

The Top Seven Intelligent Communities of 2008

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The Top Seven Intelligent Communities



The Intelligent Community Forum's annual list of the world's Top Seven Intelligent Communities sounds like a competitive ranking. But that is not its intent. ICF has developed a list of Intelligent Community Indicators (see below) that provide the first framework for understanding how communities and regions can gain a competitive edge in today's Broadband Economy.

The Top Seven have been chosen, not because they excel in all of these areas, but because each demonstrates excellence in at least one. ICF salutes them as role models for the development of vibrant local economies and healthy societies in the global Broadband Economy.

Some of this year's Top Seven also appeared on last year's list. Others from last year have been replaced by new communities. Just as appearing one year does not mean that a community surpasses all others, so being replaced on the list does not signify failure. ICF purposely introduces new examples each year in order to continually expand the scope of the Top Seven list, and the selection process must inevitably exclude some worthy and exciting examples.

The Broadband Economy

Whether you know it or not, you are living in the Broadband Economy. It is the new global economy - what many call "globalization" - emerging from the deployment of broadband around the planet. It is an economy in which, for all intents and purposes, the hard-working people of Mumbai, Shenzhen and Bangladesh live right next door to the hard-working people of Montreal, San Francisco and Berlin. The vast build-out of low-cost communications, powerful and inexpensive software and cheap data storage capacity has unleashed collaboration and cooperation across time zones and cultures that has opened markets, boosted productivity, created employment, and improved living standards. In the Broadband Economy, companies naturally look for opportunities to locate their facilities where they can gain the greatest advantage in terms of cost, skills and access to markets. The deployment of broadband worldwide has also made capital investment in businesses, factories and facilities highly mobile. Billions of US dollars move around the globe daily in pursuit of a competitive return on investment, and when trouble strikes a nation's economy, that mobile capital can flee at devastating speed.

But while global business may be mobile, communities are not. Communities everywhere have the same goal: to be a place where people can raise their children and give those young people enough economic opportunity to allow them to stay and raise children of their own. In the Broadband Economy, that task is more challenging than ever. Where geographic location and natural resources were once the key determiners of a community's economic potential, it is increasingly the skills of the labor force, and the ability of business and government to adapt and innovate, that power job creation.

The Broadband Economy may challenge communities, but it also hands them powerful new tools to build competitive and inclusive economies. Broadband offers smaller communities in remote locations the opportunity to move from the periphery to the center in economic terms. It enables small companies to be global exporters - including the export of skills and knowledge which were never before transportable across time zones or national borders. It can ensure that schools in remote regions have access to the latest information tools and reference sources. It can link healthcare providers to leading medical centers and local law enforcement to national information grids. By boosting the economic and social well-being of communities, it can reduce the incentives for their young people to move away in search of opportunity and a better quality of life. Paradoxically, it can play a key role in giving communities a sustainable future in our ever-more-connected world.

Becoming an Intelligent Community

Intelligent Communities are not the result of accident or luck. They are the product of strong and effective leadership. Sometimes that leadership comes from elected officials or government departments. In other cases, local leaders emerge from business, from academia or nonprofits. The source does not matter. What matters is that leaders respected by the community clearly define a challenge to the community's future, persuade citizens of its urgency, and mobilize the search for solutions.

In some cases, the challenge is evident. Many Intelligent Communities are former manufacturing and trade centers that failed to adapt to the rising value of the service sector, the globalization of business, and the rise of the Broadband Economy. Facing apparently terminal decline, they commit themselves to creating a new economy. Other Intelligent Communities are traditional societies which seek to stake a claim to the Broadband Economy without surrendering the strengths of their culture. Still other Intelligent Communities are already economic success stories that are striving to maintain their front-runner positions in the rising tide of global competition.

Whatever their starting point, research by the Intelligent Community Forum has identified five areas - called the Intelligent Community Indicators - in which Intelligent Communities typically work. The Indicators provide the first conceptual framework for understanding all of the factors that determine a community's competitiveness in a globalized environment. Achieving success in all five is the best preparation the community can make to prosper economically and socially in the Broadband Economy.



Broadband

In the Broadband Economy, the prosperity of a community increasingly depends on its ability to connect at broadband speeds to the World Wide Web. The Internet and private IP networks have become the common platform for the internal and external operations of companies and institutions large and small. The Web has also become a means for individuals and small organizations to gain crucial knowledge, network with others and build communities.

The term "broadband" was coined to identify Internet connectivity at faster than the speeds available from dial-up, which typically tops out at 90 kilobits per second (but more typically operates in the 28-56 Kbps range). Generally, broadband speeds begin at 128 Kbps, but this is rapidly becoming a bare minimum. In the nations that lead the world in broadband adoption – South Korea, Denmark, Canada and others – 10 million bits per second is rapidly emerging as standard, with speeds up to 50 Mbps available at affordable cost. The faster the connection, the more people tend to use it, because a broadband-connected computer can access services online nearly as fast as local software and files. In effect, a PC with a 1-10 Mbps connection gains access to almost infinite information, services and resources with the same performance users expect from their word-processing software or on-board computer games.

Intelligent Communities refuse to leave their broadband destinies entirely in the hands of either private or state-owned carriers. Instead, they express a clear vision of the importance of broadband to their economic and social future. They craft public policies - from land-use planning to the development of their own networks - that encourage the adoption of broadband services. They also work to promote equitable access to broadband services by citizens on all rungs of the economic ladder.

In practical terms, the key broadband issues for Intelligent Communities are availability and price. In both industrialized and developing nations, the private sector is moving fast to deploy broadband at competitive prices to paying customers. Prices can be too high for low-income households, however, and there remain markets – from inner-city neighborhoods to rural areas – where carriers find it difficult to cost-justify network deployment. In these markets, governments and nonprofits frequently step forward to plan, promote and deploy broadband networks alone or in partnership with businesses.

Many communities have leveraged governmental demand for communications services to reduce the risk of network deployment. Even the recent interest in security and disaster preparedness, in the wake of the natural and manmade catastrophes of the first decade of the 21st Century, have acted as a spur to metropolitan network deployment. Local government or large institutions can often cost-justify the construction of a hybrid fiber-optic and wireless network based on their own needs, and the evolve it into a public access network.



Knowledge Workforce

The term "knowledge work" was coined by management consultant Peter Drucker in his 1973 book *Management: Tasks, Responsibilities, Practices*. In this book, Drucker forecast that, within one or two decades, it would become impossible to maintain a middle class lifestyle by working with one's hands. During the previous thirty years, it had been the growth of assembly-line industries that created the American middle class because, after years of labor struggle, these industries had become places where relatively uneducated people could earn good salaries from hard work. Drucker's prescient comment signaled that the world we knew was changing. He called the new

work that would be required to enter the middle class "knowledge work" and the people who performed it "knowledge workers."

In the last decade of the 20th Century and first decade of the 21st, we have seen Drucker's prediction come true. A 2002 report from the US Department of Commerce, based on the 2000 Census, showed that the average annual earnings of a full-time, year-round employee with a high school diploma were only US\$25,900, compared with \$45,400 for a college graduate and \$99,300 for a person with a professional degree, such as a doctor, lawyer or engineer. Thus, over a 20-year period, the added value of the basic bachelor's degree from a college or university, compared with a high school degree, was nearly \$400,000. While not all knowledge workers need bachelor's degrees, the trend is clear: full participation in an advanced economy requires knowledge, whether specialized and technical or general and managerial. The effect is only increased when that economy is powered by broadband and information technology. As the network becomes the computer, to paraphrase Sun Microsystems' Scott McNealy, the ability to use IT or IT-dependent devices has become an entry-level skill to ever broader categories of employment.

