazed by these global IoE leaders. In many cases, these jurisdictions are Cisco customers; in others, they are not. The focus of these jurisdictional profiles, therefore, is not to tout Cisco’s role in these organizations’ success, but rather to document IoE excellence, how public sector entities are putting IoE into practice today, and to inform a roadmap for change that will enable the public sector to address pressing challenges on multiple fronts by drawing on best practices from around the globe.

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Director of Intelligent Communities,  
Waterfront Toronto

## About Waterfront Toronto

Waterfront Toronto was established in 2001 as a collaborative effort among the federal, provincial, and municipal levels of Canadian government. Its mission is to put Toronto at the forefront of global cities in the 21st century by transforming the Waterfront into beautiful, sustainable new communities, parks, and public spaces, fostering economic growth in knowledge-based, creative industries and, ultimately, redefining how the city, province, and country are perceived by the world.

The project is one of the largest infrastructure undertakings in North America and one of the largest waterfront redevelopment initiatives ever attempted in the world. Waterfront Toronto's 30-plus-year plan includes cleaning up the aging industrial area and attracting residents and new businesses with an integrated fiber-optic network infrastructure. The goal is to transform the harbor into one of the world's leading intelligent communities.

Kristina Verner is director of intelligent communities for the Waterfront Toronto revitalization project. In 2012, Ms. Verner was honored with the Queen Elizabeth II Diamond Jubilee Medal for her leadership and commitment to the creation of intelligent communities and collaborative ecosystems. Ms. Verner previously served as research & development officer at the University of Windsor Centre for Smart Community Innovation, and she sits on board of directors for the Intelligent Community Forum Foundation. She is also a founding member of the Board of Advisors for Walsh University's ICF Institute for the Study of the Intelligent Community.

Lisa Prime is director of environment and innovation for Waterfront Toronto, which encompasses the corporate sustainability agenda. Ms. Prime is an environmental planner who has contributed to the Waterfront revitalization since the 2008 Olympic Bid, and has worked for both public and private industry. She led the development of Waterfront Toronto's Corporate Social Responsibility and Sustainability Report (CSRSR), 2012. Lisa received honorable mention by the Clean 50 in 2011, and the CSRSR received recognition by the Clean 50 in 2012 as one of the top 15 projects across Canada contributing to clean capitalism. She also leads the Corporations Minimum Green Building Requirements, which received an international Globe Award for sustainability in 2011. Lisa was appointed to the National Canadian Green Building Council Board in 2014.

## Objectives

In 2001, the City of Toronto resolved to revitalize 2,000 acres of industrial property along the city's declining harbor. The Waterfront Toronto organization – a collaboration of federal, provincial, and municipal governments – was tasked with overseeing the project. “[This is] the largest urban revitalization initiative in North America,” said Ms. Verner. “We are building new communities that will be home to thousands of people and workers.”

Ms. Verner recalls CEO John Campbell as the driving force behind Waterfront Toronto's ambitious vision, and said his attendance at the 2004 Intelligent Community Forum Summit was a decisive moment. Mr. Campbell inspired his

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colleagues with the goal of transforming the Waterfront into a world-leading intelligent community – a vision that has been realized with Toronto having been recognized on three occasions as one of the Intelligent Community Forum’s “Top7 Intelligent Communities of the Year.” “He very much made the innovation and sustainability mandates a core part of what’s happening here today,” said Ms. Verner, adding, “John is really an exceptional example in terms of being a leader who truly understands the value of these aspects of revitalization.”

## Strategy

The Intelligent Community elements of the revitalization are designed to weave technology into the fabric of the Waterfront community. Ms. Verner noted, “One of the key pieces that differentiates this from many other revitalizations is the focus on sustainability as well as intelligent communities, where we can actually leverage technology to ultimately improve quality of life for residents, and enhance how people live, learn, work, play, and invest.” Not only will technology be used to help solve challenges like traffic and parking, but it will also make a difference by facilitating community events and providing ubiquitous access to Internet services. All development is bolstered by an advanced technological infrastructure, including an open-access fiber-optic ultra-broadband network and Wi-Fi throughout the area.

