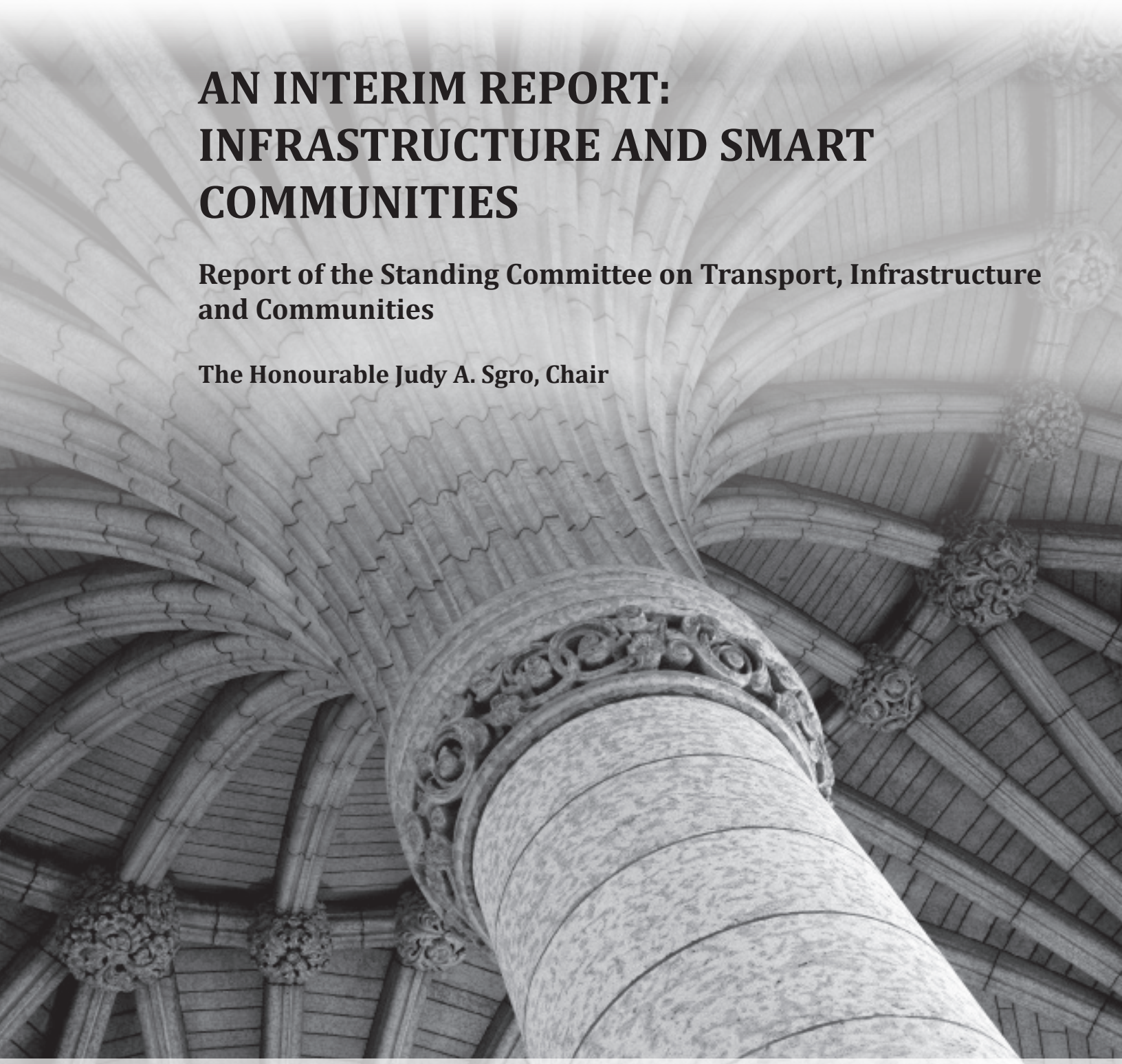
HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

AN INTERIM REPORT: INFRASTRUCTURE AND SMART COMMUNITIES

Report of the Standing Committee on Transport, Infrastructure and Communities

The Honourable Judy A. Sgro, Chair



DECEMBER 2017
42nd PARLIAMENT, 1st SESSION

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Hon. Judy A. Sgro
Chair

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NOTICE TO READER

Reports from committee presented to the House of Commons

Presenting a report to the House is the way a committee makes public its findings and recommendations on a particular topic. Substantive reports on a subject-matter study usually contain a synopsis of the testimony heard, the recommendations made by the committee, as well as the reasons for those recommendations.