In response to this challenge, Intelligent Communities exhibit the determination and demonstrated ability to develop a workforce qualified to perform knowledge work. This is not simply a matter of possessing universities able to crank out post-grads with science and engineering degrees. Effective development of knowledge workers extends from the factory floor to the research lab, and from the loading dock to the call center or Web design studio. Even classic "manual labor" jobs such as assembly line work are increasingly requiring the use of digital tools to increase productivity. The creation of knowledge workers is one of the primary means by which Intelligent Communities ensure that the majority of citizens benefit from the Broadband Economy.

How does a community equip its workforce to succeed at knowledge work in the highly competitive environment of the broadband economy? It takes a mix of contributions from the public and private sectors.

Public-Sector Contributors

- National, state or regional, and local government policies that promote high educational achievement and funding mechanisms that make it possible
- Strong early childhood and elementary-secondary education that stresses conventional literacy and numeracy as well as computer literacy
- Community colleges and technical schools that provide a means for those lacking a university education to gain career-specific and sector-specific skills and climb the economic and social ladder

Public-Private Contributors

- Universities and colleges, which typically draw some or all of their financial support from the public sector, even if they are private institutions. They provide undergraduate and graduate education that prepares students for advanced knowledge work.

- Nonprofit associations and NGOs that provide specialized training and certification

Private-Sector Contributors

- Continuing-education training offered by employers for their employees
- Private-sector training organizations that serve individual students and develop courses to meet the needs of employers

The absence of local institutions is not an absolute barrier to development of a knowledge workforce. An increasing number of distance-education programs offered by universities, community colleges and private-sector organizations can fill in the gaps in a community's own educational resources. They deliver lectures, interactive learning and other coursework on CD or via the Internet.



Innovation

The need to innovate has never been greater. Businesses of all sizes operate today in a global marketplace. Companies are having to cope with hundreds of challenges at the same time, all caused directly or indirectly by global broadband deployment, from corporate restructuring and technology change to increased competition and shortening product life cycles. As barriers to trade, transport, investment and communications fall around the world, the economic machine of which we are a part grows ever more efficient, moves ever faster, and allocates resources to their most productive use with ever greater ruthlessness. As Thomas Friedman put it in his 1999 book, *The Lexus and the Olive Tree*:

The barriers to entry into virtually any business today have been dramatically lowered, and this means that the speed by which a product goes from being an innovation to being a commodity has become turbo-charged. If your company or country, for social, cultural or political reasons, is not willing to let creative destruction work as fast as today's turbomarkets, it will fall behind. It is not for nothing that Bill Gates likes to say at Microsoft they know only one thing: In four years, every product they make will be obsolete. The only question is whether Microsoft will make it obsolete or one of its competitors will. If Microsoft makes it obsolete, the company will thrive. If one of its competitors makes it obsolete, Microsoft will be in trouble. Bill Gates almost made Microsoft obsolete by initially suggesting that the Internet was not the future of computing. Lucky for him, he came around before his four years were up.

To avoid being made obsolete, private and public-sector innovators –

- Conceive of improvements in existing services, products, technology or infrastructure
- Test the improvements for feasibility, cost and, most important of all, market acceptance
- Implement them quickly and efficiently
- Market them effectively

Studies of the effectiveness of economic development programs have noted that, in most communities, 80% of resources go toward attracting inward investment by companies outside the region. But these companies typically contribute only 20% of the community's economic growth. Where does most of the economic growth come from? From companies already in the community.

Intelligent Communities do not neglect the need to attract outsiders, but focus most of their efforts on helping existing businesses and institutions innovate and bring their innovations to market.

Innovation is the business of business, as well as of the many non-business institutions such as hospitals, universities, and development banks. But local, regional and national governments have a role to play in creating the economic and social environment in which innovation can thrive. Intelligent Communities foster innovation by:

- *Identifying and focusing resources on innovative local companies.* Innovation is one of the most powerful drivers of business success. It is the small-to-midsize innovators that create employment in economies where the large brand name companies have been shrinking payrolls for decades. Government in Intelligent Communities know who their innovators are, understand what they need and work to help those companies obtain funding, find qualified employees, gain access to markets and connect with other innovators in business and education.
- *Improving access to risk capital.* Companies can grow modestly using cash flow, but strong growth takes capital provided by risk-taking investors. Major financial cities offer ready access to capital for the right company, but in smaller cities and rural areas, the challenges are greater. Government can assist innovative companies by learning about capital markets and working through state or provincial agencies, as well as national government programs, to connect their companies to private and public sources. They can also identify national and international associations or NGOs to which corporate and institutional investors belong and use them as channels to capital markets.
- *Creating e-government programs that deliver information and services to constituents more efficiently, on a 24x7 basis and at a lower cost.* E-government can also be a very effective way to increase citizen participation in government through Web streaming of administrative meetings, e-surveys and e-voting. At the same time, e-government can contribute to job creation for local technology companies, create demand for broadband and foster the development of a more innovative culture.

When we think of innovation, we tend to think of disruptive technologies and market first-movers. But the vast majority of successful innovations have nothing to do with technology. They are relatively modest improvements in how services are delivered or products are sold that can have big effects on demand. Innovation takes place in the oldest industries – agriculture, heavy manufacturing, transportation and so on – as readily as in the newest. So it is not necessary to found a technology cluster in order to promote innova-

tion. Instead, recognize the sometimes unlikely places where innovation is taking place, and encourage more of it to happen.



Digital Inclusion

It is no exaggeration to say that the broadband economy has the potential to create a golden age of prosperity, knowledge and freedom. But it has just as much potential to foster a "gilded age," in which the benefits go to a privileged few in the age-old pattern that has hindered development around the world for centuries. What will determine the difference between gold and gilding? Enlightened policies and effective programs created by governments at the local, regional and national levels. While the private sector contributes technologies and builds networks, only the public sector can ensure that the benefits are shared widely and deeply enough to tap the full potential of the broadband revolution.

Intelligent Communities use the new tools of the broadband economy to increase economic, social and political inclusion. They work to ensure that disadvantaged communities have the opportunity to participate in the broadband economy by eliminating barriers, providing skills training and creating incentives. Success in digital inclusion feeds success in each of the other Indicators by increasing the number of broadband users, improving the quality of the workforce, boosting innovation and providing the kind of success stories that make good marketing.

The poor and poorly-educated face many barriers to participation in the broadband economy, including –

- Low levels of literacy, which block access to the text-based world of the Internet
- Inability to pay for home information technology or broadband access
- Lack of understanding of the benefits of computers and the Internet in their lives

Intelligent Communities seek to overcome these barriers by improving standards in public schools, creating programs to subsidize IT and broadband purchases and provide public access to computers and broadband networks, and by offering training programs to all ages in basic computer literacy and uses of the Internet.

Economic participation is ICF's core focus, but it is important to note the rise of e-government as a means to increase participation in democratic government. The increasing number of successful projects that put social services, purchasing, permitting, approvals and even voting online create powerful incentives for citizens to go online as well. This not only benefits the citizens directly – it promotes a culture of use for broadband and the Internet that becomes a competitive advantage for the entire community.



Effective Marketing

Effective marketing begins with the determination to put the Intelligent Community strategy and programs at the center of economic development efforts. This is a key point. Far too many communities have strong strate-

gies and execute them effectively - but fail to put this dramatic story front and center in their efforts to promote themselves internally to citizens and local businesses, and externally to potential inward investors. Telling their story effectively involves:

- *Strong public relations.* Local, regional, national and international press can provide wide exposure of interesting community development stories, if they are packaged and promoted professionally. An investment in professional public relations typically repays itself many times over in awareness of a community and the pride of its citizens and businesses. Promotable events include the introduction of economic development strategies and the introduction of new programs.
- *Measuring and reporting.* One of the most effective and least expensive ways to attract both local and national/international attention for a community's effort is to measure changes in the community - public perception, broadband deployment, program participation, etc. - then to publish these reports and to make their publication another promotable event for the public relations program. The surveys can be as in-depth or brief as the budget provides, but by doing them regularly, Intelligent Communities demonstrate commitment to continuous improvement to their citizens, businesses and potential investors.
- *Conferences and rankings.* Many Intelligent Communities stage regional and national conferences, usually in partnership with a trade association or other recognized independent organization. These conferences focus on issues common to many communities but use the host community as an example. They also identify the large number of rankings, indexes and awards that cover communities, digital government, broadband deployment and other fields, and nominate themselves repeatedly. (ICF's Intelligent Community Awards program is one example.) These efforts dramatize the community's progress and provide recognition regionally, nationally and even internationally.

