Yukon ICT Sector Strategic Plan

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BDC
Entrepreneurs first

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Executive Summary

The ICT sector is strategically important. The sector (comprised of ICT manufacturing, services and wholesaling):

- Makes a significant contribution to economic growth through high paying jobs;
- Creates products and services that enable businesses to improve productivity and value creation, and extend their reach beyond domestic markets;
- Enables communications and export of knowledge-based products and services, thus enabling providers of these products and services to locate and grow their businesses in the Yukon;
- Enables and advances the delivery of government services, including education and health care; and
- Enables quality of life for all Yukoners through general Internet access to knowledge and services.

The ICT industry in the Yukon is also relatively stable and non-cyclical, providing a counter-balance to the highly cyclical natural resources industries that have driven recent economic growth in the Yukon (GDP increased by 5.7% in 2011, the second highest growth in Canada).

The last strategic plan for the Yukon ICT sector, completed in 2002, was the catalyst for significant growth in the sector through collaborative initiatives to stimulate investment, stabilize government spending on ICT and increase import substitution. The introduction of a favourable purchasing policy by Yukon Government enabled Small and Medium-sized Enterprises (SMEs) in the ICT sector to develop and grow. However, the local, national and global ICT landscape has changed significantly since 2002 and growth of the sector has slowed. A new plan is required to reflect the current situation and guide the sector toward increased growth and development.

Building on the 2002 plan, this strategic plan examines the current state of the Yukon ICT sector, including the challenges it faces and opportunities, and applies the findings of broad stakeholder consultation, a public survey, and lessons learned from other jurisdictions to chart a course for growth of the sector.

Vision and Goals

This plan envisions that by the end of 2017 the contribution of the ICT sector to Yukon GDP will have increased by 50 per cent, from $48 million (2011; in chained 2002 dollars) to $72 million.

This growth will be driven by the ICT Services sub-sector, including software development; systems support services, telecommunications services and Internet services.

In 2017, the ICT sector will be characterized by a greater number of SMEs, but also a greater number of larger SMEs (in both revenues and number of employees) through the scaling up of micro businesses that have been able to leverage the strategies set out in this plan to invest in and grow their businesses.

Achievement of this growth will require significant collaboration among the key stakeholders

(government, industry, NorthwesTel, academia) to:

- Increase broadband penetration, a proven enabler of economic growth;
- Foster industry collaboration to create opportunities for scale and address supply-side constraints;
- Enhance Yukon Government procurement policies and processes, to enable conditions for investment by Yukon ICT firms;
- Improve access to skills and resources to develop more home-grown ICT workers, and opportunities for employees in the ICT sector to build viable career paths;
- Improve marketing and communications to realize untapped demand in the domestic market and explore export opportunities; and
- Focus on research and development that solves local problems and leverages the competitive advantages of Yukon firms.

Implementation

Yukon Government already plays a role in stimulating the domestic ICT sector through direct funding of various initiatives to encourage innovation and support ICT skills development, and is also funding a telecommunications plan to identify alternatives for government to improve the level of service in this industry in the Yukon. These initiatives align with the plan and should continue to be supported. Furthermore, Yukon Government should continue to provide this kind of strategic, project-based sponsorship in support the sector, in alignment with the plan.

In line with other jurisdictions that have taken a strategic approach to growing the ICT sector, a focal point within Yukon Government should be established to coordinate the strategy for the ICT sector and to provide oversight for implementation of this plan.

The Yukon Information Technology Industry Society (YITIS) is well positioned to foster collaboration within the industry, represent the industry in partnership with government, NorthwesTel and academia, and take the lead in implementing many of the strategies set out in this plan. Yukon Government should support the resources necessary for YITIS to fulfill these roles and build on its previous success in facilitating growth of local ICT companies.

Finally, Yukon Government should also support the appointment of a task force comprised of representatives from government, the ICT sector, First Nations and education and research, to provide integrated advice and recommendations to Yukon Government and YITIS on all aspects of implementing the plan.

Background and Approach

The last Strategic Plan for the Yukon Information and Communications Technologies (ICT) Sector, "Information Technology Sector Strategy," was completed in 2002.

The local, national and global ICT landscape has changed significantly since then and a new Strategic Plan is required to reflect the current state of the Yukon ICT sector and guide the sector toward increased growth and development.

This new plan was developed through primary and secondary research, stakeholder consultation and public input, which specifically includes:

- Research into the linkage between ICT and economic growth (see Appendix A for a bibliography);
- Input from a series of stakeholder discussion groups held in May 2012 with a total of 41 representatives of government, ICT industry, education and research sectors and First Nations;
- Results of a public survey of Yukoners (106 respondents) and Yukon businesses (37 respondents) inquiring into adoption and usage of ICT, conducted from June 25 to July 31, 2012 (see Appendix B for a summary of the survey results);
- Research supplied by the Yukon Bureau of Statistics and the Yukon Department of Economic Development;
- Research into leading practices and lessons learned in other jurisdictions seeking to spur growth in the ICT sector (see Appendix C); and
- Guidance from a steering committee with representation from industry, government, First Nations, and advanced education.

Development of the plan was led by the Yukon Information Technology and Industry Society (YITIS).

Information and Communications Technologies Sector

The Information and Communications Technologies (ICT) sector makes a significant contribution to economic growth, directly (through investment and job creation in the development, production, and sales of ICT goods and services) and indirectly (through creation and distribution of technologies that enable manufacturing, mining, agriculture, retail, and a host of other industries). ICT also enables and advances the delivery of government services, including education, health care, and defence. Furthermore, the 'networked readiness' of an economy (measured by the availability of broadband, computers and software) is highly correlated with competitiveness. Canada ranks number nine of 142 countries in networked readiness (INSEAD, 2012).

ICT also enables economic growth by broadening the reach of technologies such as high-speed Internet and mobile broadband to make it easier for people to communicate and make workers more productive.

Globally, the ICT sector accounted for 5.4% of global GDP in 2008, having created approximately 5 per cent of total GDP growth between 2003 and 2008, and is expected to reach 8.7% by 2020 (McKinsey, 2010).

Governments worldwide have recognized the importance the linkage between ICT and economic growth, and have invested significantly in supporting domestic ICT sectors, e.g., South Korea, Singapore, Sweden, and Australia.

ICT Sector in Canada

Industry Canada defines the ICT sector according to the North American Industrial Classification System (NAICS), which includes:

- ICT Manufacturing (e.g., computer and peripheral equipment, communications equipment (including wired and wireless), electronic components, audio and video equipment, instruments, communication wire and cable)
- ICT Services, including:
    - Software and Computer Services (e.g., software publishers, computer systems design, data processing)
    - Communications Services (e.g., telecommunications services, ISPs, cable services)
- ICT Wholesaling.

