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PLENARY MEETING

Canada

TELEHEALTH IN CANADA¹

Introduction

Canada has a long and rich history in the use of telecommunications to improve access to health care, principally in response to the isolation and shortage of services in remote communities. In earlier years (mid-seventies) satellites were used to offer services to the far northern communities. More recently, communication technologies are being combined with information technologies to form IT&T combinations which improve access to both services and information.

Over a short period of time (from mid-1996 to now), the private and public telehealth industry in Canada has undergone major changes due to a number of private and public sector developments and initiatives:

- The Information Highway Advisory Council (IHAC) report, Connection Community Content: The Challenge of the Information Highway, released in September 1995, made a number of recommendations regarding the importance of establishing a health information infrastructure in Canada.
- Industry Canada subsequently published an action plan, Building the Information Society: Moving Canada into the 21st Century, which proposed the steps needed to be taken to implement the recommendations of the IHAC report.
- In September 1996, the Canadian Network for the Advancement of Research, Industry and Education (CANARIE) released its report, Towards a Canadian Health Iway: Vision, Opportunities and Future Steps which made recommendations regarding an integrated health information network, the creation of a Council of senior leaders to facilitate the

¹ The material contained in this paper has been drawn from a number of sources, particularly the report on The Telehealth Industry in Canada: Background Study to a Sector Competitiveness Framework, a study which was undertaken by the author for Industry Canada, over the period 1996-97. The final version will be published in both official languages in early 1998, to be made available on Industry Canada's web site: <http://Strategis.ic.gc.ca>.

development of a Canadian Health Iway, the funding of high-priority demonstration projects and pilots, and a review of opportunities for the Canadian telehealth industry.

- In February 1997, the National Forum on Health released its final report, Canada Health Action: Building on the Legacy. The report contained a number of recommendations including that of the development of a nation wide, population-health information system.
- The Federal government's budget of February 1997 included an allocation of \$50 million to put in place a new Canada Health Information System and a Health Transition Fund of \$150 million to help provinces launch pilot projects to investigate new approaches to health care, including home care.
- The Stentor Alliance, which groups together 11 telephone companies across the nation recently created an Innovation Centre, a virtual centre focussed on new health and educational businesses.
- The CANARIE Technology Applications Development (TAD) programme has targeted health and telehealth technology development and 17 innovative Canadian-based telehealth applications have been approved.
- At a CANARIE Conference on Telehealth in April 1997, Telehealth in Canada: Clinical Networking, Eliminating Distances, 40 papers highlighting a wide range of new projects were presented showing the rapid change and achievement of this emerging field in Canada (<http://www.canarie.ca/telehealth>).

Telehealth defined

There have been many definitions of telemedicine in the literature, but few definitions to aptly define telehealth, an integrating and more holistic term encompassing all of the telematics applications in health and health care. As defined, it embraces a wide range of traditional telemedicine practices and activities, as well as newer applications combining medical and health informatics and telematics systems and applications. For purposes of this report then, the following definition will be used to define the field of telehealth:

Telehealth is defined as the use of communications and information technology to deliver health and health care services and information over large and small distances.

Telehealth permits the transfer of different kinds of health data and information: provision or confirmation of a diagnosis, surveillance and epidemiological, management, clinical and research information, literature search and retrieval, health and wellness, health and medical educational content.

Based on the most common combinations of system, content or information, users and their locations, objectives and aims for different telehealth activities in Canada, the different telehealth applications were grouped together under five general categories, as shown in **Table 1** below.

TABLE 1
Telehealth categories and users

Category	Users
1 All forms of medicine at a distance: teleconsultations, telepathology, teleradiology, telepsychiatry, teledermatology, telecardiology, etc.	Physicians Health care professionals Health care institutions
2 Inter-institutional, patient and clinical records and information systems, electronic health and clinical records and databases accessible by network.	Health care institutions Health care professionals Health care workers Physician's offices Researchers
3 Public Health and Community Health Information Networks (CHINs) and multiple-use health information networks.	Government (including policy makers) Epidemiologists Public health professionals Physician's offices Pharmacies Clinics and CHINS
4 Tele-education and multimedia applications for health professionals, and patients, and networked research databases. Internet services.	Universities and Colleges Associations Researchers Physicians Health care professionals Patients
5 Telemonitoring, telecare networks, telephone triage, remote home care, and emergency networks.	Consumers Elderly Chronically ill Disaster victims Accident victims Telenurses Call centre users or operators