According to Ms. Verner and Ms. Prime, Waterfront Toronto has several roles in the development. It works closely with their carrier of choice to facilitate the construction of the network infrastructure, oversees public improvements such as parks, and sets minimum building standards. By thinking ahead and planning for updates in technology, the Waterfront Toronto team hopes to keep this development at the forefront of sustainable living for years to come. “In terms of any level of infrastructure, we’re trying to future-proof this area. It’s all state-of-the-art infrastructure in amazing public spaces, creating a great quality of place,” Ms. Verner noted. Ms. Verner and Ms. Prime indicated that while Waterfront Toronto oversees general policy for all areas, the network infrastructure, the development of public spaces, and several remaining redevelopment projects are executed via agreement with private developers who are required to connect their buildings to Waterfront Toronto’s ultra-broadband network. “We have a requirement that all buildings must connect to our high-speed broadband,” Ms. Verner indicated, adding that treating the Internet connection as a required utility allows the Waterfront development to position transformative applications and services on top of it.

To connect the physical and virtual worlds for residents, Waterfront Toronto is working to create a sense of community in the virtual space through collaboration tools. Thus, before people even move in, they can feel connected to their neighborhood. Ms. Verner explained that, in many cases, future residents purchase their units years in advance, so it’s important to help them feel aware of, and involved in, the things that are happening prior to their arrival.

To connect people with cutting-edge technologies, Waterfront Toronto is also pursuing the creation of a state-of-the-art Innovation Centre that will serve as a catalyst for the employment strategy for the area. “It is a beacon, if you will, or the Smart City crown jewel in the Waterfront, where people can actually come and see the latest and greatest technologies that play in a variety of different sectors,”

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Ms. Verner explained. She believes that the Innovation Centre will be an effective catalyst for the development of the broader innovation district.

Waterfront Toronto also engages with other communities around the world, sharing their ideas and learning from other communities’ developments as well. Ms. Verner believes that these outreach efforts create increased understanding of the goals of Waterfront Toronto. “There is this whole concept, this innovation/collaboration ecosystem amongst other intelligent communities, that supports the sharing of best practices. We’re learning from each other in serving as a global leader, as well as a local catalyst,” Ms. Verner explained.

“Waterfront Toronto is funded by all three levels of government: the government of Canada, province of Ontario, and the City of Toronto,” Ms. Verner said. “We are the master developer for the area. Then, for the individual parcels of land that we have serviced and remediated, there are a variety of development partners that are involved.” Upon Waterfront Toronto’s creation, each of the three orders of government committed \$500 million CAD in seed capital to the project. .

Costs associated with implementing smart buildings are borne by the developers, who include these costs in their budgeting process.

## Solution

Ms. Verner describes the fiber-optic ultra-broadband network throughout the development as the “fundamental piece” of the area’s infrastructure. “We’re going to be leveraging it to connect the community as things move forward,” she stated. Unlike some municipal situations in North America, the actual transport layer essentially has been taken care of in this project. “We don’t have to worry about whether or not there’s going to be enough bandwidth moving forward,” Ms. Verner smiled. “We’re going to be well positioned to remain competitive for a lengthy period of time here.”

According to Ms. Verner, Waterfront Toronto selected a local telecommunications company for the fiber-optic ultra-broadband network installation. In addition to installing the highest level of technology currently available, the company contractually agreed that maximum performance standards will be incorporated into the infrastructure as it is developed – not only throughout construction, but for 10 years following completion of the final building in the development, and all at a competitive cost.

Ms. Verner explained the importance of this contractual clause: “In the Waterfront context, our network provider has to actually keep the network within the top seven in the world in terms of both price and performance on a wholesale basis for essentially the next 30 years, since the carrier is required to maintain these service levels for 10 years after the completion of the last building. So, in that period of time, the neighborhood will not fall behind in terms of their connectivity, which is tremendous. You have to have reliable, scalable infrastructure to be able to ensure that what you are deploying today is future-proof and will be relevant a dozen or more years down the road.”

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In order to exploit the capability of the network and ensure optimum data transfer speeds, Ms. Verner explained that the fiber-optic cabling does not stop at street level: “It’s not just fiber to the building or fiber to the riser – it’s fiber to the unit, which is an important differentiator.” The next layer of infrastructure, which Ms. Verner describes as the “intelligent platform,” runs the Intelligent Operation Center. It has the capacity to handle all different types of alerts or events, such as public safety and security, health and wellness applications, and transportation, capturing that data and translating it into useful information for people. For instance, if there’s a transportation issue, this system helps officials articulate that to the general public so that the information becomes useful very quickly. “You have the network, and that’s terrific, but what happens on top of that network is what can be transformational,” Ms. Verner explained. “We wanted to do that so that we would be able to scale with the community and bring in applications that would be meaningful to the population as it the revitalization continues.”