One challenge for local governments is that the return-on-investment of these efforts is difficult to measure. You cannot invest for six months or one year and quantify the results in financial terms. But when communities market themselves effectively over several years, the cumulative impact in terms of local pride, recognition for regional leadership, and international awareness is very high. ■

The 2008 Top Seven Intelligent Communities



Population
142,000

Labor Force
80,000

Top Industries
Wholesale and retail trade, healthcare, government, manufacturing, education.



Dundee, Scotland, United Kingdom

In the 1990s, the leaders of the city of Dundee looked back on two decades of economic devastation and vowed that the future would be different. In the 19th and early 20th Centuries, Dundee had been a flourishing city known throughout Britain for trading, whaling, textiles, food manufacturing and shipbuilding. Deindustrialization took hold with a vengeance, however, in the mid 1970s. Large-scale plant closures threw thousands out of work and caused an out-migration of skills and talent. Resulting union militancy did little to improve conditions but made national headlines that reinforced Dundee's reputation as a city in terminal decline. Population losses hit the retail sector hard, discouraged inward investment, and sharply eroded quality of life.

In 1991, local government created The Dundee Partnership (www.dundeepartnership.co.uk), a joint venture among key players including city government, the economic development agency Scottish Enterprise, universities, community groups, and the business sector. Its original focus was on the traditional tools of economic development: rebuilding the city center, developing tourist and leisure facilities and attracting corporate investment. But as the 20th Century gave way to the 21st, it became clear that more was needed. For the first time in decades, the city was experiencing net job growth, despite a continuing fall in manufacturing employment and levels of unemployment that remained well above the national average. Research revealed that Dundee's university sector - including the University of Dundee, University of Abertay Dundee, the Ninewells teaching hospital and Scottish Crop Research Institute - was driving job creation, not only in established sectors like publishing and scientific research, but in such new fields as software, animation, computer games, film and television.

Focus on New Sectors

In response, the Partnership refocused its effort on stimulating business formation in the new sectors. A government-funded Business Gateway project began providing e-business training and support to small and midsize companies, helping to improve the e-readiness of nearly 600 companies in 2004 and 2005. Moving in synch, Dundee's universities established



graduate business incubators and policies promoting the spin-out of new companies. The University of Abertay Dundee opened the IC CAVE research center to support the computer game and digital entertainment sector. A £20 million (US\$40m) Digital Media Park entered into development and, by 2007, opened its first phase, consisting of 100,000 sq. feet (9290 m²) of space for e-businesses. Two new marketing partnerships, bringing together public, private and academic leaders, launched Web sites, e-newsletters and

conferences promoting "BioDundee" to attract life science companies and "Interactive Tayside" to the digital media sector. Several Scottish investment programs support these efforts, including Proof of Concept, which funds pre-commercial research, and SMART/SPUR, which issues grants to small-to-midsize businesses to develop innovative and commercially viable products and processes.

By 2007, the life sciences sector employed 3,900 people including 300 scientists from across the world. Wyeth Pharmaceuticals announced that it would locate the world's first translational medical research center in the city. Meanwhile, over 380 digital media businesses have opened or moved into the Tayside region, compared with 150 in 2000. They employ more than 3,000 people and generate over £100 million (US\$198m) in annual sales.



Digital Savvy and Community Service

Dundee has also taken digital technology to the people. The City Council's Web site began offering online payment and processes to the public in 2002 and by 2007 had collected £25 million (US\$50m) in taxes and fees. With more than 60 online applications, the Web site is used by 32% of Dundee's population and received satisfactory rankings from 86% of users. In 2006 alone, it processed 60,000 transactions and collected over £8 million (\$16m).

Behind the "public face" of the Web, Dundee developed a comprehensive approach to its digital relationship with citizens. It established a Citizen Account database system that captured data on citizens (with their permission) and used it to pre-fill online forms. Some of the data was amassed through issuance of the Dundee Discovery Card, which replaced 10 separate card-related services in the city, for everything from bus service and parking to social services. The Discovery Card was the first example in Scotland of a university (Abertay) and City Council sharing a single card for their different purposes. One of the outstanding benefits of the Discovery Card, in the eyes of the City Council, is that it eliminates the social stigma attached to social services cards for low-income residents. So popular has it become - with 44,000 cards issued, used by 87% of 12-18 year olds for school meals and bus travel, and 85% of +60 year olds for leisure access and bus travel - that the Scottish Government decided to deploy a multi-application card for the whole country and asked Dundee to run the program.

This combination of digital savvy with community service is typical of Dundee. Broadband is commercially available to 100% of households, businesses and institutions in Dundee, with 48% of households and 90% of businesses currently connected. Speeds of up to 10 Mbps are available for £13-30 (US\$25-60) per month. But the city also operates 300 PCs with free Internet access at locations including 12 learning centers for adults, generating 15,000 user sessions per month. At least one free-access terminal is located within 2 miles of every household in the city. A network of 350 networked bus stops provides real-time travel information to digital signs and kiosks onsite as well as to mobile phones. A professor at the University of

Abertay has founded ADD Knowledge in partnership with government agencies to deliver Scotland's first home-study program for over 400,000 primary school children using next-generation video game consoles. Meanwhile, local health services use text messaging to remind patients about appointments and medications, and Dundee is proposing to become a test bed for Scotland's Project XYZ, which aims to create a WiMax network across major cities.

Dundee has come a long way since the dark days of the mid-1990s. From 2000 to 2004, the city had net employment growth of 3.4%. That average number encompassed the loss of 3,300 manufacturing jobs, a 20% growth in digital media, and 50-60% growth in life sciences jobs. New business starts rose 7% during the period and unemployment dropped, though it remains over a full percentage point higher than the average for Scotland. In 2007, the Partnership created a new group called the Digital Observatory. Its goal: to closely track Dundee's development as an Intelligent Community and provide leaders with the information they need to keep their community on the path to prosperity. ■



Population

50,500

Labor Force

29,235

Top Industries

Consulting
engineering,
health,
architecture,
finance,
insurance,
legal,
business
services,
wholesale
trade, real
estate, arts,
membership
organizations

Fredericton, New Brunswick, Canada

Founded in 1783, Fredericton was settled by American Loyalists, the losing side of the American Revolution. It owed its selection in 1785 as the capital of the province of New Brunswick to its inland location, which was considered reasonably safe from American attack. That risk faded after the War of 1812, and Fredericton got started on building the 19th Century equivalent of the knowledge economy when it became home to the University of New Brunswick and the region's Diocesan Center of the Episcopal Church. Government and other non-commercial institutions were to make up the bulk of its economy for the next 170 years.

In the mid-1980s, however, the Canadian Federal and provincial governments began to run large deficits and downsized to reduce costs. As more and more functions were outsourced, the best and brightest among government employees opted for employment in the emerging entrepreneurial class. By 2002, a KPMG study revealed that, per capita, Fredericton had more entrepreneurs than any other city in Canada. It had also become a young city, with an average age of 37, far below the national and provincial averages. Close to 70% of its labor force had some post-secondary training.

But what Fredericton's young entrepreneurs lacked was access to the information highway. New Brunswick is a rural province, with only 730,000 people living in an area the size of Ireland (home to 4 million). As with most rural regions, broadband was sparsely available and only at high prices. Not even city government could obtain a simple wide area network to connect its facilities. In 2000, the City Council decided that it had to act. By aggregating the demand of city government, the University and a dozen local businesses, the Council was able to purchase bulk commercial bandwidth at

a more competitive cost. The following year, Fredericton began building its own fiber network, which it has expanded every year since then to the present 22-kilometer (17-mi) fiber ring. The municipal-owned carrier, e-Novations, operates as a co-op and provides each member with guaranteed bandwidth as well as additional peak capacity based on availability.

