



## CHAPTER 4

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# THE REMOTE COMMUNITY SERVICE TELECENTRES OF NEWFOUNDLAND AND LABRADOR, CANADA

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### LOCATION AND CONTEXT

The Remote Community Services Telecentre (RCST) project was originally envisaged as an initiative to develop and test the concept of a wireless multifunction telecentre for rural and remote communities in Newfoundland and Labrador, Canada's easternmost province, with facilities spread across the island portion (Newfoundland) and the northern mainland portion (Labrador).

The island of Newfoundland (united with part of Labrador on the mainland in 1949) is Canada's seventh largest province, covering an area of 405,700 square kilometres (293,400 square kilometres of which are in Labrador). With a total provincial population of 551,700, this equates to a population density of 1.4 persons per square kilometre, and considerably less than in Labrador whose population is about 29,200. The province's population is distributed across several major centres and a large number of small rural communities located primarily along the coastline. This dispersal provides major challenges in the delivery of government services, particularly healthcare, education, and economic development services, to the remoter communities.

The economic base of the majority of these communities is primarily the fishing industry, followed by forestry and mining. The collapse of the northern cod stocks in the early 1990s and the subsequent moratoriums on the stock have had dramatic impacts on many of these communities, including increased levels of unemployment and out-migration. While the fishing industry has recovered to some extent through a focus on other species such as crab and shrimp, many of the small communities are still struggling to redefine themselves economically in the post-moratorium world. At the same time, budgetary pressures on the federal and provincial governments have reduced expenditures on education and healthcare and affected service delivery to these rural and remote communities. For education, this has meant reduced course offerings in many rural schools; for the healthcare system, it has meant reduced staff

resources, reduced access to specialist services, and the closing or downsizing of rural healthcare facilities.

The RCST project represents a continuation of Newfoundland and Labrador's efforts to use information technology to improve service delivery to this widely dispersed population base. Newfoundland's Telemedicine/TETRA (Telemedicine and Educational Technology Resources Agency) facility, part of Memorial University, has been providing telemedicine and tele-education services to the province for more than 20 years. TETRA operates a network that serves more than 150 communities and provides audio and audiographic conferencing services to the health and education sectors and a range of health services at a distance including EEG (electroencephalogram), ultrasound, nuclear medicine and teleconsultation. Kindergarten to grade 12 educational services have been provided to all schools across the province through STEM-Net, the Newfoundland and Labrador educational network, and the Internet. The Enterprise Network, which operated from 1990 to 1996 and used information technology to stimulate and support economic development in rural communities, created and operated Canada's first telecentres in six communities.

## **HISTORY**

The RCST project arose out of a realisation that a multipurpose approach to service delivery was the most effective way to create a network that would be viable and sustainable in the long run. While previous initiatives such as the Enterprise Network had been successful in servicing a specific sector and supporting rural economic development, the single-sector approach was difficult to sustain on an operational basis. At the same time, it was recognised that while the cost of bringing high-speed network services to rural communities was cost-prohibitive for individual organisations or user groups, this could be viable under a shared-facility model. This led, in 1997, to the development of a conceptual model of a wireless multifunction telecentre, the wireless aspect being based on the assumption that satellite and terrestrial wireless technologies would be best suited to communities or regions with limited telecommunications infrastructures.

A working group was established to develop this concept, formed from two Newfoundland information technology companies with their origins in the Enterprise Network. These companies, Futureworks Inc. and Collaborative Network Technologies Inc. (Colabnet), were formed by the former senior executives of the Enterprise Network with the intent of focusing on the application of information technology to rural and remote communities. Working with TETRA, the RCST group formalised the initial telecentre concept and efforts were made to fund development and field trials. While developing the technology infrastructure, the group also made contact with Canada's national satellite company, Telesat Canada, which had been working on a similar model under its Community Centre concept. In 1998, the RCST group was formalised through the addition of Telesat Canada and Industry Canada's Communications Research Centre to the Newfoundland partners. A further partner, QTECH Inc., was added later to provide some additional technology to the project.

By mid-1998, the RCST group had secured funding to begin the development and validation of the initial RCST concept. With Can\$150,000 investments from CANARIE Inc. and Operation ONLINE Inc. (the Newfoundland and Labrador government's agency for supporting the information technology strategy), plans were made for prototype facilities in Ottawa (at Telesat's headquarters) and St. John's (at TETRA).