Industry Canada (2012) reports:

- There are more than 33,500 companies in the ICT sector in Canada, accounting for more than 555,000 employees (3.2% of Canadian workers);
- The sector is comprised mainly of small companies. 80.3% of firms are in the software and computer services industries, although these only account for 50% of employees and 27% of revenue. In 2011, there were about 100 companies with more than

500 employees whereas there were over 27,900 companies with less than 10 employees, accounting for 83% of all the companies in the sector;

- Revenues in the ICT sector increased 5.1% in 2011, the second consecutive increase following a slight decline in 2009. The 2011 growth was driven by the services industries which grew by 5.7% and accounted for 66% of the sector's growth;

- Revenues increased from $129 to $168 billion between 2002 and 2011, a 30% increase. Over this time there has been a clear shift from manufacturing industries towards services industries, as a share of the sector's revenue. Since 2002, manufacturing revenues have declined by 17%, while services revenues grew by 58%;

- The ICT sector contributed $62.7 billion to Canadian GDP (in 2002 constant dollars) in 2011, increasing by 3.1% from 2010 and outgrowing the total Canadian economy. On average, annual growth in this sector has been 3.8% since 2002, which is two times higher than that of the overall economy (1.9%). This faster growth also means that the ICT industries have accounted for 8.9% of the Canadian GDP growth since 2002. This growth was led by the software and computer systems design industries. Since 2002, the services industries have driven the ICT sector by generating 70% of the growth;

- Reflecting structural changes that are happening in the ICT sector, the share of the manufacturing industries in total ICT sector employment has declined from 18.4% in 2002 to 14.6% in 2011, while the share of the services industries has increased from 67.8% to 72.5% over the same period of time.

- ICT industries are largest performers of private sector research and development (R&D) in Canada, accounting for 34.1% of all private sector R&D.

- The sector's workforce is highly educated and well-paid:

    - 44.4% of workers had a university degree in 2010, compared to a national average of 25.6%; and

    - ICT employees earned on average $67,225 in 2010, 52% more than the economy-wide average of $44,366.

Yukon ICT Sector

In the 2010 Yukon Business Survey, 80 Yukon businesses with a total of 576 employees identified as having ICT as a primary or secondary industry, as illustrated by Figure 2.1 below.

Figure 2.1 Number of Yukon Businesses and Employees with ICT as their Primary or Secondary Industry

ICT Sub-Industries	Number of Businesses			Number of Employees		
	ICT Primary	ICT Secondary	Total ICT	ICT Primary	ICT Secondary	Total ICT
1. Telecommunications	6		6	357		357
2. Professional, Scientific and Technical Services	34	17	51	54	67	121
3. Data Processing, Hosting, and Related Services	4		4	6		6
4. Repair and Maintenance	4		4	5		5
5. Other ICT	4	11	15	13	74	87
ICT Industry total	**52**	**28**	**80**	**435**	**141**	**576**

Source: Yukon Bureau of Statistics, Yukon Business Survey, 2010

The figures are heavily skewed by the presence of NorthwesTel, which accounts for almost all of the employees in the telecommunications industry. As such, the industry is more accurately characterized as comprising mainly small companies, similar to the national ICT sector. For example, in the 'Professional, Scientific and Technical Services' category, which includes software development and ICT support services, and accounts for 64 per cent of firms, the average size of firm is 2.4 employees. Furthermore, 40 per cent of firms made gross revenue less than $50,000 in 2009, as shown in Figure 2.2 below.

Note, the survey figures above do not include an estimated 200+ additional ICT employees who either work in government or in private sector businesses that do not have ICT as a primary or secondary industry.

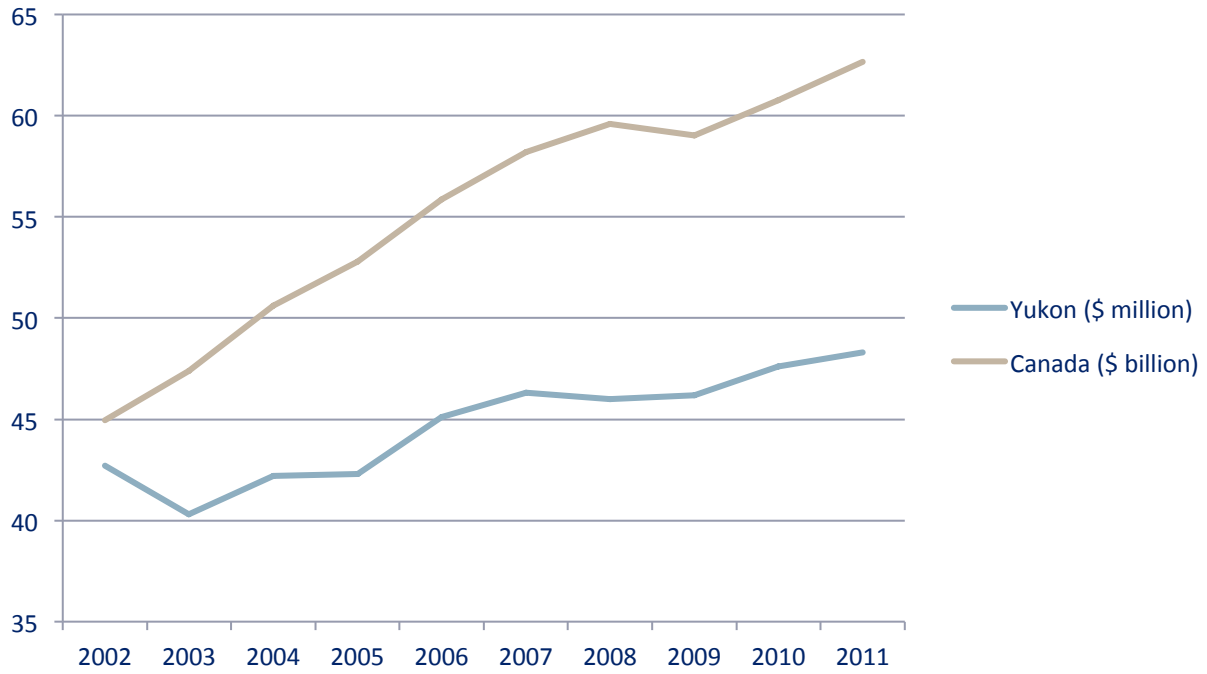
Figure 2.2 Revenue Ranges of Yukon Businesses with ICT as their Primary or Secondary Industry

2009 Gross Revenue	Number of Businesses		
	ICT Secondary	ICT Primary	Total ICT
Under $50,000	9	23	32
$50,000 to under $100,000	6	9	15
$100,000 to under $1,000,000	7	12	19
$1,000,000 or more	4	4	8
Do not know / Refuse	2	4	6
Total Businesses Reporting	**28**	**52**	**80**

Source: Yukon Bureau of Statistics, Yukon Business Survey, 2010

The Yukon ICT sector contributed approximately $48 million to Yukon GDP in 2011. Between 2002 and 2011, contribution to GDP of the Canada ICT sector grew by 28.3 per cent. Over the same period, however, the contribution of the Yukon ICT sector grew by 11.6 per cent, as demonstrated by Figure 2.3.