A portrait of Canadian telehealth activity

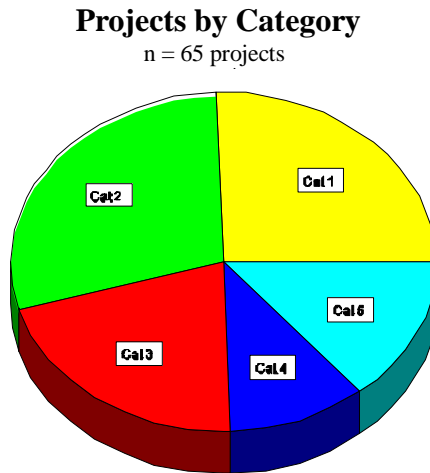
Canadian telehealth projects were classified along the five categories provided in **Table 1** above. The relative distribution of the categories for 65 of a total of 85 projects is shown in **Figure 2**.

The composition of telehealth business is changing. Telehealth applications are integrating and multi-purpose networks are growing. Telehealth projects five to ten years ago were mainly driven by remote consultation needs (telemedicine), but today most of the projects serve several functions.

More information about each one of these projects is found on Industry Canada's web site: <http://strategis.ic.gc.ca/cinch>.

Organizations involved in telehealth in Canada

A review of the projects revealed how increasingly, both public and private sector organizations are involved in Canadian telehealth practices. Based on the original 65 projects, there were seven main organizational types involved:



government (in 38 projects)
private sector (in 29 projects)
universities, colleges and research institutions (in 18 projects)
hospitals (in 16 projects)
institutes and associations (in 8 projects)
foreign organizations (in 5 projects)
other health care facilities (in 3 projects)

FIGURE 2

Canadian telehealth projects by category

Source: Project database, as of 1 April, 1997

By its very nature, telehealth requires the close collaboration of private and public sector partners.

Among the important differences between telemedicine activities of old and current developments is that private sector involvement is more prominent. In our original database, four main types of companies were involved and some companies participated in more than one activity: 1) companies which offer telecommunications and network products and services, 2) IT and electronic record companies, 3) workstations, videoconferencing and software development companies, and 4) medical equipment and system integrators. Since that time we have been able to identify over 400 telehealth companies in Canada.

In the summer of 1997, 121 companies had registered themselves in an Industry Canada database of Canadian companies. 50% of these registrants claim that telehealth is their principal business, or one of their main activities. A detailed analysis of these company profiles shows that 30% of these companies are dependent chiefly on telehealth business. The Canadian telehealth companies are either very large such as computer manufacturers and telecommunications carriers, or small, such as software developers, consultants, R&D, or service providers. Many companies are drawn from IT&T, and electronic and electrical industries. Employment in telehealth in Canada is estimated at around 1 700 people. The industry is young: 20% of the companies were created in 1997.

Technological change

The telehealth industry shares a number of characteristics with other industries which form part of Canada's growing knowledge-based economy. Telehealth is technology-intensive, another characteristic of knowledge-based industries, as it involves computers and information technology, networks, multimedia, and (in more experimental applications) artificial intelligence, robotics and virtual reality.

Recent technological evolutions owing to spectacular advances in telecommunications and information technology in the past 2-3 years have caused dramatic reductions in size and cost coupled with increases in capacity and speed. A brief list of the technological changes being experienced in this industry in Canada include:

- **Old technologies** being used in new ways: telephone triage, tele-counselling and help lines are examples.
- **Integration:** most systems and projects are being used for more than one application. Moreover, strategic planning and implementation now tends to involve the whole health care community so that systems can benefit all users.
- **EDI:** There is evidence Canadian hospitals are adopting EDI to save administrative costs related to inventory.
- **Standards:** Canada is no exception in struggling with the issues brought about by different standards which would permit greater interoperability of systems - this issue is being addressed by the Canadian Institute of Health Information.
- **Internet:** Canada has one of the fastest growing populations of internet users. Health information has become so popular that health web sites are reported to be some of the most popular sites in Canada.
- **Infrastructure development:** Most telephone companies in Canada are currently stepping up capacity and penetration of their networks, and plans are underway for province-wide health networks in most provinces.
- **Call centres:** The health care system has been able to adopt call centre technology to alleviate the pressure on the emergency hospital rooms by installing triage systems, notably in Quebec (info-Santé) and New Brunswick (Telecare).