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THE STANDING COMMITTEE ON TRANSPORT, INFRASTRUCTURE AND COMMUNITIES

has the honour to present its

TWENTIETH REPORT

Pursuant to its mandate under Standing Order 108(2), the Committee has studied Infrastructure and Smart Communities and has agreed to report the following:

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INTRODUCTION

Information technologies have taken an increasingly important place in the lives of Canadians, to the point that very few people or organizations today could go without using the Internet or smartphones. However, there is one area where information technologies have not yet fulfilled their potential: infrastructure.

That said, progress is being made. Driverless cars are now a reality. Buildings and other infrastructure are increasingly collecting information through remotely operated sensors. Traffic information is available in real time. Municipalities are offering an increasing number of services online, available 24/7, and use electronic means to interact with local residents. Our communities, both large and small, are becoming smarter.

The Standing Committee on Transport, Infrastructure and Communities (TRAN or the Committee) studied the topic of infrastructure and smart communities because it believes that community infrastructure in the future will rely more and more heavily on information technologies. Around the world, cities are using information technologies to provide services to local residents more efficiently and to better manage public infrastructure.

The Committee held five meetings on infrastructure and smart communities in February 2017. It heard from 26 witnesses and received briefs from two stakeholders as part of this study. Stakeholders shared their vision for how information technologies could be used in community infrastructure, identified challenges to overcome, solutions to implement and the role the federal government could play. This report provides a summary of what the Committee heard.

SUMMARY OF WITNESS TESTIMONY

A. No Set Definition

> " *The notion of a smart city, to be honest, is still being defined.*"[1]
>
> Grant Courville,
> QNX Software Systems Limited

One of the first challenges the Committee encountered was to define the concept of a smart community. As Mr. Hugo Grondin explained, the concept has changed significantly in the eight or nine years the City of Québec has been pursuing the idea.[2] According to Mr. Grondin, a number of definitions are in use in the field.[3] Witnesses who appeared before the Committee also gave several different descriptions of what a smart community is. The Committee noted two elements that were consistent in defining a smart community: information technologies and services to citizens.

Advances in information technology led to the first smart communities. As Mr. Charles Berndt of Hydro Ottawa explained, these new technologies have transformed how most public services are now delivered to the population.[4] Mr. Shawn Slack, representing the City of Mississauga, described smart communities being highly "connected." He gave examples from his municipality, where all its services are connected, including cameras, pylon signs and networking cabinets, being used to broadcast important messages.[5]

Prof. Teresa Scassa from the University of Ottawa explained that a smart community is one that captures and analyzes data from various sensors within the city in order to

1 House of Commons, Standing Committee on Transport, Infrastructure and Communities (TRAN), *Evidence*, 1st Session, 42nd Parliament, 9 February 2017 (Grant Courville, Director of Product Management, QNX Software Systems Limited).

2 TRAN, *Evidence*, 14 February 2017 (Hugo Grondin, Director of the Strategic Support Services Division, Information Technology Service, City of Québec).

3 Ibid.

4 TRAN, *Evidence*, 2 February 2017 (Charles Berndt, Supervisor, Smart Grid Technologies, Hydro Ottawa Limited).

5 TRAN, *Evidence*, 2 February 2017 (Shawn Slack, Director of Information Technology and Chief Information Officer, City of Mississauga).

improve decision making for planning and allocating resources. In addition, smart communities make these data available as a public resource.[6]

Various witnesses who appeared before the Committee explained that, while information technologies are required to create smart communities, these technologies on their own do not necessarily make a community smarter. Ms. Vicki-May Hamm, the Mayor of the City of Magog (Quebec), explained to the Committee that, in her opinion, a "smart city is not about infrastructure. It is about providing better service to citizens, being closer to citizens, being more transparent and sharing governance with citizens through the use of information technology."[7]

This point of view was also shared by Mr. Bill Hutchison of i-Canada, who said that a smart community was "not just an engineering program or project," but also "a social project, including culture, entertainment, social and digital inclusion, community collaboration, and citizen convenience."[8]

According to Mr. Hugo Grondin of the City of Québec, a community's needs should dictate what infrastructure and technologies a municipality invests in. Since needs vary from one community to another, the technologies and infrastructure that they require will vary as well; there is no single smart community model. Mr. Grondin said that a smart community is a city that is better managed and is more effective through the efficient use of information technologies.[9] Prof. Sriram Narasimhan from the University of Waterloo summed it up in saying that: "The smart communities of the future are ones that will effectively utilize this explosion of technology for the betterment of the life of their citizens."[10]

B. Various Implementations

While the Committee was unable to find a precise definition of a smart community, it did learn that information technologies have been integrated into community infrastructure in many different ways.