By proving the existence of broadband demand, e-Novations spurred competition. Private carriers built out additional capacity, so that 70% of households and 85% of businesses are now connected to broadband, with monthly prices ranging from C\$22 for a 256Kpbs circuit up to C\$100 for 18 Mbps service.

Encouraged by their success at delivering a high quality of service at low cost, the Council decided to give wireless broadband a try. The Fred-eZone was activated in 2003, using the city's fiber network as its backbone and 300 WiFi access points to cover an eight-square-kilometer (3 sq mi) zone downtown as well as public facilities and retail malls.



Interestingly, the Council decided to that, in Fredericton, wireless access would be an intrinsic part of the infrastructure, free to all. If they didn't charge people to walk on the city's sidewalks, the reasoning went, why would they charge them for broadband access in the eZone?

Spurring Innovation

Broadband significantly boosted Fredericton's ability to leverage its digital age assets. Chief among them is the University of New Brunswick (UNB), which accounts for 80% of the university research in the province. UNB has developed multiple social and policy research clusters in areas ranging from threat-material detection to ocean mapping, and from e-books and Web publishing to biomedical engineering. Fredericton is also home to the National Research Council Institute for Information Technology. The Institute conducts research and develops licensable technologies as well as running an incubator for tech businesses.

The Knowledge Park, a successful tech park, is a joint project of UNB, the city, the province and the Atlantic Canada Opportunities Agency. Its tenants include CGI, Canada's largest IT service provider; e-learning company SkillsSoft; the Wyndham Worldwide hotel chain; and Q1 Labs, a network security company. Other fast-growing Fredericton companies include Radian6, which provides social media monitoring solutions; Virtual Experts Clinics, offering online educational therapy systems; and Atlantic Hydrogen, a clean-tech company with a process for enriching natural gas with hydrogen to sharply reduce emissions.

It would be no exaggeration to say that innovation is in the air in Fredericton, perhaps spurred by all those wireless digital bits flying around. The city contains an estimated 70% of New Brunswick's knowledge-based businesses. In 2004, after an intensive effort to improve its management and administration, Fredericton became one of the few cities in North America to achieve the ISO 9001 quality certification. Four years earlier, the city

joined the Partners for Climate Protection program and committed to reducing its greenhouse gas emissions to 20% below 1990 levels by the year 2010. The city has moved on multiple fronts to achieve this goal, from using water-based paint for traffic lines and reducing streetlight wattage to converting traffic lights to light-emitting diodes.

The community's advanced ICT infrastructure has played an important role in this effort. A Municipal Automatic Logic System controls lighting and HVAC in 16 municipal buildings in order to reduce energy use. In the process, it reduced greenhouse gas emissions by 6 percent from 1996 to 2004, and continues to generate about C\$180,000 in annual savings. In order to reduce the power consumption of streetlights without endangering the public, Fredericton turned to a GIS mapping system. The city used summer students to gather data on the location and wattage of every street light in the community. Its engineering staff entered the data into the GIS system and used it to develop a comparison between the lighting requirements for each street and the actual facilities in place. This guided decision-making about wattage changes, which allowed Fredericton to reduce energy use by 228,000 kilowatt hours per year, saving C\$43,000 annually.



That is typical of the balance achieved by this Canadian community. While focusing on important social goals, from fighting climate change to ensuring broadband access regardless of ability to pay, Fredericton also keeps its eye on the bottom line. In 2006, Fredericton's average family income topped C\$70,000, according to the *Financial Post*, 19% higher than the New Brunswick average. It had more businesses per capita than any place in Canada, according to KPMG. When it comes to doing well by doing good in the Broadband Economy, Fredericton is setting a global standard. ■



Gangnam District, Seoul, South Korea

The Gangnam District (<http://english.gangnam.go.kr/index.php>) lies to the south of the Han River, which snakes through South Korea's capital city from east to west. This district of 557,000 people contains 2.5% of Seoul's people but produces 25% of its gross domestic product. High-rise apartments make up 80% of its residential areas, and the district is home to the corporate headquarters of such Korean firms as POSCO and Korea Telecom, as well as the IT venture companies on Teheran Road, South Korea's Silicon Valley.

So it is perhaps no surprise that, if you wish to see how completely broadband and information technology can transform local government, Gangnam-gu (as it is called in Korean) is the place to go.

<u>Population</u> 556,964
<u>Labor Force</u> 496,490
<u>Top Industries</u> Wholesale & retail, hotel and food & beverage services, manufacturing



Getting an Early Start

Gangnam's development as an Intelligent Community began in 1995, when the district launched its first "electronic government" project. By 1997, the district had a local area network connecting government offices and a set of tax payment and other applications running on public kiosks. By 1999, the system could process all registrations, permits and other citizen applications electronically. Gangnam converted the system to the Web in 2002, and by 2006, Gangnam collected 264 billion won (US\$280m) in taxes online, 15% of the total, and issued 2 million documents to citizens through the Internet or public kiosks. The system has made possible a 25% reduction in the local government's employment since 1995, saving 36.7bn won (US\$39m), even as population and economic activity have grown sharply. In terms of what economists call "opportunity cost," Gangnam estimates that it has saved citizens time worth another 28.5bn won (US\$30m). Just as important, it has minimized opportunities for corruption, because nearly every transaction between government and constituents (except those requiring the protection of personal privacy) takes place through Web-accessible platforms. As Koreans say, "no fungus grows in the light." Gangnam's system for providing access to public documents was adopted by the national government in 2002.

The years since 1995 were witness to an economic miracle in South Korea, which saw per capita GDP climb 71% through 2006. There was a matching broadband miracle as well. In 1995, only 1% of South Koreans used the Internet. Under strong policies from the national government, private wireline and wireless carriers deployed broadband networks that reached 14 million subscribers (28% of South Korea's population) by 2006, ranking the nation fourth in the world. They also enjoy some of the fastest speeds in the world, with 100 Mbps available for as little as 35,000 won (US\$37) per month. Today, 3,000 Gangnam residents subscribe to Wibro, an advanced form of broadband that can be used even in a speeding car, while 8,000 South Koreans are using a digital broadcasting service to watch TV on their handheld devices during the commute to work.



Broadband for the People

Gangnam-gu was quick to seize on broadband as a means to make government more transparent, increase citizen participation, and even to help citizens who remained outside the local broadband economy. About 350,000 citizens are registered users of the district's Web portal, and 210,000 are subscribers to an email system that asks for their comment on proposed laws and regulations. They seem to take their responsibilities seriously. Recently, the district proposed installation of surveillance cameras in a particular alley in a residential district. A local human rights organization opposed the move on privacy grounds. When polled by email, however, 82% of residents supported the move and installation subsequently led to a 40% reduction in crimes in the area. One interesting aspect of the email

polling system is that Gangnam uses demographic weighting to adjust the results. It compares the demographics of the citizens who vote (provided in the registration process) with those of the district as a whole, and weights the voting in order to make it reflective of the whole population.

The Web has also played a vital role in a public campaign introduced by newly elected Mayor Maeng Jung-ju in July 2006 called the Movement to Keep Basic Order. The campaign enlists citizens in reporting on public nuisances, from illegal parking to environmental violations, by phone and online. More important than improved law enforcement is the change it has created in public awareness. Within 10 months of the campaign's start, the average daily number of violations reported dropped nearly 9%.