Ms. Prime explains how Waterfront Toronto mandates high-performance buildings through its minimum green building requirements. These outline key performance expectation that push developers to contribute to market transformation by outreaching status quo development. This encourages developers to incorporate smart solutions into their buildings. “We don’t dictate that you have to put in sensors or monitors, but it’s all part of the design expectation. We don’t require smart building connections, for example, around safety and security or other opportunities. We have created a framework for performance that drives developers through certain key things they have to do. This sets up an expectation that they’re probably going to take low-hanging fruit if you put them halfway there.” Ms. Prime places a lot of emphasis on energy-performing design and the opportunity of high-speed broadband and collaborative buildings..

Ms. Prime indicated that in addition to having a network infrastructure that encourages a connected and state-of-the-art community, an example of what the minimum green building requirements contributes is the mandatory installation of metering equipment for monitoring energy and water consumption. “Metering is required because the green building requirements and overall performance in energy and conservation are public-policy objectives and important future proofing opportunities,” Ms. Prime explained. Currently, Waterfront Toronto is collecting some energy use data on this network and will do analytics to support objectives of market transformation. It is still too early to decipher meaningful conclusions from the data. Waterfront Toronto is also interested in working with the city to explore the viability of ubiquitous Wi-Fi and other smart and connected infrastructure opportunities.

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Figure 1. Waterfront Toronto: New and Better Connections.



Source: Cisco Consulting Services, 2014

## Potential Impact

Benefits of this project show up in network advancement, community development, sustainable infrastructure, and quality of life. According to Ms. Verner, the purpose of the advanced network infrastructure was to “build a rock-solid platform” that will allow the community to quickly incorporate beneficial applications as they arise. For instance, Ms. Verner anticipates that the network could facilitate telehealth improvements – such as remote physician/patient interactions, physiotherapy, and rehab – that will result in reduced hospitalizations and associated cost savings. The network also makes possible developments in intelligent transportation and delivery of immediate information that contributes to public safety and welfare.

Because the network infrastructure provides an avenue for the flow of “real-time, meaningful, multimodal types of information,” Ms. Verner believes it will enhance the sense of community. She described the network infrastructure as “a great platform to help people organize and discover what is happening in the Waterfront area.” It will also provide “a digital marketplace to assist the small merchants in the Waterfront, and to provide residents with the enjoyment of buying local and supporting their own neighborhood.”

Ms. Verner pointed out that the infrastructure is in place to allow equality of network access regardless of where a citizen is in the neighborhood. “The business model has been constructed in a unique way so that there is funding available to make sure that our affordable rental housing in the area has the same access levels as the market housing, so we have a full digital inclusion strategy. And it’s a true open-access network where we can build one highway and everyone can drive across it.” This sort of network availability brings tangible benefits to residents, businesses, and visitors alike.

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Benefits from the green building requirements include decreasing the area’s carbon footprint and encouraging conservation through metering and reporting water and energy consumption. Ms. Prime is vested in finding ways to gather and analyze further data on the actual impact of the policies on current consumption rates and contributions to low-carbon development. “We’re very interested in understanding how well we’ve achieved that, and what further influences may need to happen,” she said. The expectation is that policies will augment goals in keeping with Waterfront Toronto’s cooperation with the C40 through Climate + (low carbon) objectives.

Ms. Verner stressed that the value of any technological advancement must be measured by its ability to increase quality of life, and she sees part of her role as facilitating an understanding of these advantages in the community. “It’s what it’s doing for people that’s so important,” she said, “and unless you can capture some of those informative pieces and make them meaningful to people, then it’s not really useful. You just have more servers and more bits traveling through these great fiber connections, but what is it really doing for people? Is it allowing people to stay at home longer? Is it connecting loved ones from afar? They may have benefits that are more difficult to measure in traditional terms such as return on investment, but these impacts are just as important to recognize and place value on.”

## Lessons Learned / Next Steps

Ms. Verner described a significant potential challenge of her work with Waterfront Toronto as communicating the benefits of the organization’s intelligent community vision in an understandable way. “Explaining this whole notion of an intelligent community, or a smart, connected community, seems to be a little bit like nailing Jell-O to the wall,” she said. “Just building the concept of what we’re really trying to achieve seems a bit abstract to folks that are right on the periphery. Based on my previous experience, getting buy-in and increasing the number of champions can often times be difficult.” Even though practitioners in this field understand the intrinsic value and benefit, she describes the challenge of articulating return on investment without getting too technical or too socially minded.