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6 TRAN, *Evidence*, 14 February 2017 (Teresa Scassa, Canada Research Chair in Information Law, University of Ottawa, As an Individual).

7 TRAN, *Evidence*, 16 February 2017 (Vicki-May Hamm, Mayor, City of Magog).

8 TRAN, *Evidence*, 16 February 2017 (Bill Hutchison, Co-Founder and Chair, i-Canada).

9 TRAN, *Evidence*, 14 February 2017 (Hugo Grondin).

10 TRAN, *Evidence*, 14 February 2017 (Sriram Narasimhan, Associate Professor, University of Waterloo, As an Individual).

The transportation sector is probably the area where information technologies are already being used the most. These technologies have given managers of public transit networks real-time information on vehicle locations so they can improve traffic flow. This information can also be shared with users, making it easier for them to plan trips and make services more accessible.[11] A similar technology application is being used to track the number of spots available in municipal parking lots and communicate this information with decision-makers and users.[12] According to Mr. Grant Courville of QNX Software Systems Limited, a smart community could potentially have traffic lights that communicate with the control systems of autonomous vehicles in order to improve traffic flow and road safety.[13]

The energy sector will also see the benefits from smarter infrastructure in the near future. Mr. Charles Berndt of Hydro Ottawa explained that smart homes and the Internet of Things will give consumers more ways to control their electricity consumption, based not only on their own needs, but also on the total demand on the network. He further explained that new technologies will give consumers the option to sell locally generated electricity back to the grid to generate revenue.[14]

The City of Québec leveraged technology in a less conventional way in the form of a cycling app that gave municipal officials a means to track the routes that cyclists took through the city so they could plan the network of bike paths accordingly.[15] The City of Magog is deploying smart weather stations that will give municipal officials real-time weather data on the state of local roads, so they can make planning decisions more rapidly.[16] In the United States, Google was able to build detailed maps of air pollution in some cities so that citizens and government can work to address these environmental challenges.[17]

Another less conventional but growing use of technology is in the assessment of the condition of physical infrastructure. For example, Prof. Sriram Narasimhan of the University of Waterloo told the Committee that he is currently working to develop hydrant-mounted sensors that can “effectively determine leaks and other disruptive

11 TRAN, *Evidence*, 14 February 2017 (Hugo Grondin).

12 Ibid.

13 TRAN (Grant Courville).

14 TRAN (Charles Berndt).

15 TRAN (Hugo Grondin).

16 TRAN (Vicki-May Hamm).

17 TRAN, *Evidence*, 7 February 2017 (Colin McKay, Head, Public Policy and Government Relations, Google Canada).

events within varied water distribution networks."[18] He also told the Committee that sensors could soon be used to monitor bridges, which would "help [urban] planners to come up with maintenance and refurbishment plans, taking into account budgetary and manpower constraints."[19]

The Committee also heard about how new technologies could change municipal governance. Mr. Grondin of the City of Québec said that more and more data collected by towns and cities in Quebec can be made available to citizens and businesses thanks to the use of information technologies. Ms. Hamm, Mayor of the City of Magog, also mentioned that more residents have been getting involved at the municipal level, because new information technologies make it easier for them to participate in activities such as budget preparations in some communities.[20]

In fact, the number of ways communities can use information technologies is probably infinite. As the next section describes, the witnesses who appeared before the Committee gave a very long list of opportunities available to communities and citizens.