Gangnam has also found innovative ways to bring the benefits of Web-enabled government to citizens who have never gone online. In 2005, Gangnam equipped its social service staff with wireless PDAs, enabling them to check information, make reports and request services while visiting clients. In 2006, it launched TV GOV, a set of interactive e-government applications running over the familiar medium of the television set. The system enables users to access services in 34 categories, as well as government news channels, cultural and arts channels, and specialized information for seniors, women and children. In 2007, the district began offering a service that placed wireless motion detectors in the homes of the elderly and triggered a remote alarm if the sensor failed to detect motion for an extended period of time. In 2008, the service will be extended to provide citizens with the option of wireless location tracking for young children or the elderly suffering from dementia. These are the first of a set of "ubiquitous technology" services that the district expects to introduce in coming years to further improve the quality of life of its citizens.

Education Online and Offline

Korean culture puts a premium on education. The success of the broadband economy in Gangnam has both added to educational requirements and delivered new ways to meet them. To equip citizens with digital skills, a program called the Regional Information Classroom has provided classes on computers and the Web to over 400,000 citizens in their middle and senior years. Additional instruction is available via programs on TV GOV.

Education is a major expense for families with children in South Korea, and low-income students are at a substantial disadvantage. Gangnam offers several programs to lower this barrier. The district offers over 100 online lectures from a famous private academy for only 20,000 won (US\$21) per year to more than 335,000 registrants. It has opened digital libraries in the empty classrooms of elementary schools, providing access to 330,000 electronic books not only in those schools but nationwide to more than 133,000 students in 123 communities. The district also has a partnership with the University of California at Riverside's International Education Center to

deliver ESL (English as a Second Language) instruction to students in the district. Knowledge of English is considered so important that it assigns native English speakers to work in its schools and operates an "English Experience Village," in which students interact with native English speakers in real-life situations.

This vast array of programs takes a great deal of investment. Gangnam also invests directly in business development. Its Small & Medium Business Development Fund invested 4 billion won (US\$4.2m) in 32 technology companies in 2006. It also underwrites the activities of local nonprofits dedicated to business development, child welfare, sports and conservation. But in addition to the intangible returns of good governance, the community sometimes receives a direct return that also makes headlines. In 2004, Saga City in Japan awarded a US\$2 million contract to a Gangnam company to build a complex software platform. What Saga City wanted, and was willing to pay for, was Gangnam's e-government system. ■



Population

4,225,175

Labor Force

2,125,400

Top Industries

Health care, social assistance, credit services, employment services, motor vehicles & equipment manufacturing, plastics products



Northeast Ohio

Northeast Ohio is an 18-county region bordering on one of America's Great Lakes to the north and including the major metropolitan center of Cleveland (pictured right) and the cities of Akron, Canton and Youngstown. To Americans of a certain age, the names of those cities tell the tale of the Industrial Age. This region was one of America's great trade and manufacturing centers, a key link in the national transportation system, home to steel companies and the place where Standard Oil founder John D. Rockefeller made his fortune. Following the Second World War, however, it fell into seemingly unstoppable decline, particularly in the core urban areas, as US manufacturing lost competitiveness in a global market. Amidst rising unemployment, eroding institutions, population loss and racial unrest, the tremendous wealth created in the industrial era was no longer invested in creating new businesses and industries, nor in education and the development of social capital. In 1978, Cleveland became the first US city to default on its creditors since the Great Depression and, in 2004 and 2006, was named America's poorest big city.



Buried Assets

Yet the region retained hidden strengths: world-class health facilities, a vibrant arts culture, three major professional sports teams and respected institutions of higher learning, including Case Western Reserve University and Oberlin College. Another major asset was buried in a literal sense. During the 1990s, the telecom industry built out more than \$4 trillion of

fiber-optic communications systems worldwide. In most cases, these circuits followed the traditional transportation corridors such as rail lines and highways, which meant that Northeast Ohio found itself once again at the hub of a high-capacity transportation network.

In 2002, Case Western named as its new chief information officer a visionary named Lev Gonick. With global technology and community development experience on his resume, he soon began outlining a revolutionary idea. He believed that the region's nonprofit institutions could spearhead development of a common community network that would not only save them money and expand capacity but foster a wide range of innovation collaborations. The vision impressed many regional leaders, notable among them Cleveland Mayor Jane Campbell. Case Western and the city assembled a core group of institutions including NorTech (an economic development organization focused on technology), Cuyahoga Community College, Cleveland State University, the county library system, the local Public Broadcasting System (PBS) affiliate, and Cleveland's transit authority and school district. These were the founding members of a public-private partnership they called OneCleveland, which was eventually renamed OneCommunity (www.onecommunity.org). Under the leadership of its president Scot Rourke, OneCommunity forged partnerships with the region's telephone and cable carriers, under which the carriers donated unused fiber-optic circuits to OneCommunity and OneCommunity contracted for last-mile fiber and VPN services from the carriers.

To make the deal, OneCommunity had to overcome resistance to the creation of what carriers at first viewed as a new competitor. Fortunately, Rourke and his team came from the venture capital industry, which allowed them to talk the language of business plans and return on investment. It also ensured OneCommunity began life with a sustainable business model. Eventually, they persuaded all parties of OneCommunity's essential value: by helping the public and nonprofit sectors become better users of IT and telecom services, OneCommunity would save them money while simultaneously boosting demand across the region. And boost demand it did. Lev Gonick reports that, prior to OneCommunity, Case Western was using about 40 megabits per second of capacity for all of its operations. Within a few years of joining the OneCommunity network, average demand had risen to 400 Mbps. Since start-up, the OneCommunity network has expanded to connect more than 1,500 schools, libraries, governments, hospitals and universities. Its OneClassroom content and digital asset management system connects these users to world-class content from the Cleveland Museum of Art, Cleveland Orchestra, PBS and other sources. In 2006-07, the network hosted an 18-month program called Voices & Choices, which engaged tens of thousands of area leaders in Web-enabled "town meetings" in order to educate people about the challenges facing the regional economy and obtain their input. Voices & Choices has led to a regional economic development plan called Advance Northeast Ohio



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(www.advancenortheastohio.org), which focuses on business growth and attraction, talent development, inclusion and government collaboration for greater efficiency.

Rebuilding an Entrepreneurial Culture

OneCommunity would be impressive just as a story of network deployment - but it would not have achieved the potential that its creators envisioned. Because OneCommunity's Board is made up of the leading governmental and nonprofit institutions of the region, it became the hub of intensive collaboration. Today, the work of tech-based economic development agency NorTech, for example, is complemented by Team NEO, a joint venture of the largest metro chambers of commerce, which works to attract business investment in targeted sectors. Another nonprofit, JumpStart, provides venture capital to start-up companies with high growth potential. In 2006, it tied for ninth among the 100 most active investors making first-time investments in start-up or early-stage companies, according to *Entrepreneur* magazine, up from 61st place in 2005. Meanwhile, private investor Morgenthaler Ventures, founded in Cleveland with offices in Silicon Valley's Menlo Park, tied for 11th most active on the *Entrepreneur* list.

BioEnterprise is another nonprofit partnership, founded by The Cleveland Clinic, University Hospitals, Case Western and Summa Health Systems. It supports business formation, recruitment and acceleration for emerging medical device, biotechnology and health care service firms. Since its founding in 2002, it has created, recruited or accelerated more than 60 companies, helped them attract more than \$565 million in funding, and concluded over 225 technology transfer deals with industry partners.

In November, OneCommunity announced that it would share with the Northeast Ohio Regional Health Information Organization (NEO RHIO) an \$11.2 million grant from the US Federal Communications Commission to develop a regional broadband health care network. The network will connect 19 rural hospitals and numerous clinics in 22 counties to over 30 existing hospitals already on the OneCommunity network. The project will enable NEO RHIO and its collaborating medical providers to deliver telemedicine, records access, medical imaging and remote diagnostic services to improve community health care. At the same time, it creates the opportunity for the region to become a center of excellence in the emerging business of electronic patient records management.