Figure 2.3 ICT Sector GDP (2002 Constant Dollars) for Canada and Yukon (2002 – 2011)



Source: Yukon Government, Department of Economic Development

Data is not available to conclusively determine why the growth rate of the Yukon ICT sector is slower than its national counterpart; however:

- Manufacturing companies and wholesalers have greater representation in the national sector and tend to be much larger companies with access to greater economies of scale and opportunities for growth. These companies are likely to prefer locating in large urban areas with a greater availability of skilled and unskilled labour, and closer to the U.S. border for ease of distribution;

- Software development and computer services are highly labour intensive industries but Yukon businesses face inherent challenges in sourcing appropriately skilled labour due to the Yukon's size, remoteness and relatively high cost of housing;

- The size and population of the Yukon also means that many potential ICT initiatives cannot be executed due to insufficient return on investment; and

- Utilization of IT services is relatively low among businesses in the Yukon. Recent research found that a majority of companies do not have functioning backup systems.

Other constraints to growth of the Yukon ICT sector include:

- Relatively few customers to sell to locally (especially after the first sale);
- Yukon has no higher education institute providing post-secondary education and training in ICT, and students who find this training outside of the territory often do not return. Yukon students that take remote courses typically move to opportunities in the South; and
- Distance from major markets, as while the Internet can provide for business connectivity, it is not a substitute for face-to-face contact in developing business.

The Yukon ICT sector, in collaboration with stakeholders, will need to fully leverage its assets and core competencies to overcome these challenges and constraints and close the growth gap.

Assets and Core Competencies

Despite the relatively slow growth, the Yukon ICT sector has a number of assets and distinct core competencies that may offer it a competitive advantage, and should be leveraged to pursue growth. Assets include:

- A highly skilled workforce, comprised of more than 500 professionals working in ICT as a primary or secondary industry, and an estimated 200+ ICT professionals working within government and non-ICT industry;
- Large customers and employers, e.g., Yukon Government, NorthwesTel and First Nations governments are significant purchasers of local ICT products and services and employers of ICT workers;
- Yukon Government practice of setting ICT contract size and scope to enable local firms to compete;
- Local, northern and government-specific knowledge;
- Access to key influencers and decision makers in government and private business, as a result of the small market size;
- Close-knit community of suppliers is positioned for stronger collaboration to network, build critical mass, and pursue joint ventures;
- Government is willing to invest in partnerships with local ICT firms and Yukon College is prepared to develop training programs based on industry needs; and
- A growing number of mid-sized software and telecommunications firms are able to sell their products and services outside the Yukon, positioning for increased exports.
- Internet infrastructure and resources that can be leveraged for greater value;
- Established organizations funding innovation and commercialization of ICT products and services (e.g., Yukon Technology Innovation Centre) and providing business mentoring;

- Access to the South via Internet and air connections, to enable the critical face-to-face aspect of business development;
- First Nations governments with capital to invest and desire to create jobs and effective government programs; and
- Quality of life and lifestyle opportunities to attract new resident workers, combined with sufficient Internet service and air access to retain them.

Distinct core competencies of the Yukon ICT sector include expertise in software solutions for small communities and government services, expertise in telecommunications for rural and remote locations, and cold climate research.

Growth of the ICT Sector: Key Challenges and Opportunities

The Yukon ICT sector faces a number of challenges that will need to be overcome in order for the sector to achieve growth.

Limited telecommunications infrastructure

Broadband speed is highly correlated with broadband penetration, which is a driver of economic growth. Estimates of the impact of a 10 per cent increase in broadband penetration range from 0.6 to 1.4 per cent increase in growth of GDP.

Current broadband speeds available in the Yukon will support basic applications such as email, social networking, and online banking, but will not allow consistent delivery of data-heavy activities which citizens can expect to rely on for the delivery of public services, distance education and training, and e-health services.

Businesses that deliver or receive services through the Internet are challenged by the available capacity and lack of redundancy in the Yukon telecommunications infrastructure. Feedback from stakeholder focus groups and the results of the public survey suggest that breaks in service are a major challenge to users and a barrier to investment in the development of products and services that would be distributed through the Internet.

During initial consultations for this plan, cell phone coverage outside of Whitehorse was reported to be weak and limited to CDMA-based access, and cell phones of a major provider (Rogers) were reported to not work anywhere in the Yukon. Recent improvements have resulted in 70% of the Yukon population outside Whitehorse having access to 4G HSPA coverage (Watson Lake, Dawson City, Haines Junction, Marsh Lake) and Rogers phones now working in Whitehorse through a roaming agreement with ice Wireless[1]. Nevertheless, the gaps in coverage still present a challenge to adoption and use of ICT technologies in an age when products and services are increasingly accessed through mobile technology. It is also a challenge to accessing hosted applications and data from remote locations without Internet access. For the important tourism industry the limitations on wireless coverage are seen as a source of dissatisfaction for the more than 300,000 visitors each year.

For the Yukon to reach its potential in terms of economic growth and quality of life for Yukoners, there is a requirement for access to faster broadband speeds to support adoption and usage of data-heavy services.

For Yukon businesses to build models that rely on receipt and delivery of services through the Internet, it is critical for the Internet pipeline to be available at all times.

Not only is seamless cell phone coverage a prerequisite for a modern society and business environment, it is an enabler of economic growth by providing opportunities for Yukon-based

[1] Information supplied by NorthwesTel.

firms to provide wireless services; increasing local demand for cell phones and related products and services; and generally removing an obstacle to doing business across the Yukon.

Expensive Internet services

Telecommunications infrastructure in the Yukon is largely owned and maintained by one company, NorthwesTel. A recent report commissioned by Yukon Government found:

- "Yukon consumers pay more for services with less capability. For example, for a 10 Mbps service Canadians elsewhere pay $54 per month. Yukoners pay 40% more for a 5 Mbps service. In addition, Yukon consumers that exceed the usage included in their basic service package can pay three to five times more than their southern counterparts[2]; and

- For high-end business service, the differential is even higher. A 50 Mbps IP-backbone service costs eight times more per month in Yukon than a similar service does in southern Canada."

