A Case Study on the Development of Broadband Technology in Canada

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INTRODUCTION

The Development of Broadband

Broadband commonly refers to Internet connection speeds greater than narrowband connection speed of 56kbs. Digital subscriber lines (DSL) and cable modems were the most popular forms of broadband in public use over the last 10 years. In 2004, over 80% of U.S. homes were equipped with cable modems, and up to 66% of U.S. households were able to receive DSL transmissions. It is expected that the impact of broadband technologies will continue to play an important role in the U.S. and the rest of the world. It is predicted that the number of broadband-enabled homes will exceed 90 million worldwide by 2007 (Jones, 2003). Canada and Korea currently are the two countries leading the way in broadband saturation. The following discussion focuses on the Canadian case of broadband development.

Canadian Broadband

A bandwidth revolution is underway in Canada driven by an explosion in computing power and access to the world's fastest research network. (Lawes, 2003, p. 19)

As is the case almost everywhere, the development of broadband in Canada began with narrowband Internet. Canada's main broadband initiative, CANARIE (Canadian Network for the Advancement of Research, Industry and Education), can be traced to regional-federal cooperative network principles established by NetNorth (forerunner to Ca*net) in the late 1980s and growing public and private sector interest in developing high-speed networks during the early 1990s (Shade, 1994). By 1993, CANARIE emerged as a not-for-profit federally incorporated organization consisting of public and private sector members. Its goal was to create a networking infrastructure that would enable Canada to take a leading role in the knowledge-based economy. The initial three-phase plan to be carried out within an eight-year period was expected to cost more than $1 billion with more than $200 million coming from the federal government. The objectives of the first phase were to promote network-based R&D, particularly in areas of product development, with expected gains in economic trade advancement. The objectives of the second phase were to extend the capabilities of CA*net to showcase new technology applications that advance educational communities, R&D, and public services. The objective in the third phase were to develop a high-speed test network for developing products and services for competing internationally in a knowledge-based economy. CANARIE's overarching aim in the first three phases was to leverage Canada's information technology and telecommunication capacities in order to advance the Canadian information economy and society. By the end of CANARIE's three phases, high-speed optical computing networking technology connected public and private institutions (i.e., universities, research institutes, businesses, government agencies and laboratories, museums, hospitals, and libraries, both nationally and internationally) (Industry Canada, 2003). CANARIE's contribution to sustaining the Ca*net 4 broadband network (now in its fourth generation) made it possible for networks to share applications, computing power, and other digital resources nationwide and internationally.

CANARIE also provided funding for a number of organizations carrying out innovative initiatives requiring broadband technology, including Absolu Technologies Inc., Shana Corporation, HyperCore Technology Inc., Cifra Médical Inc., Broadband Networks Inc., Callisto Media Systems Inc., The Esys

Corporation, PacketWare Inc., NBTel InterActive, Nautical Data International Inc., and Miranda Technologies Inc. CANARIE has funded more than 200 projects involving 500 Canadian companies and providing an average of 30% of total project costs (CANARIE, 2003).

BACKGROUND

Recent broadband-based research and development initiatives in areas of interinstitutional networking and learning object and learning object repository development are particularly relevant to the field of human-computer interaction (HCI). A growing number of broadband-based research and development projects is appearing worldwide, such as, ICONEX (UK), JORUM (UK), JISC Information Environment (UK), AESharenet (AU), COLIS project (Australia), TALON Learning Objects System (US), and Multimedia Educational Resource for Learning and Online Teaching (International).

Over the last decade, a number of important interinstitutional networking and learning object repository initiatives were spearheaded in Canada. Through the advancement of grid computing, satellite communications, and wireless networks, computers in research labs around the world and in the field could be connected to a computer network, allowing users to share applications, computer power, data, and other resources. Canada's broadband network provided a technology infrastructure for a wide range of large-scale research and development initiatives, such as virtual astrophysics communities (Canadian Virtual Observatory), microelectronic online testing (National Microelectronics and Photonics Testing Collaboratory), remote satellite forest monitoring (SAFORAH), and brain map database sharing (RISQ), SchoolNet, and the Canadian Network of Learning Object Repositories. SchoolNet was a federal government institutional networking project developed in 1994 to increase connectivity to public schools and to promote social equity by allowing all Canadian schools and public libraries to be interconnected, regardless of geographical distance. Through this project, Canada became the first country in the world to connect all of its public schools to the Information Highway (School Net, 1999). Another major initiative was the Canadian Network of

Learning Object Repositories (EduSource Canada) created in 2002 to develop interoperable learning object repositories across Canada. EduSource Canada sponsored a number of learning object repository projects, including Broadband-Enabled Lifelong Learning Environment (BELLE), Campus Alberta Repository of Educational Objects (CAREO), and Portal for Online Objects in Learning (POOL).

NON-TECHNICAL ASPECTS OF BROADBAND TECHNOLOGY

Key Non-Technical Problems of Broadband Technology

A selected review of federal government databases on major broadband initiatives in Canada over the last decade reveals a number of problems highlighted in government documents and news reports on government broadband efforts. Particularly salient are problems revolving around public knowledge, education, and systemic organization.

Problem of Public Knowledge

Although more than $1 billion was invested in CANARIE's projects, very few people know of its existence. With little public knowledge of its existence, CANARIE is in danger of being eliminated through economic cutbacks. Efforts to gain media attention have not been effective. Despite the presence of numerous CANARIE-sponsored gophers, Web sites, and press releases, there is a paucity of public information available in popular media.

Problem of Education

The success of projects like SchoolNet was measured in terms of how many computers there were in schools and libraries and how many were connected to the Internet. One major criticism was that efforts from project leaders to promote public interest overemphasized the physical aspects of computers and connectivity and underemphasized how individuals employ technology for educational ends. This partly explains resistance from local network users to participate in many learning object reposi-

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