Once these sites were validated, field sites were to be established in Goose Bay and Nain (both in Labrador). The St. John's, Ottawa and Goose Bay sites were to use satellite technology, while Nain would use traditional terrestrial communications.

While the initial planning and design work was under way, the group was successful in securing an initial investment of Can\$750,000 from the European Space Agency under a reciprocal agreement with the Canadian Space Agency. This allowed all sites to be implemented as satellite sites, and for additional sites to be established in Labrador (at Forteau) and on the island (at Twillingate). Subsequent funding from the federal government (Health Canada, which provided Can\$199,000) and the provincial government (the Department of Health and Community Services, which provided Can\$106,000) allowed for the implementation of yet another site at Port aux Basques. All of these telecentres were operational by March 1999, with the exception of Port aux Basques, which became operational in August of that year.

## **AFFILIATIONS AND STRATEGIC ALLIANCES**

In addition to the national and provincial affiliates mentioned above, the RCST has strong links with a growing number of user agencies in Newfoundland and Labrador.

Each of the telecentres within the RCST network has a specific focus and design that corresponds to the needs of the communities it serves. In all of the centres except Forteau, the primary requirement has been healthcare delivery and in Goose Bay, Nain, Port aux Basques and Twillingate, the primary sites are healthcare institutions. The primary partners and user groups at these sites are the regional healthcare boards, healthcare professionals and community health and health education groups.

In Port aux Basques, Twillingate and Goose Bay, the project has partnered with the federal and provincial health departments to develop and test new approaches to primary healthcare delivery in rural communities, the TEACH (Telecentres for Education and Community Health) project focused on primary care, medical professional development and community health education. This has brought a number of new user groups to these sites, including Memorial University's Faculty of Medicine and the province's Centre for Nursing Studies.

While healthcare has predominated in the initial implementations of the RCST sites, there has also been a steady development of other user demands. Pilot projects are under way with the College of the North Atlantic, the provincial college system, to deliver courses from its Distance Learning Centre into the RCST communities. And, in support of this, secondary sites have been implemented in several RCST communities using wireless technologies. The centre in Forteau has focused primarily on economic development and has built a user base from the business and community development sectors.

The provincial and federal judicial agencies are piloting the delivery of judicial services in Labrador through the RCST infrastructure, while several departments, including Human Resources Development Canada, are participating in a project to deliver a range of government services into Port aux Basques through a community networking trial.

## **FUNCTIONS**

The development and implementation of specific user applications within the RCST project is guided by a formal Application Plan maintained and carried out by the project

team. Given the wide range of potential applications that could be implemented within the RCST, the definition of a set of core applications for the project was felt to have distinct advantages from a management and implementation perspective. The Application Plan, which was completed in the spring of 1999, has since been updated and is maintained on an ongoing basis. The plan gives the project:

- a focus for the application, planning and implementation process;
- a direction for ongoing technical planning, by identifying which facilities and technologies have to be available to support the selected applications;
- a planning mechanism under which potential new applications have been assessed and integrated into the plan for implementation as part of a structured process; and
- a mechanism to identify the resources — human, financial and technical — required in support of the applications.

The RCST has currently implemented 13 specific applications across six areas:

- telemedicine
- tele-education
- government services
- Internet services
- business/community services
- other

These are not intended to be the only applications implemented through the RCST scheme, but they do represent the core set that has been systematically planned, implemented and evaluated. As the service has progressed, additional applications have been added to the plan, based on user demands or the inclusion of new sites and their requirements within the project. Table 4.1 lists the core application set.

*Table 4.1: Core applications of the Remote Community Services Telecentre project.*

APPLICATION FAMILY	APPLICATION
Telemedicine	Medical data transfer Video consultations Store and forward consultations
Tele-education	Medical professional development Nursing education Post-secondary education
Government services	Judicial services Government kiosks
Internet services	Internet access Web casting
Business/community services	Videoconferencing Telework
Other	Technology demonstrations

Table 4.2 shows the current distribution of applications over the telecentres, although it should be noted that an application may be deployed in additional sites should user demand warrant it.