  Source: Lemay-Yates Associates Inc., *"Yukon Telecommunications Development",* 2013

Both Yukoners and Yukon businesses have identified low affordability of Internet services as a key obstacle to creativity and innovation, as well as increased adoption and use of ICT. Stakeholders report that wholesale pricing rates do not enable competition on the last mile.

Growth of the ICT sector will require firms to be able to access telecommunications and Internet services at rates that enable them to leverage the full capability of the Internet, pursue innovation, and be competitive in other markets.

Enabling competition on the last mile will provide opportunities for local ICT companies to offer a range of Internet and managed hosting services.

Reliance on YG as a customer

The domestic market is dominated by the Yukon Government (YG), which is reportedly the largest purchaser of ICT products and services in the domestic marketplace, although exact figures are not available. Thus, the success and growth of the Yukon ICT sector is tightly linked to not only government capital and operating budgets, but also the effectiveness of the government's ICT budget planning and procurement processes.

There is an opportunity for YG to adapt its planning and procurement functions to support investment and growth of the ICT sector, and enable import substitution of products and services that it currently procures from suppliers outside the territory.

[2] Effective February 1, 2013, NorthwesTel reduced usage-based billing from $7.50 to $5.00 per GB.

The Yukon ICT sector, and especially businesses that rely on YG as a significant revenue stream, should also seek to diversify by increasing penetration of the non-government domestic marketplace, including import substitution, and increasing focus on export opportunities.

Access to ICT skills and capacity

Yukon ICT businesses find it challenging to hire qualified resources for a number of reasons:

- The level of training in ICT that is available locally, e.g., through Yukon College and professional training organizations, has diminished dramatically in recent years. There are few options available for local resources to obtain basic ICT skills or more advanced professional development training required to sustain a career in the sector.

- Given the typical size of firms in the Yukon ICT sector, the requirement is typically for more generalist ICT skills. This is against a broader trend toward ICT resources becoming more specialized as technology advances.

- Wages in the Yukon ICT sector are reportedly not competitive with other markets, such as Calgary, where wages for computer programmers and software engineers were among the highest in the country in 2011 (and reportedly around 20 per cent higher for similar positions than in the Yukon). Wages in other markets such as Edmonton and Vancouver are more comparable to those of the Yukon for ICT positions.

- Attracting skilled labour into the Yukon is also challenged by the cost of living in the Yukon, relative to wages, which has increased significantly in recent years due to sharp increases in the cost of housing.

In order to achieve growth, the ICT sector will need to work in collaboration with government and the education sector to find new ways of providing the training and support required by the sector to grow, sustain and retain resources. There is an opportunity to shift from Yukon-based programming to a greater focus on identifying and building demand for training and then brokering delivery by outside experts.

Development of local capacity will need to recognize the different learning needs of all constituents, including First Nations.

The sector will also need to find ways of attracting skilled labour to the Yukon, including capitalizing on its advantages as a "lifestyle" location.

Lack of scale

There is a lack of scale on both the demand and supply sides that challenges the Yukon ICT sector in planning and executing effective long-term investments. The sector is characterized by many small businesses, including numerous sole proprietors that lack the management capacity or access to capital and economies of scale required to grow to the next level.

On the demand side, the domestic customer base is relatively small, limiting the growth of those ICT businesses that do not export their products and services. Furthermore, stakeholder consultations revealed that there is significant 'latent' demand in the small business sector. Many small businesses are reportedly under-utilizing technology due to poor experience with IT

service providers and a recent informal survey found that 91% of 72 local businesses did not have a functioning back up system.

In order for the sector to grow there needs to be:

- *A shift in the industry to an increased concentration of larger (not necessarily large) firms to capitalize on opportunities for growth, access economies of scale in production, generate requirements for a broader range of skill sets, and provide career paths to retain employees in the Yukon;*

- *A focus on harnessing the untapped demand in the domestic marketplace; and*

- *An increased focus on exports to support long-term growth of the sector.*

Strategies should be designed to enable the shift from an ICT sector of small enterprises to more medium-sized and larger firms.

Limited competitive advantage

Due to the challenges described above, the Yukon ICT sector does not have an outstanding competitive advantage to drive and support growth of export markets. There are some limited opportunities to leverage growing industries and innovation efforts to develop and export solutions and services. For example:

- Development, commercialization and export of technologies and solutions, and associated services, for the growing mining industry (the value of mineral production in the Yukon is forecast to increase by more than 200% between 2008 and 2012, Natural Resources Canada); Exploration expenditures in 2011 were $307 million, with more than 100 companies undertaking exploration activity (Yukon Economic Outlook, 2012).

- Development, commercialization and export of sustainable cold climate technologies and related solutions for subarctic regions around the world (*Yukon Research Centre, Cold Climate Innovation*).

Support for innovation and commercialization activities may support growth of the ICT sector. Opportunities also exist for import substitution as significant expenditure on ICT products and services by Yukon organizations, including the YG, is made outside of the territory.

Vision and Strategies

By the end of 2017 the contribution of the ICT sector to Yukon GDP will have increased by 50 per cent, from $48 million (2011; in chained 2002 dollars) to $72 million.

This growth will be driven by the ICT Services sub-sector, including software development; systems support services, telecommunications services and Internet services.

In 2017, the ICT sector will be characterized by a greater number of SMEs, but also a greater number of larger SMEs (by both revenues and number of employees) that have been able to leverage the strategies set out below to invest in and grow their businesses.

The strategies set out below will enable this growth by leveraging the sector's assets and competencies to address its challenges and constraints, and take advantage of its opportunities, as discussed above. Implementation will require significant collaboration among the key stakeholders (government, industry, NorthwesTel, academia) with key lead roles by Yukon Government and YITIS.

1. Increase broadband penetration

Increased broadband penetration is a proven enabler of economic growth[3]. Yukon Government should set broadband targets and minimum standards for broadband speed to all areas of the Yukon that assure service parity to southern urban centres, and support the actions required to achieve these.

By 2017, Yukon firms should have access to broadband speeds, costs and reliability on par with southern urban areas, at least in the Whitehorse area. This can be achieved by enabling competition on "last mile" services to put downward pressure on prices, encourage service innovation and long-term investment in infrastructure, and create opportunities for local companies to provide more managed services. Alternatively, or in parallel, the major stakeholders (NorthwesTel, Yukon Government, ICT sector, City of Whitehorse) could collaborate to share fibre in the Whitehorse area to reduce costs per bit.

In the short-term, stakeholders should explore with NorthwesTel the potential to run a full "pipe" at lower rates, and opportunities to add more "lasers" to improve bandwidth at a relatively low cost.

[3] McKinsey 2010 summarizes various studies that have examined this and found the impact of an increase of 10 percent in broadband penetration can be growth of up to 1.4% of GDP.