C. Opportunities to Seize

> "*We are now witnessing an era of digital transformation, where our ability to measure infrastructure performance […] using sensors and processors has far surpassed our wildest imagination from just a few decades ago.*"[21]
>
> Mr. Sriram Narasimhan

A number of witnesses who appeared before the Committee said that emerging technologies in community infrastructure could completely redefine communities. As Prof. Kevin Quigley of Dalhousie University said:

18 TRAN (Sriram Narasimhan).

19 Ibid.

20 TRAN (Vicki-May Hamm).

21 TRAN (Sriram Narasimhan).

> "Infrastructure investments in wireless technologies, high-speed commuter trains, and driverless cars, for example, will not just accommodate the needs of future communities—they will shape them."[22]

Mr. Gary Andrishak of IBI Group said that, in his view, people's behaviour and how cities move, function and feel will change as autonomous cars become more common, similar to the changes that resulted from the advent of the automobile in the early 20th century, which reshaped our community development and led to urban sprawl. Mr. Andrishak also believes that autonomous cars will develop in parallel with a public transit renaissance, the rise of shared mobility and the emergence of on-demand transit services, but that urban planning and development will have to be rethought.[23]

In redefining communities, a number of witnesses explained that it would be possible to improve the quality of life for citizens. For example, Mr. Barrie Kirk of the Canadian Automated Vehicles Centre of Excellence explained to the Committee that autonomous cars would make it easier for people with disabilities and for seniors to get around.[24] Self-driving cars could also be integrated into the transit network to bring people from their homes to transit stations, thereby solving the "last mile" issue.[25] Mr. Kirk believes that autonomous vehicles could be an alternative to public transit in communities that currently do not have a public transit system.[26] In addition, he said that 80% of traffic collisions, deaths and injuries could be prevented with self-driving cars and automated transit systems.[27]

The need to update various infrastructure in the coming years provides an opportunity to integrate information technologies with community infrastructure, thereby making communities smarter, said Mr. Charles Berndt of Hydro Ottawa.[28] According to Mr. Barrie Kirk, that is what the City of Toronto is planning to do with the establishment of "a city-wide committee to look at the impact of AVs [autonomous vehicles], not only on transit and transportation but revenue, policy, zoning, and all the other parts of city

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22 TRAN, *Evidence*, 16 February 2017 (Kevin Quigley, Scholarly Director, Dalhousie University, MacEachen Institute for Public Policy and Governance, As an Individual).

23 TRAN, *Evidence*, 2 February 2017 (Gary Andrishak, Director, IBI Group Inc.).

24 TRAN, *Evidence*, 7 February 2017 (Barrie Kirk, Executive Director, Canadian Automated Vehicles Centre of Excellence); (Grant Courville).

25 TRAN (Gary Andrishak; Grant Courville).

26 TRAN (Barrie Kirk).

27 Ibid.

28 TRAN (Charles Berndt).

government"[29] with a view to completely redefining the city of Toronto in the next 25 years.

Some witnesses said that updating infrastructure using information technologies would mean that existing infrastructure could be used more efficiently in the future, and could even reduce future maintenance and replacement costs. For example, Prof. Sriram Narasimhan of the University of Waterloo explained to the Committee that installing sensors on a structure, such as a bridge, would generate data on its use and its health. This information could then be used to "triage which bridges have enough residual capacity left in them that they don't need to be replaced right away—some minor repairs would suffice—and which bridges and other types of critical infrastructure need replacement right away."[30] Similarly, Mr. Kirk told the Committee that using autonomous and connected vehicle technologies could reduce future demand for road infrastructure because AVs would increase the traffic-carrying capacity of existing highways and roads by a factor of at least two.[31]

New infrastructure technologies also provide opportunities for economic development. The Committee learned that, in the City of Québec alone, the technology industry has 540 companies and 65 research centres, chairs, groups and institutes that employ nearly 20,000 people, generating $1.7 billion in annual revenues.[32] Mr. Hugo Grondin of the City of Québec explained to the Committee that his city encourages development in this sector by giving businesses "the opportunity to use city data and work with the city to pilot business projects they are interested in launching."[33]

Mr. Bill Hutchison, Chair of i-Canada, estimates that the global market for new infrastructure technologies is worth approximately $1 trillion.[34] A number of Canadian companies could benefit from this export market, particularly vehicle technology companies such as QNX Software Systems. Mr. Barrie Kirk of the Canadian Automated Vehicles Centre of Excellence brought to the attention of the Committee that, in the 2020s, 40% to 60% of the value of an average car will be from connectivity or other technological components, whereas that value stands at only 4% or 5% today.[35]

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29 TRAN (Barrie Kirk).