*Table 4.2: Distribution of applications by centre in the Remote Community Services Telecentre project.*

APPLICATION	GOOSE BAY	NAIN	FORTEAU	TWILLINGATE	PORT AUX BASQUES	ST. JOHN'S
Medical data transfer	X					X
Video consultations	X	X		X	X	X
Store and forward consultations	X	X				
Medical professional development	X			X	X	X
Nursing education	X	X	X	X	X	X
Post-secondary education	X	X	X	X	X	
Judicial services	X	X				
Government kiosks	X	X				X
Internet access	X	X	X	X	X	X
Web casting	X	X	X	X	X	X
Videoconferencing	X	X	X	X	X	X
Telework			X			
Technology demonstrations	X	X	X	X	X	X

During the initial operations of the RCST, a number of unique and innovative services have been provided to the user communities. Examples include:

- a full-time teleconsultation linkage between the Nursing Centre in Nain and the regional facility in Goose Bay for emergency medical applications (This is used for asynchronous “store and forward consultation,” where the remote medical staffer captures patient data (text, audio, image, video) and uses an e-mail-like software tool to assemble this into a consultation record. This is transmitted to the receiving site where another physician reviews the data and transmits back a possible diagnosis and treatment plan.);
- a provincial government pilot distance course for nurse practitioners in Nain, Goose Bay and Twillingate (Nurse practitioners are nurses who can also perform some of the duties of a physician in rural and remote communities where such a person is not readily available);
- links for Scouts, Guides and other community groups, enabling them to share experiences over the network; and
- links between students in St. John’s and their counterparts in rural Newfoundland and Labrador.

One particularly innovative use of the system involved the launch of a new software product designed to encourage school children to consider careers in information technology. The launch was organised from St. John's and Web cast, with the launch site connected to the RCST site in Forteau by videoconference. This meant that as the product was being launched, the students in St. John's could see the students in Forteau viewing the Web cast, and the students in Forteau could ask questions of the group assembled in St. John's.

## **COSTS AND FUNDING**

The total projected budget for the RCST through to April 30, 2000, was over Can\$2 million. The period extending from July 1998 to April 2000 was considered the research and development phase of the project, and as such there has been no imposition of user fees to date. The project has so far operated with Can\$1.4 million secured from the funding partners, the contribution of satellite airtime by Telesat Canada, and the remaining financing coming directly from the RCST project partners. The long-term operating model is for the RCST to operate as a commercial network, funded through network access fees as well as fees for professional services such as applications development, training and evaluation.

In the original planning documents for RCST, it was assumed that each telecentre would be made self-sustaining as a shared community resource. However, the current business model deals with the financing and operation of all the sites as part of a common network. Two major factors in this change of direction were (1) the emergence of major institutional user groups such as government departments and regional healthcare boards, which could potentially sustain facilities within their communities, and (2) the refinement of the satellite airtime management system to more easily assign airtime costs to specific users and applications. To manage the transition of the RCST network from a research and development initiative to a self-sustaining commercial venture, a number of the project's partners created a new private company, Equidistant Inc., as the vehicle for commercialisation.

## **ACCOMMODATION**

In all of the communities other than Forteau, the primary site containing the satellite earth station is located in the local hospitals or nursing clinics. At the hospital sites in Twillingate, Goose Bay and Port aux Basques, multiple-access points have been created to allow for the delivery of not only clinical services (i.e., emergency teleconsultation), but educational or public access services as well.

The Forteau facility is located in the former Enterprise Network telecentre facility, and has connected several rooms in the facility for Internet access and videoconferencing services. The latest development in the RCST model has been to use high-speed (4 Mbps) wireless technology to expand services to other locations in the community. This has been done primarily to provide a wider range of public access options outside the healthcare facilities and place applications delivery at more appropriate sites (e.g., placing course delivery at the college sites). At the time of writing, this facility had been implemented in four communities:

- *Nain* — wireless link to the Community Centre
- *Goose Bay* — wireless link to the Rural Academic Centre and the College of the North Atlantic

- *Port aux Basques* — wireless links to government offices Human Resources Development Canada (HRDC), the local economic development agencies, the College of the North Atlantic, the public library and some private companies
- *St. John's* — wireless network extension to the offices of HRDC

## MANAGEMENT

Overall management of the RCST project is provided by a Management Committee, comprising senior representatives of the project partners, which meets on a monthly basis. Day-to-day project management is provided jointly by Telesat Canada (Mr. Abdul Lakhani) and Colabnet (Mr. Keith Sheppard). The Management Committee is supported by two groups drawn from the project partners: a Technology Team, responsible for the design, implementation and management of the project infrastructure; and an Applications Team that designs, develops and supports the actual user applications. The management process is further supported by two Advisory Committees drawn from key user and service provider groups in the health and education sectors. The Health Committee includes representatives from the Department of Health and Community Services, the Memorial University Faculty of Medicine, the Centre for Nursing Studies, and the regional healthcare boards. The Education Committee includes representatives from the Open Learning and Information Network, the College of the North Atlantic, the Department of Education, and the Memorial University School of Continuing Studies.