The efforts of OneCommunity and its partners are all directed to the same goal: rebuilding the business, political and social culture of entrepreneurship that created the region's Industrial Age prosperity. In the Broadband Economy, that takes a different set of assets and skills, from broadband to partnerships to digital literacy. It also takes long-term investment in human and social capital. But the partners are betting that same spirit that drove the region's earlier success can create a sustainable and inclusive economy in the 21st Century. ■



Population
401,000

Labor Force
222,700

Top Industries
Wholesale and retail trade, transport and storage, communication, real estate, business services, software development.



Tallinn, Estonia

In 2004, a decade after the last Russian troops departed the newly independent country, Estonia became a member of the European Union. This event marked an extraordinary political and economic transformation powered by the nation's capital city of Tallinn (www.tallinn.info), home to 31% of the country's population and producer of nearly 60% of its GDP.

When independence came in 1991, Estonia was left with a shattered industrial economy, decrepit infrastructure and impoverished schools - but blessed with a strong government of determined leaders. They took radical measures to tame hyperinflation, abolish business taxes to encourage investment while still requiring a balanced budget. In 1995, Estonia's ambassador to the US and Canada (now president), Toomas Hendrik Ilves, publicized the idea of connecting all schools to the Internet. Estonia's then President Lennart Meri supported the idea and the government created a program called "Tiger Leap" to provide all schools with PCs and Internet connections by 1999.



This simple idea was a spark that lit a wildfire of innovation. Banks in Tallinn talked about their own Tiger Leaps while introduce e-banking, and newspapers being published for the first time put out online editions. An NGO created a program that put computers into vehicles to introduce ICT to the rural population. Lack of purchasing power, however, posed a clear obstacle. In response, the National Library in Tallinn introduced the first public access Internet services with funding from UNDP. The Soros Foundation began a program that invited enthusiasts to create public Internet access points all over the country, and in 2000, a private foundation called Look@World, funded by telecom, banking and computer companies, spread public access Internet even farther.

Creating the Conditions for Growth

Today, 100% of secondary schools connect to the Internet, and the public enjoys access to 325 public Internet access points and 360 WiFi hotspots in Tallinn, as well as 400 public access points and 775 hotspots outside it. Residential broadband penetration in Tallinn is at 44%, while 95% of businesses and 100% of government facilities are connected to broadband, with prices ranging from 125 krooni (US\$12) per month for 512Kbps up to 545 krooni (US\$52) per month for 12Mbps.

A good deal of the credit for this advanced telecom infrastructure goes to national policymakers who established a liberal and rational regulatory framework. In 1999, the government took the radical step of selling 49% of the undercapitalized and underperforming state-owned telecom carrier to Telekom Finland and Telia of Sweden. A Telecommunications Act, Digital Signature Act and Public Information Act were passed in quick succession in

2000 and 2001 to create the conditions for growth in all forms of telecommunications. Policymakers and the government of Tallinn were equally welcoming to Finnish and Swedish banks, which now dominate the financial sector. While such moves would stir local oppositions in many parts of the world, the people of Tallinn were used to outsiders. The city was established by Danes in 1248 and Estonia was ruled by Swedes, Germans and Russians until its first independence in 1918. Rapid change was possible because of a public consensus that Tallinn's best chance for sustainable growth was to become a vital part of a global economy.

Government and Business Innovation

Government was a major partner in innovation. As part of Tiger Leap, the national government made wholesale purchases of computers and persuaded banks to support leasing programs that included Internet access. It encouraged the Look@World foundation to provide computer literacy training to 100,000 adults. The government also introduced an electronic ID card and developed a data security system to support safe e-commerce. The ID card is a mandatory document for all Estonians over the age of 15, and 1.1 million cards were issued through October 2007. In addition to providing visual identification and a legally valid digital signature, the card can be used as a ticket on public transport, as a bank card and as an authorization card for online voting. The government also created an e-government "middleware" platform called X-Road to bridge the many databases and systems that were springing up in different departments. X-Road not only allows different systems to talk to each other securely but includes standard tools to speed the development of new online services. It now takes from a few hours to a few days, at a cost of US\$1,000 to \$10,000, to develop a new service. X-Road has become the backbone for all e-government services. In December 2006, it linked 67 databases to provide 687 different services across 392 institutions and companies.

In Tallinn, members of city government use an eMeeting system to collaborate regardless of location, and work is now underway on a paperless system for drafting regulations. At Tallinn's banks, 98% of customers access their accounts online, and drivers use their mobile phones to pay for parking. In 2002, an online information system called E-School was launched at five Tallinn schools. It connects parents, students, teachers and school administrators over the Internet, making school information accessible at home and reducing the routine workload of teachers and administrators. By January, E-Schools expanded to 15 schools in Tallinn and, by September 2007, it covered 85% of students throughout Estonia.

Tallinn has also not neglected the standard tools of ICT-based economic development. Tallinn Technopol, a science and technology park, offers 51,000 m² (550,000 sq ft) of space for ICT, biotechnology and new materials companies. It includes a 2,500 m² (27,000 sq ft) incubator offering a range of start-up support services. In addition to high tech, it has development programs aimed at maritime and tourism, and provides co-funding when individuals or companies apply for commercially viable patents abroad.

Rewards of the Broadband Economy

Today, Tallinn's advanced infrastructure, hard work and openness to the world are paying big dividends. The city receives more than 77% of all foreign direct investment (FDI) in Estonia, which attracts more FDI per capita than any nation in Central and Eastern Europe. The most active sectors are finance (46%), real estate and business services (15%) and manufacturing (13%). Geography strengthens Tallinn's hand, because its port offers one of the best transit corridors between eastern markets and the Europe and North America. A free zone for international trade, the port has been brought up to international standards through large business and public investments. Cargo volume, growing year by year, topped 41 million tons in 2006. Another 10 million tons and 1.5 million passengers passed through Tallinn's international airport that year.



Seven out of ten inhabitants in Tallinn's workforce are in the service sector. This reflects in part the sharp fall in industrial output after independence, when Estonian businesses lost their major market in Russia. While traditional machine building, metals, textiles, food and furniture industries have since become competitive internationally, Tallinn's newest success stories are in electronics. ABB Eesti and Elcoteq Tallinn are two companies providing outsourced manufacturing to such international companies as Ericsson, Nokia, ABB and Philips. E-health is Tallinn's latest area of focus. Four projects funded by the European Commission are piloting the creation of a unified health information system. Another pilot project, Doc@Home, is developing an integrated, standards-based, remote management system for patients with a range of chronic health problems.

As a committed member of the world's largest economic zone, Tallinn's next challenge is clearly to maintain its competitiveness and build on its high-value location at the intersection of physical and digital commerce. ■



Westchester, New York, USA

Westchester County is a 500-square-mile (1295 km²) region, with a population of just under one million, located at a geographic and demographic crossroads. It lies between New York City on its southern border and the state's relatively rural "upstate" region to the north. Known for some of America's wealthiest commuter towns, Westchester is also home to a fast-growing immigrant and low-income



Population

949,335

Labor Force

499,472

Top Industries

Trade, transport, utilities, education, health services, government, professional services, financial services, leisure & hospitality, construction.

population, today making up about 35% of the total. Its workforce of nearly half a million people generates an impressive 10% of all US patents.

Crossroads, of course, are traditionally hubs of commerce. Under the leadership of County Executive Andrew Spano, Westchester has taken major strides to keep its geographic and demographic advantages relevant in the Broadband Economy.

Broadband and Quality of Life

The county has long considered quality of life to be its strongest advantage in attracting middle and upper-income residents and competitive employers. Its Intelligent Community strategy has focused on maintaining this intangible but essential element.