30 TRAN (Sriram Narasimhan).

31 TRAN (Barrie Kirk).

32 TRAN (Hugo Grondin).

33 Ibid.

34 TRAN (Bill Hutchison).

35 TRAN (Barrie Kirk).

According to Mr. Grant Courville of QNX Software Systems, there is an opportunity for Canada to benefit from this developing market through collaboration between the private sector, academia and government.[36]

The emergence of smart communities is not only an opportunity for the business sector, but also for smaller and more remote communities. For example, Ms. Cathy Heron of the Alberta Smart City Alliance told the Committee that the City of St. Albert in Alberta "realized that its future competitiveness was connected with its ability to innovate and therefore developed a unique Smart City Master Plan."[37] The Mayor of the City of Magog, Quebec, Ms. Vicki-May Hamm, also told the Committee that providing applications and equipment to improve services to citizens made the region more attractive to businesses.[38]

D. Challenges and Solutions

While many Canadian communities are riding the wave of new technologies, the witnesses who appeared before the Committee identified a number of barriers to developing smart communities. These challenges include rapid technological change, a lack of connectivity, managing personal information and privacy protection, network security, low private sector investment and the limited and fragmented involvement of the public sector.

1. Rapid Technological Change

> "*Implementing technology all over the place is not enough; sound choices governing its use have to be made.*"[39]
>
> Mr. Hugo Grondin
> (City of Québec)

The speed at which technology evolves appears to be a challenge for communities when significant infrastructure investments are involved. According to Mr. Shawn Slack of the City of Mississauga, the issue is that "the consumer is setting the pace of technology and change, and it is a challenge for cities to adapt and to meet that expectation when

36 TRAN (Grant Courville).

37 TRAN, *Evidence*, 16 February 2017 (Cathy Heron, Co-Founder, Alberta Smart City Alliance and Councillor for the City of St. Albert).

38 TRAN (Vicki-May Hamm).

39 TRAN (Hugo Grondin).

delivering city services."[40] Another challenge that municipal decision-makers face, according to professor Jennifer Schooling of the University of Cambridge, is to avoid making technological choices today that will restrict their options in the future.[41]

One solution to this challenge is through the standardization of technologies. The Committee learned that more and more standards are being established to make it easier to manage smart cities and communities, such as the 37000 series of standards from the International Organization for Standardization (ISO).[42] According to Prof. Sehl Mellouli of Laval University, it is important for municipalities to choose technologies based on international standards over patented proprietary technologies, because the long-term development potential is better.[43]

Mr. Kevin Miller, the Director of Public Policy at ChargePoint, also suggested that buildings and infrastructure projects built today should take into account that there will be higher numbers of electric vehicles in the future. He proposed that building codes be updated to that end. In his opinion, ensuring that buildings are ready for electric vehicles now "will avoid the unnecessary costs of retrofitting sites that are not EV-ready" in the future.[44]

2. Lack of Broadband Network Connectivity

Communications and broadband network connectivity is essential for building smart communities. As Mr. Shawn Slack of the City of Mississauga said, "you need to have connectivity for the city's services, but you have to have connectivity for the residents too."[45] A lack of connectivity leads to a digital divide.[46]

One type of digital divide is between urban areas and rural and remote areas, and it is primarily due to the lack of modern communication infrastructure in remote regions. According to Mr. Colin McKay of Google Canada, communication services and Internet access in Canada rely primarily on old technologies, such as telephone and cable access

40 TRAN (Shawn Slack).

41 TRAN, *Evidence*, 14 February 2017 (Jennifer Schooling, Director, Centre for Smart Infrastructure and Construction, University of Cambridge, As an Individual)

42 TRAN (Hugo Grondin).

43 TRAN, *Evidence*, 16 February 2017 (Sehl Mellouli, Full Professor, Laval University, Faculty of Business Administration, As an Individual).

44 TRAN, *Evidence*, 14 February 2017 (Kevin Miller, Director of Public Policy, ChargePoint).

45 TRAN (Shawn Slack).

46 TRAN (Sehl Mellouli).

points.[47] This aging communication infrastructure means that some communities do not have access to high-speed connections, which in turn means that they are unable to install certain digital services or smart infrastructure. Ms. Vicki-May Hamm, the Mayor of the City of Magog (Quebec), and Cathy Heron, the Co-founder of the Alberta Smart City Alliance and Councillor for the City of St. Albert (Alberta), confirmed that many regions and communities in Canada still do not have access to high-speed Internet.[48]