2. Foster industry collaboration

Within the relatively small Yukon ICT sector, greater collaboration and integration between SMEs has been identified as a key strategy for creating opportunities for partnership and scale and, as such, providing an incentive for long-term investment and capacity building. Greater collaboration may also surface opportunities for consolidation and a greater concentration of larger firms in the industry – a critical success factor for growth as larger firms will be able to access economies of scale in production, generate requirements for a broader range of skill sets, and provide career paths to retain employees in the Yukon. YITIS is well positioned to foster collaboration within the industry, implement other strategies (see below) and represent the industry in partnership with government and academia. Yukon Government should support the resources necessary for YITIS to build on its previous success in facilitating industry growth of local companies (e.g., in the last 6 years Vandelay Systems has grown from 2 to 7 people, SDC Software from 5 to 20 employees including a Calgary office, and a number of smaller independent firms have emerged) and deliver this mandate (estimated annual funding $200,000).

3. Enhance Yukon Government procurement policies and processes

As the sector's largest customer, the Yukon Government can indirectly support investment and capacity building within local ICT firms, and enable import substitution of products and services that it currently procures from suppliers outside the territory, through an overhaul of planning and procurement policies and processes. Specifically, government could:

- Further integrate planning and budgeting for O&M requirements across government to achieve synergies and create opportunities for scale;
- Pool generic resources (e.g., business analysts, project managers) to improve redundancy and ensure these resources are optimized across government's systems development projects rather than being constrained by organizational silos. This will also allow for career paths within these occupations and allow for junior talent to be productive through knowledge transfer from more experienced resources;
- Improve planning and provision for support infrastructure for systems that are developed, with appropriate organizational structures and longer horizons for outsourced services (e.g., 3 years vs. 1 year) to provide greater certainty to industry and enable industry investment and growth;
- Collaborate with the local ICT industry on capital and operational planning processes ensure local capacity development requirements are met;
- Enhance procurement policies to:
    - Enable firms to demonstrate and benefit from a local impact on skills development and capacity through project legacy (e.g., elevating junior to expert experience through involvement in complex projects); and
    - Address capital scarcity through alternative procurement strategies that leverage private sector capital to advance major systems initiatives, accelerate the upgrade and replacement of legacy systems, and reduce the current backlog.

Yukon Government also has an opportunity to support growth by tying the local ICT sector into planning and delivery of modernization initiatives, e.g., expanding e-Government services in line with other Canadian jurisdictions.

4. Improve access to skills and resources

To ensure that the ICT industry is able to develop and retain home-grown talent, Yukon Government should develop a technology education plan that provides a roadmap for K-12 students through post-secondary education to starting careers in the ICT industry. Given that post-secondary students have to leave the territory for ICT courses, Yukon Government should consider a program to incent students to return to the Yukon following their studies (e.g., STEP program).

Collaboration within the ICT industry and resource pooling within government, and NorthwesTel, will result in investment in resource development and career paths for ICT employees, and thus enable greater opportunity for larger employers (e.g., NorthwesTel, Yukon Government) to access the required resources locally.

In addition, the ICT sector will need to work in collaboration with government and the education sector to find new ways of providing the training and support required by the sector to grow, sustain and retain resources. In particular, and recognizing the limited availability of ICT training in the Yukon, stakeholders (industry, government, academia) should collaborate to identify and aggregate local needs for ICT training and broker matching ICT training services from outside territory if necessary, or facilitate access to relevant online learning.

It is important, in the relatively small sector, for talent to be clustered where possible in order to avoid shortages (which are then filled with external resources) and risk to career growth. YITIS should take a lead role in surfacing opportunities for local employers to cluster talent to the benefit of the industry as a whole. There is also a role for YITIS to match industry mentors to junior and starting employees, to facilitate networking and knowledge transfer.

Given the importance of increasing the number of larger firms in the sector, YITIS should work in collaboration with Yukon Government, academia and experienced entrepreneurs to support ICT entrepreneurs' acquisition of the managerial, technical and marketing skills to develop and grow their business.

Yukon Government could also create incentives for businesses to invest in enabling ICT, including support for acquisition of skills required to utilize the technology.

YITIS should also work directly with Yukon Government and NorthwesTel to identify opportunities and mechanisms for leveraging the talent available within these organizations to support research and development initiatives, industry capacity building, and export opportunities.

5. Improve marketing and communications for the domestic market

YITIS should take a lead role in raising awareness and interest in Yukon ICT products and service capabilities within the domestic marketplace, including satellite operations, and the value of ICT to as a business enabler (e.g., profile businesses that use ICT successfully in their enterprises to serve as case studies for prospective users). There are opportunities to capitalize on latent demand for ICT and related support services in the domestic private sector, and to exploit opportunities for import substitution, especially in government and the expanding resource sector (growth and import substitution).

YITIS should also:

- Facilitate interaction between the ICT sector and other sectors that are heavy users of ICT (e.g. tourism, mining, education) to broaden communications efforts and identify opportunities for cross-sector collaboration; and

- Seek opportunities to leverage skills used to develop systems for Yukon Government in developing systems for other governments, including Yukon First Nations.

6. Focus on research and development that solves local problems and leverages the competitive advantages of Yukon firms

Support for research and development should be focused on innovation and commercialization of ICT products and services that solve local problems and leverage Yukon's competitive advantage (e.g., expertise in software solutions for small communities and government services, expertise in telecommunications for rural and remote locations, cold climate research). These solutions can then be exported into other markets.

YITIS has a role in supporting this direction and should partner with the Yukon Technology Innovation Centre to assist local businesses in commercializing and bringing new technologies to market more quickly. YITIS should also facilitate access to alternative forms of capital by small and medium-sized companies seeking expansion financing, including cultivating and converting relationships with outside investors, and supporting the links between investors and local entrepreneurs.

YITIS should also take the lead in identifying opportunities to export existing products and services developed in the Yukon (e.g., socio-economic web portal[4]) and support the actions required to bring these to other markets.

[4] www.sewp.gov.yk.ca

Implementation Strategy

Implementation of the plan will require investment and commitment by YG and stakeholders, per the following recommendations.

Strengthen role of Yukon Government

Yukon Government already plays a role in stimulating the domestic ICT sector through direct funding of various initiatives to encourage innovation and support ICT skills development. Current initiatives include funding to support innovation and commercialization in partnership with Yukon College (approximately $800,000, including support for cold climate innovation) and funding for digital literacy and internet-based business training (approximately $660,000 in partnership with the Council of Yukon First Nations and the federal government). Yukon Government is also funding a telecommunications plan to identify alternatives for government to improve the level of service in this industry in the Yukon. These initiatives align with this plan and should continue to be supported. Furthermore, Yukon Government should continue to provide this kind of strategic, project-based sponsorship in support of the sector, in alignment with the plan.