## STAFFING

Staffing for the RCST project team was drawn primarily from the project partners. The division of labour among the partners is as follows:

- *Telesat Canada/Communications Research Centre* — provides communications infrastructure design, implementation and support
- *TETRA* — provides telemedicine and tele-education application development and support
- *Colabnet* — provides network infrastructure design and implementation and applications development
- *Futureworks Inc.* — provides human systems design and implementation and evaluation
- *QTECH* — provides government kiosk applications

As the project progressed, a number of new staff were added to keep up with user demand, primarily in the applications development and support areas.

The original project plans envisaged reliance on volunteer staff at the project sites and this is indeed how most sites have operated. However, one of the major lessons learned from the project so far has been that demand tends to outstrip the abilities of the volunteers to keep up with the workload. On the basis of such feedback from all the sites, it was decided to secure funding for full-time Site Co-ordinators in each community. The first of these was appointed in late 1999 and the provision of a Site Co-ordinator is now part of the base budget for all new sites. The primary duties of a Site Co-ordinator are to:

- promote the site and its services locally;
- build awareness of the site and its services with the local user community;
- assist the local community with developing new applications or services around the facility; and
- provide support to users of the facility.

## **TRAINING MANAGERS, STAFF AND USERS**

Three specific training strategies have been developed and implemented within the RCST system.

The first of these is a week-long formal training programme that all Site Co-ordinators must undergo before taking over their centres. This programme is delivered at the RCST site in St. John's. It is customised according to the current skill levels of the Co-ordinators, but typically covers:

- standard telecentre technology platforms,
- satellite communications systems,
- community entry and interaction,
- core user applications,
- technical and user support processes, and
- the RCST philosophy and operating guidelines.

The second element is a site introduction or orientation programme for all new telecentres. Once a new centre has been completed and commissioned, a team comprising technical and applications support staff goes onsite to conduct a number of hands-on training sessions on the technology platform and standard applications for the various user groups. This programme is customised for each community. It is based on planning sessions held with the key user groups and always includes a number of open-house sessions where core community groups and the community in general can learn about the services and consider how to initiate new applications within the community.

Third is the specific training or in-service programmes that are provided to address new applications or technology elements as these are introduced into the various sites. These training sessions are carried out on an as-needed basis, face to face or in distance mode over the RCST network.

## **PUBLICITY**

A number of mechanisms have been used to disseminate information about the RCST project on an ongoing basis. A Web site has been established ([www.rcst.net](http://www.rcst.net)) to provide basic information about the project and regular updates on its progress. A monthly RCST newsletter is published and distributed electronically to the user and partner communities. This information is also used to update the RCST project page on the European Space Agency Web site. The RCST prototype sites in Ottawa and St. John's, which represent full working RCST facilities, are another invaluable promotional tool. These have been used for over a hundred technology and applications demonstrations for national and international delegations, including a number from Africa, Asia and South America.

## **ACCESS**

Hours of operation at RCST facilities are typically from 8:00 a.m. to 11:00 p.m. Monday to Friday, with weekend access or applications on an as-required basis. However, while the local partners have made a number of accommodations for access and hours of use, the placement of the vast majority of these telecentre facilities within healthcare institutions has affected the implementation of non-health activities and the public's access to them. This has led to the development of multiple-access points in a number of communities, a trend expected to spread to the other RCST sites and reflected in the design of new sites.

## **TECHNOLOGY**

The design philosophy behind the RCST technical model was to create a platform that was as cost-effective as possible, using off-the-shelf components wherever available. The basic communications technology was an IP-based satellite bandwidth-on-demand (BoD) system located at the primary site in each community. The BoD system allowed for the allocation of bandwidth ranging from 19.2 Kbps to 2 Mbps to each site on an as-needed basis, using a scheduling system that allowed sites to book connections based on applications demand. This model is considerably more cost-effective than traditional satellite systems that require a community to buy a dedicated block of airtime geared towards their heaviest bandwidth consuming application. Under the RCST's BoD model, communities buy only the bandwidth they need for the time slots needed. The BoD model also allows a pool of bandwidth to be acquired and shared among a number of communities on a managed basis, thus providing each community with a higher level of service than it would be able to afford on its own.