For most health care professionals, the central focus of the new telehealth era is the penetration of the electronic health record, of faster access to information even before it is published, of more versatile desktop multimedia tools. At the community level, hospitals are being fused, downsized, shut down, and modified to handle ambulatory care clients.

Major challenges and issues in telehealth in Canada

- The industry is in its infancy and potential users have little knowledge or experience in the field. In Canada there is but one University offering a formal programme of health telematics training.
- 30% of the Canadian telehealth projects involve medicine-at-a-distance, but physicians are not remunerated and not licensed to practice outside their own geographical area.
- Tele-triage systems now promote the use of the telephone thereby allowing nurse-practitioners to provide health care advice. However, potential liability issues exist.

- Health care reform is encouraging ambulatory care and shorter hospital stays but few technologies are available in Canada, and few professionals are aware of the range of the technologies available.
- Confidentiality, privacy and security on the health networks are still causing concern among patients and providers alike.

Some reasons for these challenges are apparent:

- The telehealth industry is young and many of the applications are custom-designed, one-off installations.
- Many intra-hospital informatics systems belong to previous computer generations; legacy systems which have not been retrofit for extra-mural communications.
- Best practices are not well known to practitioners.
- Appropriate tools for measuring cost effectiveness and cost benefits have rarely been used in planning new systems.
- Multiple stakeholders are involved in the implementation of most telehealth systems.
- While there is a demonstrated need for turnkey, trouble-free telehealth systems, there are very few companies capable of providing such services.
- Stable financing is difficult to find for both the private and public industries.
- The evolution of telehealth related technologies is so rapid that even small, young companies must invest with caution in any given product or system.

Financing telehealth in Canada

In 1996, Canada spent an estimated \$75.2 billion on health, 9.5% of the GDP, and \$2 511 per person. Though the distribution of health care expenditures did not include special budgets for telehealth, the health care reform movement in Canada, increases in medical information, in ambulatory care procedures, in the size of the ageing population along with the shortage of specialists in remote regions are all contributing to the need to adopt telehealth systems to substitute for some of the traditional and more expensive ways to deliver health care in Canada. Thus:

- the telehealth industry in Canada is expected to generate expenditures of C\$1.6 billion over the next 5 years;
- close to \$800 million will be spent in Canada over the next 3-6 years if one considers all the categories of telehealth applications;
- an estimated additional \$300 million will be spent on infrastructure development.

Telehealth R&D

Early telehealth research was funded entirely by government sources. The investment climate in Canada has recently been favourable for companies engaged in the knowledge industries and high technology sectors because of tax incentives and availability of different sources of funding for R&D. The reimbursement and licensing problems have discouraged implementing operational applications and encouraged telehealth R&D. CANARIE, the federal government Communications Research Center (CRC), the regional agencies, provincial government funding, innovation-development funds such as Innovatech in Quebec, and various S&T programmes such as the National Centres of Excellence (NCE) have all been tapped for telehealth R&D by different Canadian organizations.

The international profile of the Canadian telehealth industry

The Canadian telehealth industry possesses a number of distinct advantages for international markets:

- telehealth in Canada is often multidisciplinary and tends towards integration;
- telehealth projects are part of Canada's health care system, which is well managed and respected internationally;
- Canadians have pioneered distance applications and gained an excellent international reputation in education and training.

Canadian telehealth organizations enjoy a high profile internationally. Canadian telehealth companies are active in Latin America, in the far east, in Africa, in Europe, and in the Middle East. Over 85% of Canadian companies involved in telehealth claim they are already exporting. Their product offerings include diagnostic software, encryption, imaging, mobile stations, networking and video products, patient record software, peripherals, publications and databases and telecare products. Service offerings include consulting, emergency care, multimedia production, management, R&D and teletraining. Several universities are providing health continuing education and training in a number of foreign countries. Canadian telehealth organizations are present in all nine of the G7 global health care application sub-projects, and leading in two of these. A number of Canadian organizations private and public participate in the EC framework programmes. Tele-guided surgery has been successful between Canada and Japan and between Canada and France.

In conclusion

Though the telehealth private and public industry is small and the health care system undergoing important structural changes in Canada, there is a bright future for the development of a health information highway and newer telehealth applications in this country. The R&D and export capacity of the Canadian telehealth industry indicates that this industry is ready to offer a large range of services and products on the international market. An ageing and demanding consumer will no doubt provide more impetus for the development of home telecare systems, as well as more easy-to-access health and wellness information on the Internet.