In line with other jurisdictions that have taken a strategic approach to growing the ICT sector, a focal point within Yukon Government should be established to coordinate the strategy for the ICT sector and to provide oversight for implementation of this plan.

In particular, a focal point is required to:

- Build support for the ICT sector as a strategic priority for Yukon Government;
- Develop consensus within government around the goals and priorities of the sector plan;
- Coordinate and integrate participation of government departments (e.g., through policy and program development) toward the goals of the plan
- Liaise with YITIS and other sector stakeholders to provide oversight and ensure alignment of activities with the goals of the plan;
- Monitor progress against the plan, and ensure current and future government-funded initiatives achieve value for money; and
- Conduct an annual review of the plan, including adjustment of the plan if necessary due to changes in the environment.

Yukon Government should also:

- Design and manage a broadband expansion plan that results in healthy competition between Internet service providers, to achieve increased broadband penetration and affordable pricing;
- Promote digital diversity, and remove barriers to adoption and use of ICT throughout the Yukon;
- Consider tax policies to promote investment in the Yukon ICT sector;

- Liaise with the federal government to advocate for, and secure, federal funding for infrastructure initiatives, including broadband expansion and improved cell phone coverage;

- Work with the CRTC on a sustainable regulatory framework for the telecommunications industry which encourages competition, innovation, and customer choice in a manner that maximizes local ICT employment in the Yukon;

- Work directly with an ICT industry representative body (YITIS - see below) to support the activities required to increase the profile of the industry, attract investment and explore export opportunities;

- Work with a cross sector task force (see below) to address ICT workforce planning and development needs, and maximize investment in local employment and services; and

- Develop partnerships with other Northern/Arctic jurisdictions to identify opportunities for collaboration.

Strengthen role of YITIS

YITIS is well positioned to foster collaboration within the industry, support implementation of other strategies, and represent the industry in partnership with government, academia, and other stakeholders. Yukon Government should support the resources necessary for YITIS to build on its previous success and fulfill the following roles:

- Continue advocating for the Yukon ICT sector;

- Foster collaboration and networking among ICT firms to leverage synergies of knowledge, identify and pursue opportunities for joint ventures, shared marketing and business development efforts, and shared capacity building;

- Facilitate access to alternative forms of capital by SMEs seeking expansion financing, including cultivating and converting relationships with outside investors, and supporting the links between investors and local entrepreneurs;

- Raise awareness and interest in Yukon ICT products and service capabilities within the domestic marketplace, including satellite operations, and the value of ICT to as a business enabler (e.g., profile businesses that use ICT successfully in their enterprises to serve as case studies for prospective users);

- Promote the benefits of local ICT services in the domestic marketplace (local knowledge, responsiveness);

- Facilitate interaction between the ICT sector and other sectors that are heavy users of ICT (e.g. tourism, mining, education) to broaden communications efforts and identify opportunities for cross-sector collaboration;

- Foster collaboration between industry, government and academia to:

    - Enable access to talent;

  - Improve skills forecasting and workforce development planning; and
  - Identify and aggregate local needs for ICT training and (a) broker matching ICT training services from outside territory, and (b) facilitate access to relevant online learning.

- Work in collaboration with government and the education sector to find new ways of providing the training and support required by the sector to grow, sustain and retain resources;
- Identify opportunities to fund training needs (e.g., Canadian Northern Economic Development Agency (CanNor) has a mandate and budget to build SME capacity in the north) and secure funding;
- Surface opportunities and mechanisms for local employers (including private industry, Yukon Government and NorthwesTel) to cluster and pool talent to the benefit of the industry as a whole;
- Work in collaboration with Yukon Government, academia and experienced entrepreneurs to support ICT entrepreneurs' acquisition of the managerial, technical and marketing skills to develop and grow their business;
- Match industry mentors to junior and starting employees, to facilitate networking and knowledge transfer;
- Work directly with Yukon Government and NorthwesTel to identify opportunities and mechanisms for leveraging the talent available within these organizations to support research and development initiatives, industry capacity building, and export opportunities;
- Seek opportunities to leverage skills used to develop systems for Yukon Government in developing systems for other governments, including Yukon First Nations;
- Work directly with the Yukon Research Centre to assist local businesses in commercializing and bringing new technologies to market more quickly;
- Identify opportunities to export existing products and services developed in the Yukon and support the actions required to bring these to other markets; and
- Work with NorthwesTel to:
  - Ensure the right commercial Internet packages are provided to industry in the Yukon;
  - Explore opportunities for local capital investment and partnerships to leverage NothwesTel’s planned upgraded infrastructure;
  - Explore opportunities, along with other telecommunications providers, YG and other large commercial consumers of IT to create a data centre and/or common infrastructure (e.g. local MAN); and

- Explore the feasibility of leveraging unused band-width Southbound to create opportunities for backups or local hosting.

Appoint a cross-sector task force

Yukon Government should also support the appointment of a task force comprised of representatives from government, the ICT sector, First Nations and education and research, to provide integrated advice and recommendations to Yukon Government and YITIS on all aspects of implementing the plan.

Leverage existing investments and structures

Existing investments and structures should be leveraged as much as possible in pursuing the strategies and goals. For example:

- Yukon Research Centre could play an expanded role in encouraging and supporting innovation and commercialization.

- Yukon Chamber of Mines and YITIS could work together to identify the specific ICT support needs of the mining industry in the Yukon and build the capacity required to serve this growing industry.

Align required ICT skills and capacity with opportunities for Yukoners

For Yukoners who have to choose which types of jobs (and necessary education) they want to pursue, the ICT sector should promote itself as a more attractive opportunity than presently. Based on local skills requirements, YG and the ICT industry should jointly invest in the education and training of local ICT professionals by providing, for example, internships, scholarships and starting jobs for selected individuals.

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Appendix B: Public Survey Results

1. Purpose of Survey

- To raise interest and awareness in ICT;
- To gather individual and business perspectives on ICT adoption, usage and priorities; and
- To ensure all stakeholders have a channel to provide input to the process.

2. Timing and Distribution

- Open June 25 to July 31, 2012.
- Accessed through YITIS website; available in English and French.
- Supported by interest and awareness raising program including newspaper advertisements; radio interviews; and direct email.