There is also a digital divide between segments of the population, associated primarily with a lack of Internet access for people with low incomes and a lack of technological proficiency among some seniors. According to Statistics Canada, 83% of Canadians households had access to the Internet in 2012.[49] However, Prof. Sehl Mellouli of Laval University told the Committee that, in some communities, up to 30% of the population does not use digital platforms. He explained that, even within the same city, certain neighbourhoods may have fewer citizens connected to the Internet. According to Prof. Mellouli, the digital divide is a major challenge for communities who want to move toward a smart city concept. He said that this digital divide would disappear within one to two generations, but that support is needed today for the roughly 20% of people who do not use technology.[50]

3. Managing Personal Information and Privacy Protection

Protecting personal information and privacy was quickly identified as a key concern during the Committee's study. The concept of a smart community relies heavily on the ability to collect and analyze huge amounts of data on both infrastructure and on the citizens who use them.[51]

Prof. Teresa Scassa of the University of Ottawa told the Committee about her research and shared her thoughts on privacy as it relates to smart communities. She explained that one issue is that municipalities could take the information they collect on their citizens and sell it to the private sector. According to Prof. Scassa, data collected by municipalities would be very valuable to some private companies, and municipal officials could be tempted to monetize this type of data to generate additional revenues.[52]

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47 TRAN (Colin McKay).

48 TRAN (Vicki-May Hamm; Cathy Heron).

49 Statistics Canada, "Canadian Internet Use Survey, 2012", *The Daily*, 23 November 2013.

50 TRAN (Sehl Mellouli).

51 TRAN, *Evidence*, 14 February 2017 (Ms. Teresa Scassa, Canada Research Chair in Information Law, University of Ottawa, As an Individual).

52 Ibid.

The other issue raised by Prof. Scassa was about municipalities obtaining data collected by the private sector. She explained to the Committee that privacy legislation is different for the private sector and for the public sector, and that as a result municipalities could obtain data without being subject to the same oversight and transparency requirements. Ms. Scassa also told the Committee that she believes that federal privacy legislation needs to be updated to take into account data being shared between the private and public sectors.[53]

However, some witnesses who appeared before the Committee believed that integrating new technologies into infrastructure would not create major problems with regard to managing personal information and protecting privacy. According to Mr. Hugo Grondin of the City of Québec, municipalities "always work with the owners of the information and obtain their permission" before making the data available, and the data in question are generally less sensitive.[54] Mr. Colin McKay of Google Canada told the Committee that companies like Google that collect user information generally collect de-identified, aggregated data that does not have specific information on individual users.[55] Mr. Bill Hutchison of i-Canada said that he believes it is currently possible to manage privacy issues effectively.[56]

4. Safety and Security

Implementing smart infrastructure also raises questions about the security of critical infrastructure. Prof. Jennifer Schooling of Cambridge University told the Committee that the United Kingdom's Centre for the Protection of National Infrastructure realized that the data collected on buildings were inadvertently revealing sensitive information on critical infrastructure.[57] She also mentioned that the United Kingdom is in the process of developing cybersecurity standards for smart cities.[58]

Mr. Grant Courville of QNX Software Systems Limited gave autonomous vehicles as an example, where "if you breached any kind of security you could potentially affect the safety of the vehicle."[59] In his opinion, while there are standards and certification

53 Ibid.

54 TRAN (Hugo Grondin).

55 TRAN (Colin McKay).

56 TRAN (Bill Hutchison).

57 TRAN (Jennifer Schooling).

58 Ibid.

59 TRAN (Grant Courville).

organizations for the security of automotive systems, technology companies must constantly be working to ensure these systems are not breached.[60]

5. Low Private Investment in Research and Development for Smart Infrastructure

According to some witnesses, deploying smart infrastructure is held back by market failures. Professors Kevin Quigley of Dalhousie University and Jennifer Schooling of Cambridge University explained to the Committee that private companies are less likely to invest in some of the technologies required to develop smart communities.[61] Ms. Cathy Heron of the Alberta Smart City Alliance gave an example, explaining that telecommunication companies balk at providing high-speed Internet access in remote areas with low population density.[62] According to Prof. Sriram Narasimhan of the University of Waterloo, investments are needed to address some of these technical and technological gaps so that smart communities can be developed.[63]

Some witnesses also shared about initiatives to encourage R & D in smart infrastructure. For example, the City of Québec gave technology companies the opportunity to test out new products in the city – for example by installing a new type of streetlamp – or to collaborate to implement new technology applications within the municipal administration.[64] The Alberta Smart City Alliance said the solution to get telecommunication companies to invest in high-speed Internet was to include technology industry representatives in the discussion very early on.[65]

