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Preparing Canada and Canadians for the Digital Society: Research on Digital Infrastructure and Digital Literacy

The purpose of this brief submission is to draw attention to previous and ongoing research funded by the Canada Research Chairs program, the GRAND Network of Centres of Excellence, the Social Sciences and Humanities Research Council of Canada, and Infrastructure Canada regarding the development and use of digital infrastructure in Canada.

The consultation paper states that “More and more each day, every sector of our economy and our society comes to rely on digital technologies” (p. 8). While it is true that digital technologies are becoming a fundamental part of life for many individuals and are widely adopted among businesses, educational institutions and not-for-profits, it is important to recognize the dual assumptions embedded in this statement: i) that digital technologies are readily available for everyone to rely upon, and ii) that everyone in our society is able to use digital technologies.

These assumptions can be explored by considering the supply of, and demand for, digital technologies. On the supply side, research that my colleagues and I have been engaged in for many years focuses on the development of broadband networks, the fundamental enabling infrastructure that citizens use to access the digital world. This research informs issues regarding *Building a World-Class Digital Infrastructure*. On the demand side, we are investigating Canadians’ Internet use, offering insights on the ways that Canadians have incorporated the Internet, a widely adopted digital technology, into their daily lives. We are also considering methods for assessing Canadians’ engagement with the digital society through use of technologies like the Internet. This research informs questions of *Building Digital Skills for Tomorrow*.

Studying issues of supply and demand concurrently highlights a paradox in today’s digital society: the pace of technological innovation and infrastructure development is ahead of our capacity to effectively make use of, and engage with these digital technologies. Indeed, as governments and service providers around the world make plans to roll out ultra high speed broadband networks, data on actual usage suggests that development of such networks is not yet justified based on existing demand. This does not mean that these projects are without value, but does suggest that further work is needed to ensure that all stakeholders realize benefits from the substantial public and private sector investments that will be required to make this infrastructure available to, and widely used by, everyone. It is essential that digital infrastructure (e.g. broadband networks) be developed in ways that serve the needs of all potential users (e.g. citizens, governments, business, not-for-profit agencies etc.), ensuring that access to the digital society is available to all.

Building a World-Class Digital Infrastructure: Relevant Research

The Consultation Paper's opening statement regarding development of a world-class digital infrastructure observes that "the *telecommunications industry* is in the midst of a major shift towards next generation networks" (p. 16, emphasis added). In identifying the telecommunications industry as the driver of infrastructure development in this country, the consultation paper reflects the market forces driven reality of Canadian telecommunications policy. But if a 'world-class digital infrastructure' is to serve the needs of all Canadians, not just the telecommunications industry, a much broader perspective on infrastructure development is required. The consultation paper also notes that "the Canadian residential broadband market has largely settled into regionalized competition between the incumbent telephone company and local cable provider" (p. 16). This is true of the market today, again reflecting the current policy environment and ineffective regulatory regime (Middleton & van Gorp, 2009; van Gorp & Middleton, 2010a), but need not be true in future. For instance, in a variety of countries including Australia, the Netherlands, New Zealand and Singapore, nationwide broadband networks are being developed that in ways that minimize competing investments in infrastructure (thus reducing the costs of its development) and maximize consumer choice (Middleton, 2010; Middleton & Given, forthcoming; van Gorp & Middleton, 2010b). Here in Canada, alternative models in which communities develop their own infrastructure are also proving viable (Fiser, 2009). These approaches (investigated in the projects listed below) should be explored when considering the options for the development of "state-of-the-art network infrastructure" in Canada.