3. Responses

	English	French	Total
Individual	103	9	112
Business	34	3	37

4. Individual Survey Highlights

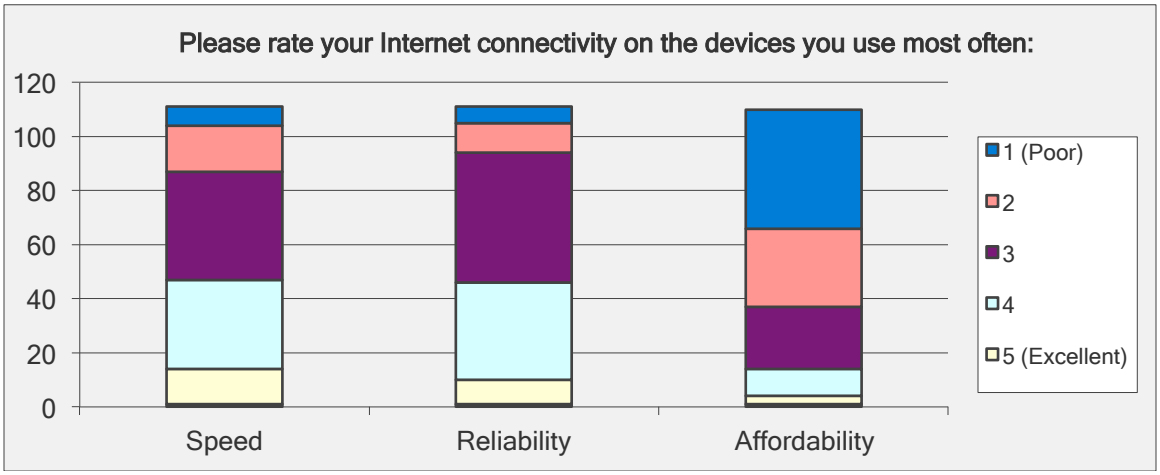
Demographics

- 112 respondents; 92% residing in Whitehorse
- 96% of respondents aged 25 - 64 (the survey does not appear to have reached youth or seniors)
- 91% of respondents are employed

Technology Use

- 70% have smart phone / mobile phone (up from 60% in 2009); 89% have laptop
- 55% use smart phone / mobile phone to access the internet; 87% use laptop
- Median personal internet use lies between 11 and 20 hours per week (42% in this range)
- Median work/study internet use lies between 21 and 30 hours per week (25% in this range)
- 79% of individual respondents know how much data they use; of these, the median usage lies between 20GB and 50GB per month
- Most frequent personal use of the internet is for email, information, news, and social media

- Affordability of internet connectivity is a much greater concern for individuals than speed and reliability:



Education and Training

- Only 5% of respondents are not comfortable learning and using new information technology
- 40% of respondents have taken training in the use of computers, software or other IT in the last 5 years – in Yukon
- 22.5% have taken online training
- 44% have not taken any IT training in the last 5 years
- 58% rated 3, 4 or 5 on the 5-point scale as to how likely they would be to take an IT/computing class if available locally

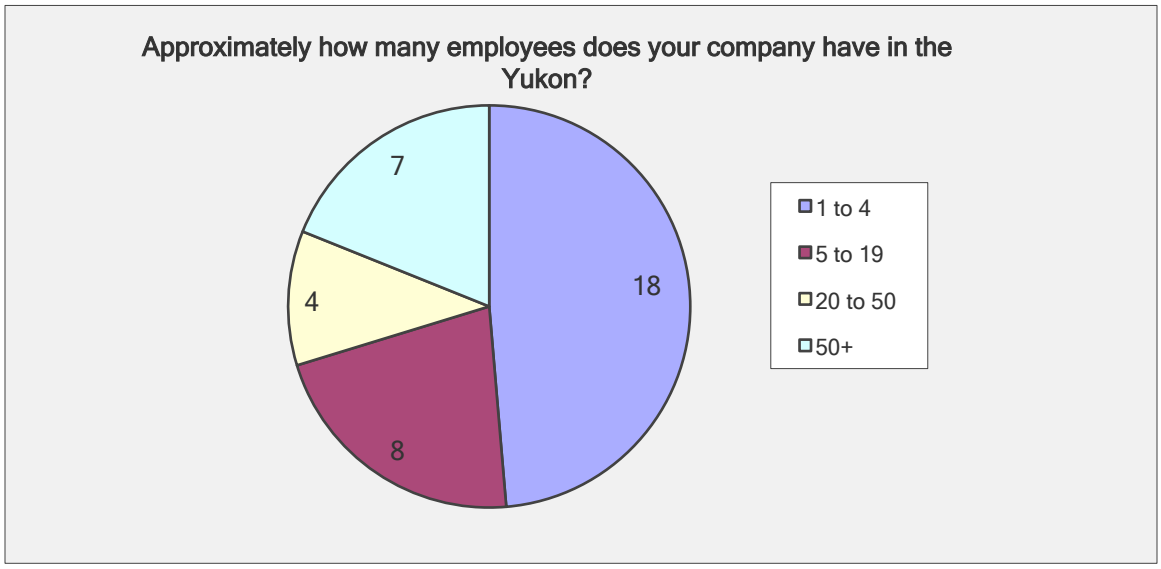
How to enable Yukoners to increase adoption and use of information technology and the Internet? (59 respondents)

- Lower cost of internet service (25 responses)
- Ensure consistent availability / reliability of service (8)
- Increase competition for provision of internet services (7)
- Improve broadband speed (7)
- Increase connectivity / wireless coverage in rural communities (6)
- Improve access to ICT education and training:
  - Available (6)
  - Affordable (4)
- Increase public access to the internet, including free WIFI access points (3)