Canada can also learn from the example set by the United Kingdom. Professor Schooling, of Cambridge University, explained that the United Kingdom government funds the Centre for Smart Infrastructure and Construction, whose mandate is to "support the UK in becoming a world leader in the fields of sensing technology, asset management and smart city development."[66] The Centre receives roughly £10 million (around C$16.5 million) in public funding and £7 million (roughly C$11.6 million) from industry partners.[67] The United Kingdom also has various industry councils with industry

60 Ibid.

61 TRAN (Kevin Quigley; Jennifer Schooling).

62 TRAN (Cathy Heron).

63 TRAN (Sriram Narasimhan).

64 TRAN (Hugo Grondin).

65 TRAN (Cathy Heron).

66 University of Cambridge, "Jennifer Schooling".

67 University of Cambridge, Centre for Smart Infrastructure and Construction, "Our funders".

representatives. These councils encourage collaboration between the private sector and government and ensure that the outcomes are beneficial to both parties.[68]

6. Limited and Fragmented Public Sector Involvement

Some witnesses suggested that the development of smart communities was also held back by the limited and fragmented involvement of the public sector. Kevin Quigley of Dalhousie University explained to the Committee that the current decision-making structure in Canada, with multiple levels of government, limits the co-operation between stakeholders.[69] The result of this fragmentation, according to Ms. Cathy Heron, Co-founder of the Alberta Smart City Alliance and Councillor for the City of St. Albert (Alberta), is that project planning and execution are done in isolation, rather than in a coordinated and strategic manner.[70]

Ms. Heron added that slow rates of technology adoption can also be attributed in part to the municipalities' limited capacity to advance these projects along. She explained that some smaller communities simply do not have the human and financial resources required to deploy the technologies that larger cities use to provide services more efficiently.[71]

Prof. Kevin Quigley of Dalhousie University suggested to the Committee that, to develop smart communities, regional planning must improve; it must happen over the long term.[72] Ms. Heron shared this perspective, giving the example of communities in the Edmonton area, which were forced to work together by a provincial ministerial order. This led to increased collaboration in implementing various technology solutions, especially with regards to investments in communications and public transit solutions. In addition, this closer collaboration gave smaller communities the opportunity to participate in projects that they would not have been able to carry out on their own.[73] Mr. Shawn Slack of the City of Mississauga gave a similar example from his region:

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68 TRAN (Jennifer Schooling).

69 TRAN (Kevin Quigley).

70 TRAN (Cathy Heron).

71 Ibid.

72 In his testimony, Mr. Quigley used New Zealand as an example, as it has a 30-year infrastructure plan. TRAN (Kevin Quigley).

73 TRAN (Cathy Heron).

Mississauga created a consortium with six neighbouring municipalities, as well as other stakeholders, in order to establish and fund a regional fibre optic network.[74]

E. A role to play for the Federal Government

For the most part, the witnesses who appeared before the Committee agreed that the federal government could play a role in encouraging the development of smart communities.

First, several witnesses believe that the federal government and other levels of government should lead by example and encourage smart infrastructure development. Mr. Collin McKay and Prof. Kevin Quigley said that the federal government should act as a catalyst, bringing together various public and private stakeholders to develop a vision for the future of Canadian communities.[75] Ms. Cathy Heron of the Alberta Smart City Alliance said that the federal government could set the tone by updating its digital strategy to take into account the needs of smart communities.[76]

Funding was another issue that was brought up by witnesses appearing before the Committee. All those who spoke to this matter said that federal infrastructure funding should also be available for deploying the technologies required to develop smart communities. Mr. Shawn Slack of the City of Mississauga pointed out that, thanks to the Infrastructure Stimulus Fund, his city was able to renovate community centres and install wireless networks. In addition, through federal Canada 150 funding, Wi-Fi will be made available in Mississauga parks in 2017.[77] Ms. Heron of the Alberta Smart City Alliance identified a need for long-term funding to support integrating technology and infrastructure.[78] When he appeared before the Committee as part of this study, the Hon. Amarjeet Sohi indicated that the Smart Cities Challenge announced in the 2016 Fall Economic Statement is not limited to physical infrastructure; rather, it will "enable communities to use technology and to find innovative ways of maintaining existing infrastructure and building new infrastructure."[79]

Some witnesses also pointed out the role the federal government could play in improving the R & D capacity for smart infrastructure in Canada. While emphasizing the