Mr. Spano came to office in 1998 with the belief that the county's future would depend heavily on telecommunications. Aside from a cluster of corporate headquarters nicknamed "The Platinum Mile," the county had fallen behind most of the areas with which it competed for people and jobs. Discussions with major telecom carriers made it clear that they were far more interested in winning competitive battles in New York City than investing in Westchester. The county's response was to conceive the Westchester Telecom Network (www.westchestergov.com/westchestertelecom), a multi-gigabit fiber backbone that now extends over 800 miles (1287 km) into every corner of the county. Its development was made possible by collaboration. The county government worked with 43 local governments, an independent library system, major hospitals and dozens of school and water districts to pool communication budgets worth \$50 million over five years. This long and intensive effort provided all the incentive needed for a cable TV company, Cablevision Lightpath, to build the network. Losing customers worth \$10 million per year also sparked the interest of the region's carriers, which subsequently built and lit three OC192 (9900 Mbps) fiber rings within the county to create one of the best local telecom infrastructures in the United States. Today, residential and business customers can select from broadband options ranging from 768 kbps for \$15 up to 50 mbps for \$90 per month. Over 3,500 companies have connected directly to the Westchester Telecom Network, as well as more than half of all municipal agencies in the county, and all of the county's schools, libraries and hospitals.

The network has permitted Westchester to create, attract and retain innovative organizations. E-government programs built on the network's foundation include FirstFind.info, a virtual library that provides general and local information to low-level readers and adults with limited English skills. The Shared Criminal Justice Data



Warehouse, winner of a 2006 county achievement award, is used by county, local, state and New York City police departments. It offers a powerful search system that produces meaningful results from even vague and incomplete data, and provides access to aerial photography and GIS mapping. A revamped county Web site has become a primary communications tools and receives 22,000 visitors per day, compared with

12,000 in 2004. The network also played a direct role in attracting major employers to the county, including Nokia, New York Life Insurance and Morgan Stanley. But small, innovative organizations have benefited as well, including animation company Blue Sky Studios (animator of the movie *Ice Age*) and Pace University Online Learning for Trade Unions, which creates distance learning programs in telecommunications.

Spreading the Wealth

Like all Intelligent Communities, Westchester has clearly seen that broadband is not enough to secure a prosperous future. To create an inclusive and vital local economy, it has launched successful programs to promote business growth, improve the skills of the workforce and fight digital exclusion.

The county's Industrial Development Agency and state agencies offer tax abatement and Revolving Loan Fund and Technology Investment Fund programs targeting small business. Private investors including Morgan Stanley, MMV Financial and First Round Capital are also active in the county. The Westchester Information Technology Cluster is a virtual corporation supported by county government and business groups that works to match the needs of potential buyers to its database of more than 1,500 technology specialists at over 180 small-to-midsized technology companies. The Westchester Not-For-Profit Technology Council provides a similar service to non-profits in need of technology assistance by matching them with tech-savvy volunteers. Reaching beyond the US border, Westchester launched in 2007 a Web portal called US Channels (www.us-channels.com) to promote trade between county companies and the world, and has published a Chinese-language electronic magazine in DVD format.

Westchester has partnered with its neighbor, Fairfield County in Connecticut, to win a \$5 million, 3-year US Government grant for a "Talent for Growth" program. It aims to create a talent-driven system linking education, workforce and economic development partners with regional businesses, in order to develop a pipeline of skilled workers and improve the mobility of workers and communications systems. Another partnership, with New York State counties, targets "green workers." The Green Talent Pipeline unites the county governments with private and public employers to focus on "green" workforce development, economic development and education, to leverage the region's initial successes in developing clean technologies.

To help bridge the digital divide, the county runs a Westchester Scholars Program, which awards computers, software, connectivity and training to 50 students from low-income families per year. A Westchester Access program distributes older computers from county and local government to nonprofits, many of which use them as incentives to bring low-income adults into computer and Web training programs. The county also funds a large network of computers and connectivity at 41 library locations throughout Westchester.

Since the Westchester Telecom Network began service in 2001, this crossroads community has placed significant bets on its future. The expanding web of investments in Web-based applications, business growth, talent development and inclusion seem certain to power its growth for decades to come. ■



Population

223,000 (WS);
320,919
(Forsyth
County)

Labor Force

183,742
(Forsyth
County)

Top Industries

Education,
health,
manufacturing,
food products,
financial
services

Winston-Salem, North Carolina, USA

In the middle of the 20th Century, Winston-Salem had a global reputation for producing a product whose use is now being banned worldwide. The product is tobacco, and its trajectory is a fair measure of the path of Winston-Salem's industrial economy, which thrived on a mix traditional to the American South of tobacco, textiles and manufacturing. All three play a role in the economy today, but none are positioned to deliver sustainable growth.

In the mid-1990s, Wake Forest University began work on a plan to connect its medical school and undergraduate campuses with a high-speed network, which ultimately resulted in a 26-mile fiber-optic ring around Winston-Salem. The university's vice president of finance and administration, Dr. John Anderson, saw the potential to use this new asset for community development. He coordinated a series of leadership meetings that, with the active support of the Winston-Salem Chamber of Commerce, created an informal working group including the top government, institutional and educational users of communications.



In 1997, they dubbed themselves WinstonNet (www.winstonnet.org) and, a year later, staged a demonstration at a local school - attended by North Carolina's members of Congress - of video collaboration and multi-media teaching tools. In 1999, WinstonNet won a US Department of Education grant in partnership with the Winston-Salem/Forsyth County Schools to connect the school system to the fiber ring and the fiber ring to the North Carolina Research and Education Network (NCREN), a nonprofit, statewide network of educational institutions. Once construction was completed, the school system gained access to the Internet at the blazing speed of 155 Mbps. In the same year, WinstonNet incorporated as a nonprofit organization, with members including the city, the county, the school system, Wake Forest and its subsidiaries, the Chamber of Commerce and the local community college. Each member paid an annual service fee for use of the network, which was now called WinstonNet. Wake Forest began to earn a return on its investment and the members gained some of the best broadband access in the world at a very competitive cost.

Citizens benefited, too. Institutional and public investment spurred demand for broadband and the private-sector investment needed to deliver it. Today, 88% of households in Winston-Salem subscribe to broadband via DSL, cable, fiber, wireless and satellite, as well as 100% of government offices and nearly every business. Carriers including AT&T, Sprint, Time Warner Telecom, ITC Deltacom and DukeNet provide speeds ranging from 256 Kbps for US\$20 per month up to 8 Mbps for \$55.

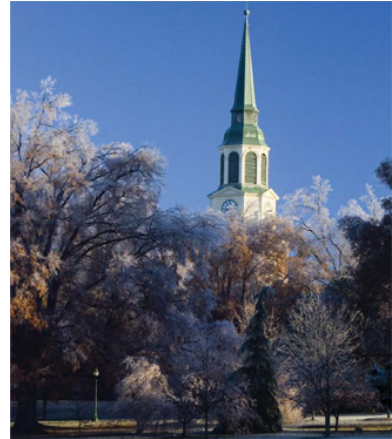
Beyond Connectivity

But the nonprofit WinstonNet was about much more than connectivity. Its real purpose was to enable Winston-Salem's transition from a manufacturing to knowledge-based economy. The WinstonNet Board believed that the community's future lay in services, logistics and biotechnology, which would place heavy demands on education and training to overcome not only the community's industrial legacy but fast growth in the immigrant population. North Carolina experienced a 37% increase in its immigrant population from 2000 to 2006, by which time Spanish speakers made up 7% of the total.

WinstonNet developed a three-pronged strategy to attack the problem. In 2003, the organization dedicated its first Community Computer Lab at a recreation center. Over the next year, it opened a total of 30 sites offering free computer access to children and adults, with Wake Forest University and Forsyth Technical Community College leading the project and Microsoft and Cisco Foundation providing funding. Today, there are 44 labs operating in community centers, churches, schools and libraries, managing more than 3,500 email accounts and logging over 75,000 user sessions per year.

In 2005, WinstonNet partnered with One Economy, a national nonprofit, using a grant from Cisco, to build a community Web portal. The Beehive Web portal was launched in 2006. With content in English and Spanish at a 5th grade reading level, the portal provides information on money, health, jobs, family, immigration, taxes, government services and computer training and support. The library system has taken responsibility for maintaining the portal, which according to One Economy, is now number three in the nation for the most "hits" to a community Web portal.