Because it involves all-new infrastructure, Waterfront Toronto lacks data that would indicate before-and-after results. “It’s not like we can say that it’s going to save X amount of money over what’s currently in place,” Ms. Verner said. “Finding the right metrics to articulate value is very difficult. It’s not that abstract, but because it seems technical, sometimes it’s hard to talk to describe the benefits in a way that potential collaborators really get excited about it.” Explaining new ideas can always be something of a challenge, and this project – despite its advanced technology and community benefits – is no exception.

Ms. Prime encounters similar difficulty in garnering the understanding for area developers. “The biggest challenge in putting long term building design demands on developers is the disconnect between operations and the capital perspective on the project,” she said. “For example, developers often don’t invest in infrastructure that isn’t required by law, and oftentimes when requiring infrastructure such as meters, they still push back. Buildings are often viewed as a capital works project that gets handed over – they don’t look at operations.” She explained that Waterfront Toronto

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mitigates the dilemma through an RFP selection process for builders who have a proven record of green building and understand both the requirements and the motivation behind them.

Additional challenges stem from the project’s 30-plus-year timeframe. Ms. Prime stressed the need for continual renegotiation during long-term development to allow the community to stay cutting-edge. “One of the problems as you do a development agreement is the building doesn’t get built that day. Even if we’re in an agreement situation or renegotiating or adding things, I’m always trying to raise performance for what is not built yet because it frankly becomes out of date before it actually goes into the ground.” Ms. Prime collaborates with builders to help each structure incorporate the latest technologies available at the time of agreement.

At a community scale, occasional limitations and missed opportunities can arise due to new technology or lack of operations experience or changed approach for city staff that must take on systems. Ms. Prime explained that some desired policies are prohibited from becoming mandates due to Waterfront Toronto’s limited jurisdictional charter. “I personally think it would be great [if] the whole neighborhood could be sensoried for all the streetlighting and transportation lighting, and infrastructure flows. But it would all have to be somewhat of a pilot project for the Waterfront because, of course, we’re not the entire city, and operations are citywide.” Waterfront Toronto works to demonstrate value for the municipality and advance technology via agreement with developers and city decision makers. Sometimes, she reflected, “you can’t always have success ,but you can find opportunities to pilot.”

Ms. Prime also noted that predicting public response of new residents to a community design can be challenging, specifically concerning use of public transportation. “As a master developer, we are interested in any and all data related to the neighborhood – neighborhood function, how people are behaving, what choices they’re making, and so on. The way that the neighborhoods are designed, the expectation was that people would use transit. They would presumably work close to where they live. These are all things that we see in other communities by design, and in some other international cities where they take this approach, but it may not necessarily be what happens once new residents move in.”

Learning from the unique challenges of developing an intelligent community, Ms. Verner emphasized that progress requires commitment. “Make sure that you come equipped with plenty of patience,” she advised. “There are going to be a lot of stops and starts along the way, but never waiver from good, solid values. Build and maintain trust, and always be transparent, because these intelligent community initiatives are, in their very nature, very much in the full discipline of silo-busting.” Every new design requires time and effort to develop, market, and complete.

Ms. Verner considers Waterfront Toronto’s forward-thinking plans and infrastructure crucial in a revitalization project. She pointed out that planning for future technological advancements should be a priority for other communities planning similar developments: “Always make sure that you’re future-proofing. Always have mechanisms built into your model to make sure that your city is able to stay competitive.” By integrating cutting-edge technology and architecture, a project has the best chance of staying relevant as years pass.

Waterfront Toronto is assessing the viability of smart traffic and parking solution pilots. “It’s a great time to plan for these type of solutions since we can build in sensors and other required technologies at the time of initial construction, whereas other cities would need a lot of retrofitting,” Ms. Verner said.

Ms. Prime advised communities seeking to incorporate smart technology to “establish what your core priorities are and what your performance priority should be. Then, locate various technologies that support you in getting to that performance, track the performance, and improve processes and systems.” From Ms. Prime’s perspective, there is room in every community to upgrade key elements such as water and sewer, traffic lighting, energy, and buildings. “When you’re doing new design and you’re doing redevelopment, it’s a great opportunity to pilot things.”

Looking to the future, Ms. Verner concluded, “It’s a matter of really just focusing on best-of-breed solutions, so that the things that we’re launching and the things that we’re introducing to communities can be trusted, that they’re secure, that they’re scalable, because we are going to be growing very quickly.”

## More Information

For more information, visit <http://www.waterfronttoronto.ca>



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