74 TRAN (Shawn Slack).

75 TRAN (Colin McKay; Kevin Quigley).

76 TRAN (Cathy Heron).

77 TRAN (Shawn Slack).

78 TRAN (Cathy Heron).

79 TRAN (The Hon. Amarjeet Sohi).

importance of funding research on smart infrastructure, Mr. Hugo Grondin of the City of Québec explained to the Committee that the role of municipalities does not align well with funding R & D, and indicated that the federal government might be able to play a role in this area.[80] According to Ms. Heron of the Alberta Smart City Alliance, providing funding for research in this area is one of the roles that the federal government could play.[81] Prof. Kevin Quigley of Dalhousie University said the federal government's role should include supporting "a research network that includes researchers in computer science, urban planning, public economics, trade, security, environment, and so on."[82]

Other witnesses mentioned the role the federal government could play in regulating autonomous vehicles. Mr. Grant Courville of QNX Software Systems Limited told the Committee that there are currently no security standards or rules on autonomous vehicles, and he emphasized the importance of standardization between the provinces and with the United States.[83] Mr. Joachim G. Taiber of the International Transportation Innovation Center suggested to the committee that regulating automated transportation was one area where the federal government should give guidance.[84]

Ms. Cathy Heron of the Alberta Smart City Alliance said that the federal government had an important role to play in telecommunications. She suggested that, instead of providing government funding for broadband communication networks, the federal government could make regulations to encourage telecommunication companies to provide network access in smaller communities.[85]

80 TRAN (Hugo Grondin).

81 TRAN (Cathy Heron).

82 TRAN (Kevin Quigley).

83 TRAN (Grant Courville).

84 TRAN (Joachim Taiber).

85 TRAN (Cathy Heron).

APPENDIX A
LIST OF WITNESSES

Organizations and Individuals	Date	Meeting
City of Mississauga Shawn Slack, Director of Information Technology and Chief Information Officer	2017/02/02	42
Hydro Ottawa Limited Charles Berndt, Supervisor Smart Grid Technologies		
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Canadian Automated Vehicles Centre of Excellence Barrie Kirk, Executive Director	2017/02/07	43
Cerco Cable Joachim G. Taiber, Chief Technology Officer International Transportation Innovation Center		
Google Canada Colin McKay, Head Public Policy and Government Relations		
Office of Infrastructure of Canada Hon. Amarjeet Sohi, P.C., M.P., Minister of Infrastructure and Communities Jean-François Tremblay, Deputy Minister Jeff Moore, Assistant Deputy Minister Policy and Communications Glenn R. Campbell, Executive Director Canada Infrastructure Bank Transition Office	2017/02/09	44
QNX Software Systems Limited Grant Courville, Director of Product Management		

Organizations and Individuals	Date	Meeting
As individuals Sriram Narasimhan, Associate Professor University of Waterloo Teresa Scassa, Canada Research Chair in Information Law University of Ottawa Jennifer Schooling, Director, Centre for Smart Infrastructure and Construction University of Cambridge **City of Québec** Hugo Grondin, Director of the Strategic Support Services Division Information Technology Service **Greater Toronto Airports Authority** Michael Riseborough, Director of Terminal Infrastructure	2017/02/14	45
As individuals Sehl Mellouli, Full Professor Université Laval, Faculty of Business Administration Kevin Quigley, Scholarly Director Dalhousie University, MacEachen Institute for Public Policy and Governance **Alberta Smart City Alliance** Cathy Heron, Co-Founder and Councillor, City of St. Albert **ChargePoint** Kevin Miller, Director of Public Policy **i-Canada** Bill Hutchison, Chair and Co-Founder **Ville de Magog** Vicki-May Hamm, Mayor	2017/02/16	46
MacKay Meters James MacKay, Vice-President of Sales **Regional Group of Companies** Bruce Lazenby, Head of Business Development Formerly Chief Executive Officer of Invest Ottawa	2017/02/21	47

Organizations and Individuals	Date	Meeting
Société de transport de Laval Guy Picard, Director General **Ville de Victoriaville** Martin Lessard, Managing Director	2017/02/21	47

APPENDIX B
LIST OF BRIEFS

Organizations and Individuals

Canadian Cable Systems Alliance

MacKay Meters

MINUTES OF PROCEEDINGS

A copy of the relevant *Minutes of Proceedings* (Meetings Nos. 42, 43, 44, 45, 46, 47 and 86) is tabled.

Respectfully submitted,

Hon. Judy A. Sgro, PC, MP
Chair