In 2006, WinstonNet put the last piece in place through a partnership with Forsyth County Libraries that created a sustainable computer training program. A three-year grant from state government permitted WinstonNet to hire a full-time coordinator, who has created a volunteer group of 40+ trainers, created a standard curriculum of courses and developed a certification program. Classes are taught in both English and Spanish. In its first year, the program completed 189 classes with total attendance of just under 1,000 people. WinstonNet is now developing, in partnership with a local nonprofit, a set of classes for visually impaired and physically challenged computer users as well.



Public-Private Partnerships

While working to raise the skills level of the entire community, WinstonNet has also contributed to technology and economic development. In 2002, WinstonNet became North Carolina's first Regional High Speed Networking Hub (GigaPoP), boosting Internet connection speeds to 622 Mbps. In 2007, WinstonNet switched on a proof-of-concept WiFi network covering 1 square

mile (2.5 km²) as a first step in creating what the organization calls "ubiquitous access to knowledge and information for everyone." Wireless Winston is a new public-private partnership backed by anchor tenancy agreements with the top employers in the community. Its goals are to reduce telecom costs, enhance education, improve student-teacher-parent communication and improve public health and safety.

In 2004, Targacept, a biopharmaceutical company spun out from R.J. Reynolds, joined WinstonNet in a cooperative program to demonstrate state-of-the-art "grid computing" in local schools. WinstonNet is now exploring development of a supercomputing center to be housed at the Piedmont Triad Community Research Park, where Wake Forest is constructing a high-performance data center. This research park, anchored in Winston-Salem's historic downtown business district, will provide 5.7 million square feet (529,547 m²) of "green" commercial space for life science research on land donated to the city by R.J. Reynolds. It is being developed by another public-private partnership called Idealliance and is currently home to five buildings including the Biotechnology Research Facility of Wake Forest University Health Sciences.

Greater Momentum

Other public and public-private organizations are adding momentum to the development process. The Piedmont Triad Entrepreneurial Network was formed in 2004 to offer programs and resources to fast-growing small businesses in the areas of education, mentoring, networking and capital formation. Wake Forest is developing the Angell Center for Entrepreneurship as an incubator housing 3-5 start-ups at a time for up to 12 months. Among its tenants will be winners of the Triad Entrepreneurial Initiative's annual business plan competition.

In addition to actively supporting these efforts, the city of Winston-Salem has deployed ICT to improve its services. In 2007, it opened a Citizen Contact Center providing one telephone number for access to all city services. Greater convenience for citizens resulted in a significant reduction in total call volume as more service requests were satisfied on the first call. The MyCityofWS service allows citizens to establish a profile on the City's Web site that defines their interests and location, so they can be notified by email of relevant new information. The fire department uses a wireless dispatch system with data routing and imaging, which has helped the department exceed standards for response time and effectiveness.

How does Winston-Salem measure the results of its many investments and partnerships? There have certainly been economic successes. Winston-Salem and Forsyth County now count 37,000 biotech employees as residents, and biotech companies contribute an estimated \$10 billion in annual revenue to the area. Dell Computer opened a manufacturing facility in Forsyth County in 2005 that will create another 1,500 jobs and contribute at least \$100 million in new investment. But Winston-Salem also measures progress in human terms. WinstonNet is now in discussions with the school district and community leaders on development of a program to place computers in the homes of low-income students. The program proposal covers funding, curriculum integration, teacher training, technical staffing, hardware

and broadband connections. If WinstonNet is successful in attracting funding, as it expects, the program will start in 2008/09 with 550 students in middle schools with high percentages of low-income students. Success, then, is measured not only in today's jobs. It is also measured by the community's ability to build a more prosperous and inclusive Broadband Economy for tomorrow's citizens. ■

The Selection Process

ICF's Intelligent Community of the Year Award program serves two purposes. It honors the achievements of communities tackling the complex task of building and maintaining competitive and inclusive local economies in the global Broadband Economy. It also gathers data on strategies and best practices for ICF's international research program.

Each year, hundreds of communities submit detailed nomination forms during the late spring and summer. In September or October, an internal committee selects from among the complete nominations the most compelling group to become its Smart21 Communities of the Year. These are announced at a ceremony hosted by the prior year's Intelligent Community of the Year.

Following the naming of the Smart21, academic researchers conduct a thorough review of the nominations and generate quantitative scores in each of six areas: the five Intelligent Community Indicators developed by ICF and a sixth topic that changes from year to year. In 2008, the special topic was sustainability, and ICF asked for data in any of the following three areas:

- **Self-sustaining programs.** Intelligent Communities work to create programs that sustain themselves through revenue, growth of the tax base, and the attraction of long-term investment.
- **Smart growth.** Intelligent Communities plan their development and use technology in order to maintain quality of life while creating jobs and spurring business growth.
- **"Green" development.** Some Intelligent Communities invest in Intelligent Community programs in order to reduce pollution and curb carbon emissions as well as for economic development and inclusion.

For the past three years, the analysis has been led by ICF associates based at Laurentian University in Sudbury, Ontario, Canada.

- **Dr. Sylvie Albert** is a professor of Strategy and Organizational Behaviour at Laurentian University (Ontario) in the Faculty of Management. Dr. Albert has published two books on the intelligent community movement and has completed her doctoral dissertation and several articles on this topic. She spent six years as a human resource planning consultant, five years as a Director of Economic Development, and ten years as a consulting project manager on dozens of economic development and



telecommunication projects across Canada under her own company Planned Approach Inc. She has served on the Board of the Telecommunications Access Partnership, the Northern Ontario Heritage Fund Corporation, and the Ontario Jobs and Investment Board. In 2000, Sylvie was named one of the Most Influential Women of the Year by the Northern Ontario Influential Women Award.

- **Dr. Rolland LeBrasseur** is a Professor of Organizational Behavior in the Faculty of Management at Laurentian University, teaching courses in organizational behavior and management research. He is a member of the Editorial Review Board of the *Journal of Small Business & Entrepreneurship*. His current writings focus on the organizational development taking place in small businesses, organizations, and communities. He holds a B.A. and M.B.A. from McGill University, an M.A. from Queen's University, and a Ph.D. from Warwick University.



The statistics they produce undergo a final review by ICF's internal committee prior to publication of the Top Seven Intelligent Communities of the Year. In May, after a second evaluation process conducted by an independent research company, one of the Top Seven is named Intelligent Community of the Year.

The Author

Robert Bell is Executive Director and co-founder of the Intelligent Community Forum. Mr. Bell has led economic development missions to cities in Asia and the US; authored articles in *The Municipal Journal of Telecommunications Policy*, *Telecommunications*, *Satellite News* and *Asian Communications*; and appeared in segments of ABC World News and The Discovery Channel. He is a frequent speaker at municipal and telecommunications industry conferences. The author of ICF's pioneering study titled *Benchmarking the Intelligent Community*, he leads research efforts for the Forum as well as overseeing its operations and finances.



The Intelligent Community Forum

The Intelligent Community Forum (ICF) is a nonprofit think tank that focuses on the creation of prosperous local economies and robust societies in the “broadband economy” of the 21st Century. From global networks connecting business centers to DSL linking homes, broadband is revolutionizing business, government, education, work and lifestyles. By opening markets, it both creates new jobs and destroys existing ones. By making possible the export of services and skills, it puts workers into wage and skill competition with people around the globe. ICF conducts research, hosts events, offers site-tour programs, publishes newsletters and presents awards to help communities understand both the opportunities and challenges, and to promote best practices in economic and social development.

Intelligent Community Forum

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Supporting the Work of the Forum

ICF is pleased to acknowledge the contributors who support our Awards program, the *Building the Broadband Economy* annual summit and the annual ICF Immersion Lab study tour of Intelligent Communities:

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