Project Title	Funded By	Dates
ICT Infrastructure as Public Infrastructure: Connecting Communities to the Knowledge-based Economy & Society (www.cwirp.ca)	Infrastructure Canada Peer Reviewed Research Studies	Completed March 2008
Developing Next Generation Broadband Infrastructure: Learning from Australia's National Broadband Network (www.broadbandresearch.ca/australia)	SSHRC (International Opportunities Grant)	October 2009 - September 2010
Investigating Competitiveness in the Canadian Internet Services Provision Market (www.broadbandresearch.ca/competition)	Canada Research Chair	May 2009 - December 2010

Building Digital Skills for Tomorrow: Relevant Research

It is important to understand Canadians' current capacities for engagement with digital technologies and with the broader suite of activities and services that will evolve as we create a digital society. Statistics Canada's Household Internet Use Survey (conducted until 2003) and the Canadian Internet Use Survey (conducted in 2005, 2007 and 2009) provide an excellent source of data¹, but these data have not been the subject of extensive analysis. Working with colleagues at Statistics Canada, our ongoing research seeks to better understand the ways that average Canadians do engage with the Internet, and to develop better measures of digital literacy. For instance, it is important to note that although overall Internet adoption rates are high (80% of Canadians aged 16 and over reported using the Internet for personal reasons in 2009), further analysis reveals that only 30% of adult Canadians could be classified as high intensity (going online for 5 or more hours per week, and online every day) and high scope Internet users (carrying out a broad range of online activities) in 2009 (Statistics Canada, 2010).

¹ It is essential that Statistics Canada be funded adequately to continue to collect data on how Canadians participate in a digital society. Much of the data collection and analysis capacity in this area in Statistics Canada has been eliminated in the past few years, and must be restored as part of Canada's Digital Strategy. The Digital Strategy should identify data needed to assess ongoing progress toward a digital society. Statistics Canada should consult with stakeholders to develop appropriate data collection tools, enable wide access to the data, and foster partnerships with researchers to analyze the data.

This raises questions as to how prepared or how capable the majority of Canadians are to participate in a digital society, one where frequent and extensive online engagement is likely to be required. It also demonstrates the need for improved ways of assessing digital literacy (going beyond simple measures of adoption), and readiness to exist in a society where a digital, online environment become the primary place for citizens to interact with each other, and to engage in education and commerce and access to government services and healthcare information. The research noted below addresses these issues.

Project Title	Funded By	Dates
How Will Canadian Consumers Benefit from Access to Broadband Networks? An Investigation of Broadband Demand, Usage, Supply and Policy in Canada (www.broadbandresearch.ca/internetuse)	SSHRC (Initiative on the New Economy)	Completed March 2006
Canadian Internet Use Survey Analysis/Measuring Internet Engagement (www.broadbandresearch.ca/internetuse)	Statistics Canada (Research Fellowship)/ Canada Research Chair	ongoing

Integration: Building a Digital Infrastructure to Meet the Needs of Canadians, and Ensuring the Canadians Have the Skills and Capacity to Prosper in a Digital Society

Two new projects are underway to explore the ways in which digital infrastructures can be developed to meet the needs of all Canadians. These projects are both just beginning, but will build on the research already noted above. They continue the focus on understanding skills and literacy issues, in the context of demand for, and usage of broadband networks. On the supply side, the projects address the development of appropriate policy environments that will foster the development of ultra high speed broadband capacity, informed by stakeholder requirements. Recent work by Sadowski and colleagues (2010) in the Netherlands links individuals' personal capacities to engage with technologies with their technology adoption patterns, offering new insights into how infrastructures can be developed in ways that better meet users' needs. This sort of work fosters the integration of supply and demand issues in the digital economy, enabling synthesis of the research on Digital Infrastructures and Digital Skills that will enable Canadians to prosper in a digital society.

Project Title	Funded By	Dates
Next Generation Broadband Networks in Canada: An Investigation of Infrastructure Policy, Supply and Use (www.broadbandresearch.ca)	SSHRC (Standard Research Grant)	April 2010 - March 2013
Digital Infrastructures: Access and Use in the Networked Society (www.digitalinfrastructures.ca)	GRAND Networks of Centres of Excellence (Graphics, Animation and New Media Canada)	April 2010 - March 2015

Summary

The objective of this submission was to draw attention to work being done under the auspices of Catherine Middleton's Canada Research Chair, regarding development and use of Communication Technologies in the Information Society. The projects listed here focus specifically on digital skills/literacy, and the development of digital infrastructure. There are many other excellent research projects of relevance to Canada's Digital Economy Consultation, being carried out across Canada and internationally. This submission does not attempt to offer an exhaustive review of this research, instead it describes a specific program of research that informs particular aspects of the Digital Economy Consultation.

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