5. Business Survey Highlights

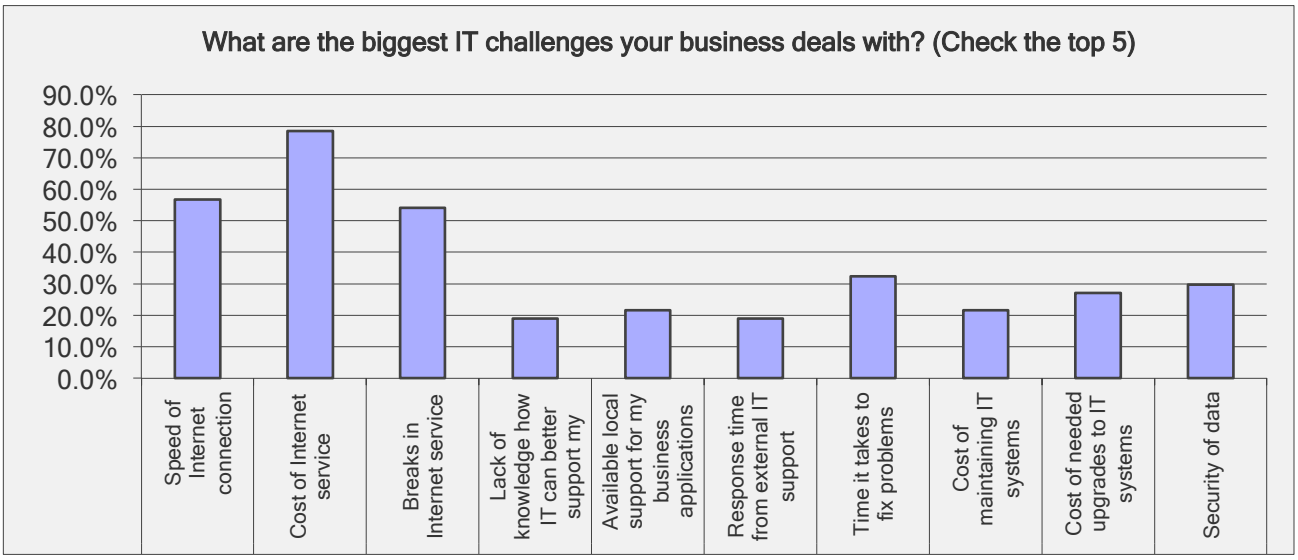
Demographics

- 37 respondents, at least 34 of which are in Whitehorse
- 9 respondents reported they are in the ICT industrial sector (7 in software development; 2 in communications)
- Almost half (18) of the respondents are very small businesses (1 to 4 employees):



Technology Use

- 54% of respondents said technology, and keeping up with technology, is 'extremely important' to success.
- 70% of respondents utilize smart phones in their business; 97% use laptop computers
- 95% of respondents use fixed line. cable for internet connectivity; 40% use mobile
- 51% of respondents use a download speed greater than 5 Mbps
- Median data usage lies between 60GB and 125GB
- 54% responded 'I do it myself' to provision of technology support; 38% reported a 'staff member does it'; 24% pay a company in the Yukon to do it
- 60% of respondents spent less than $10,000 on technology, including IT service, in 2011
- Cost of internet service (78%); speed of internet connection (57%) and breaks in internet service (54%) are reported as the biggest IT challenges for businesses:



- Most important business applications of IT are (top 5):
  - Email
  - Web browsing
  - Business website
  - Online banking
  - Accessing business applications on the internet

- Respondents indicated that the following would have a high or very high impact on their business:
  - Cheaper Internet rates (84%)
  - Faster broadband connection (76%)
  - Uninterrupted Internet service (70%)

- 62% of respondents report that greater availability and quality of IT services in the Yukon would have a medium to high impact on their business

What could be done to enable greater use of information technology by Yukon companies, to sustain and grow their business? (18 respondents)

Note: comments more sporadic here than on the individual survey - not weighted.

- Increase competition for provision of internet services
- Lower cost of internet service
- Raise bandwidth caps to encourage innovation
- Improve access to ICT education and training
- Provide training to enable business to develop business, and market and sell products and services online
- Increase awareness of local ICT services

Appendix C: Lessons Learned from Other Jurisdictions

To define the most appropriate ICT Sector development strategy we can also benefit from the initiatives and lessons learned from other initiatives to develop broadband penetration and local ICT development in comparable rural areas (other rural provinces in Canada, Sweden, Australia and Alaska).

Government policy plays a critical role in enhancing performance of the ICT sector

Statistical analysis relating the performance of the ICT sector to a standard set of policies indicates that public policy and sector performance are intricately linked. The performance of the ICT sector— measured in terms of ICT adoption, quality, product innovation, and consumer benefit in terms of lower prices—is statistically linked to the adoption of pro-competitive policies, guaranteed by regulatory independence and guided by an overarching vision for the ICT sector. Furthermore, when controlling for economic development, if a country adopts policies of managed competition guaranteed by an autonomous regulator and generates a target vision for the ICT sector, it will result in a vibrant sector benefiting the country and its population.

Development of appropriate competition models for the telecommunications sector is a critical driver of sector performance

Healthy competition is required not only to yield price reductions in services, but also to stimulate innovation and investment. Sustainable competition models result in industry structures that exhibit a moderate amount of consolidation of the telecommunications sector which tends, in turn, to stimulate innovation by creating greater certainty of returns. Statistical analysis indicates that platform-based competition in broadband is positively linked with higher likelihood of investment in fibre optics in the local loop.

These findings are confirmed by case studies showing that platform-based competition is the primary driver of broadband development in Japan, Korea, and Sweden. Limited competition resulting from a highly concentrated industry structure acts as an obstacle for the development of broadband, as in Mexico.

Affordable bandwidth remains the greatest impediment to Internet service in rural areas

Remote and rural regions of for example Alaska receive all communication (including phone, television, and Internet) over high-cost and high-latency satellite connections. In these remote areas, the lack of dependable high-speed connectivity limits the services and applications for hospitals, local health clinics, schools, and businesses. Residents in satellite-served regions are unable to fully participate in today's knowledge-based economy, or access global information resources, due to a lack of affordable and capable Internet access.

Digital diversity among indigenous populations

Digital diversity includes several parameters: access and adoption; innovation and entrepreneurship; and participation in communications sector policies and services. Digital diversity refers to more than just diverse populations having access to broadband. Digital diversity should include their use of broadband, developing and sharing content, utilization of broadband for economic activities, and employment in ICT-related jobs. In some circumstances, diverse populations may also be beneficiaries of institutional uses of broadband, such as for education, health care, and e-government.

Broadband targets

As access to broadband, and associated speed, is a critical enabler of economic growth, it is necessary to have standards and targets to guide investment. Canada's targets are:

"In terms of network coverage, we expect that virtually all Canadians will have access to basic broadband speeds of 1.5 Mbps by early 2012 as a result of private sector and government investment. Within the next five years, we expect that 75-80 percent of Canadians will have access to broadband speeds of 50-100 Mbps as result of continued private sector investment"[5]

These targets are in line with the strategic objectives in other developing countries. For example:

- The Government of Australia's objective is to connect 93 per cent of Australian homes, schools and businesses with fibre-to-the-premises technology providing broadband speeds of up to 100 Mbps with a minimum fibre coverage obligation of 90 per cent of Australian premises. All remaining premises will be served by a combination of next generation fixed wireless and satellite technologies providing peak speeds of at least 12 megabits per second.

- In Sweden the Government defined that in 2020, 90 per cent of all households and businesses should have access to broadband at a minimum speed of 100 Mbps. 40 per cent should already have access to broadband at that speed by 2015.

The challenge here is that Canada's broadband targets seem to be mainly focused on the highly populated Southern regions. In order to achieve a vibrant and competitive society and business climate in the Yukon, at least the populated areas like Whitehorse should have the same broadband availability and pricing as the Southern urban centres. Due to the scale, this likely cannot be achieved without substantial government funding.

[5] Helen McDonald , Assistant Deputy Minister , Spectrum, Information Technologies and Telecommunications Industry Canada