Where the RCST network is based on standard Internet protocols, standard Internet compatible devices can be used within the telecentres. High-quality videoconferencing for medical, education, business and government applications is provided by adapting a standard H.323 videoconferencing system (Intel TeamStation) as a standard device in the centres, with specific customisations for individual applications. Each site is also equipped with its own IP-based Ethernet local area network, to which are attached workstations for Internet access or units optimised for multimedia distance education courses. A basic RCST facility consists of a server (UNIX), an H.323 videoconferencing system with medical peripherals for telemedicine applications, a distance education workstation optimised for applications such as MS-NetMeeting and several general workstations for Internet access.

The central network site in St. John's provides for network management as well as access to shared facilities such as the Internet through an external Internet service provider and linkages to external networks such as the national CA-Net II research and education network.

## **RESEARCH AND EVALUATION**

A number of evaluations have been carried out on the RCST project, including a series of baseline focus groups and interviews organised in late 1998 and an interim evaluation in late 1999. To support these processes, a number of tools and techniques have been developed, including protocols for focus groups and key informant interviews, user feedback forms, and statistical analysis of usage data. At the time of writing, the final

summative evaluation had not been completed (being due in late 2000), but the initial feedback from the user groups and service providers has been positive and indicates ongoing support for the RCST service.

A separate evaluation process was conducted with the healthcare community under the aegis of the TEACH project. While this evaluation focused primarily on the delivery of healthcare and health education services, its results again bode well for the full RCST evaluation. Among the significant findings:

- Growth in usage was rapid, from 224 hours of use in August 1999 to more than 1,000 hours by December 1999.
- Ninety-eight per cent of the telecentre clients said that they would use the facility again, and 97% said that they would recommend it to a colleague.
- Eighty-eight per cent of telecentre clients rated the facilities as either “excellent” or “very good.”

## CONCLUSIONS

The key success factors in the RCST system to date have been the stability and the reliability of the technology platform, and the flexibility demonstrated in developing and implementing the new applications. The BoD technology has worked very well and has made possible a range of services for the project sites that were not previously available. In particular, the quality of the videoconferencing services being delivered and the ability to adapt this system to handle multiple applications have been major factors in the rapid acceptance of the health applications and expansion into other areas such as video-based lectures and remote judicial services.

The primary limitation has been the lengthy time-cycle required to develop and deliver the new applications. This is mainly due to the need to work closely with both the user groups and the service providers in order to convert services for effective distance delivery. The telecentres were also originally limited by the fact that the video services were point-to-point and that it was difficult to justify delivering college courses to single communities. This was corrected in late summer 2000 when the RCST network rolled out a multi-point bridging facility with the capacity to connect up to six sites concurrently for conferencing sessions.

There are several important lessons in the RCST project that should be considered by any communities looking to establish similar facilities:

- Dedicated local staffing is crucial to successful telecentre establishment. While volunteers can play a major role in building and sustaining a telecentre, there is a need for one individual whose only focus is building use of the telecentre by the community.
- It is important that a formal, structured process be used to define, design and implement new services for the telecentres.
- The applications development process can be expected to take longer than projected.
- The single facility model may work well for sites with a single-application focus, but the access issues associated with the multipurpose telecentre model are better addressed through the provision of multiple access points in a community.

- Even though the RCST model is multipurpose, an initial telecentre establishment should focus on a core application set such as telemedicine or telelearning/training and then use this to build community awareness and demand for additional services.

The RCST experience shows that there will be increasing demand for the use of network technologies to enhance service delivery for and between rural and remote communities. An interesting aspect of the RCST project that bodes well for the future is that, although the original plan for the project envisaged user service demand being the key element in building the service, in fact that demand by service providers across multiple sectors has ended up playing an equally important role in the operation and expansion of the service. The acceptance of network-based service delivery by a wide range of public sector service providers creates an environment in which the establishment and viable operation of telecentres can be easier to finance and justify.

The RCST model was subsequently used as the basis for the Smart Labrador project that is being supported under Industry Canada's national Smart Communities Initiative. This three-year, Can\$11 million project will see the development and deployment of a wide range of technology-based services to more than 20 communities in Labrador starting in late 2000.

