

The Top Seven Intelligent Communities of 2011

Health in the Intelligent Community

1 June 2011



Intelligent Community Forum
www.intelligentcommunity.org

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The Top Seven Intelligent Communities of 2011

Health in the Intelligent Community



Since 1999, the Intelligent Community Forum has presented awards to honor the achievements of communities tackling the complex task of building and maintaining competitive and inclusive local economies in the global Broadband Economy.

Smart21 Communities of 2011



Top Seven Intelligent Communities of 2011



The awards are based on ICF's Intelligent Community Indicators (see page 14), which provide the first framework for understanding how communities and regions can build sustainable, inclusive prosperity in today's hypercompetitive global marketplace. The award process begins with the naming of the Smart21 Communities of the Year in October. In January, analysis by an international academic team narrows the list to the Top Seven Intelligent Communities of the Year. And in June, one city, town or region is selected through a second analysis, conducted by an independent research company and an international jury of experts, as the Intelligent Community of the Year.

To gain a place among the Top Seven, communities pass through an intensive analysis of their strategies, programs and results in five categories: broadband deployment, the ability to create and sustain a knowledge-based workforce, digital inclusion, innovation, marketing and advocacy. To the five standard categories is added a theme that changes from year to year. In 2011, the theme of the Intelligent Community Awards is “Health in the Intelligent Community.”

The Top Seven excel in all of these areas. But that does not make them the seven "smartest" communities on the planet, whatever that might mean. Rather, it makes them the seven most compelling models of best practice in economic and community development worldwide. The Top Seven are leaders because of the strategic approach they have taken to creating prosperity in the Broadband Economy and the effectiveness of their execution. They are leaders in helping all of us better understand the way toward the community of the 21st Century.

2011 Theme: Health in the Intelligent Community

In 2008, the 30 industrialized nations of the Organization for Economic Cooperation and Development spent an average of 8.5% of their gross domestic product on healthcare in all its forms. For a block of nations with a GDP worth \$43.2 trillion, that amounted to more than \$3.7 trillion. Levels of spending ranged from over 15% of GDP in the United States (about \$2tr) to under 6% of GDP in Turkey (\$43bn).

However you calculate it, it's a lot of money. And it is expanding at a rapid pace. A 2004 report from the OECD showed that health expenditure in the world's 30 wealthiest nations rose from an average of 7.8% of GDP in 1997 to 8.5% in 2002, and the trend has been ever upward since then. Nor is it confined to this exclusive club. Global health expenditures rose from an average of 9.2% of GDP in 2000 to 9.7% in 2007. Low-income countries saw a 12.7% increase in the percentage of GDP devoted to healthcare from 2000 to 2007, compared with 9.8% growth in the highest-income countries. (In middle-income countries, for some reason, there was little or no rise in expenditure as a percentage of GDP.)

In the United States, the Congressional Budget Office forecast in 2009 that Federal spending for Medicare and Medicaid, the primary public health programs, would rise from 5.3% of GDP that year to 6.4% in 2002 and 10% in 2035. Most of the growth would be accounted for by increased spending per beneficiary rather than the aging of the population. The OECD Health Report from 2004 cited the same main drivers: advances in medical technologies and higher public expectations for health, with an increase in the average age of the population also a factor.

Given the enormous sums involved and the high rate of growth, there is now a loud and wide-ranging debate about how the costs of healthcare can be

reined in without damage to outcomes. The debate is particularly vibrant (if frequently incoherent) in the United States, where spending per person is more than twice the average of its OECD brethren (\$7,290 in 2009 versus \$2,964). The American healthcare system is clearly plagued by inefficiency, low productivity and a severe mismatch between what healthcare providers currently spend money on and the kinds of spending that produce the best results for the greatest number.

Meanwhile, inequities in healthcare among nations – and between rural and urban areas even in middle to high-income countries – remain large. According to a 2010 report from the World Health Organization, the child mortality rate (probability of dying by age 5) is 118 per 1,000 live births in low-income countries, compared with 7 per 1,000 live births in high-income countries. In low-income countries, the median for childbirths attended by a health professional is 37%, compared with 95% in high-income countries. For all countries, however, the median figure is 51% in rural areas and 89% in urban areas.

Seizing the Opportunity for Innovation

Whether the goal is to reduce costs, improve outcomes or extend basic health services to the underserved, innovation is the means to get there. Intelligent Communities are well positioned to benefit from the wave of innovation expected in healthcare and life sciences, because they are home to innovative businesses, institutions and governments.

The field is hardly a stranger to innovation. We may criticize how health-care funds are spent, but spending on healthcare innovation has delivered great benefits. According to a 2010 report from the Council for American Medical Innovation, for all childhood cancers combined, the number of children surviving five years after diagnosis has grown from less than half in 1975 to more than 80% today. Health economists estimate that declining mortality in the US from 1970 to 2000 had an economic value of more than \$3 trillion per year. In another estimate, economists forecast that a treatment delaying the average onset of Alzheimer's disease by 5 years would save \$111 billion in medical costs within the first 10 years of its introduction in the United States alone.

As an industry sector, healthcare and life sciences presents several different opportunities to Intelligent Communities:

- **A growth sector providing entrepreneurial opportunity for new businesses**

Given high levels of spending that, since the 1990s, have grown faster than the overall economy, healthcare and life sciences companies offer attractive growth prospects. It is also a sector ripe for disruptive change, whether the issue is cost control, quality of care, personalized medicine,

computational biology or genetic research. Such changes present opportunities that entrepreneurs are identifying and creating companies to exploit. With the majority of new jobs in the industrialized nations coming from companies less than five years old, healthcare and life sciences have a vital role to play in job creation.

■ **A source of employment growth for people at many skill levels**

Ninety percent of the healthcare system is made up of non-physician professionals and health care support workers, and the majority has jobs that require less than a 4-year university education. In the US, ten of the 20 fastest-growing occupations are healthcare-related, and healthcare is expected to generate more wage and salary jobs from 2008 to 2018 than any other industry, in response to rapid growth in the elderly population. This factor will drive up healthcare employment even in the many countries where healthcare is provided by a national system subject to public-sector budget constraints. And an increasing range of industries will find a role in helping to improve the delivery of healthcare services (see below).

■ **A means to improve quality of life for residents**

Providing and paying for healthcare is largely the province of institutions, national or state/provincial governments and insurers. But in many communities, local government gets involved as a strategic partner where there is an opportunity to improve quality of life for citizens. In some cases, local government targets particular demographic groups, from the elderly to the very young. In others, the issue is geographic: by intervening in the market, local and state/provincial governments seek to connect rural and remote areas to the quality of care enjoyed by urban residents.

The ICT Opportunity

In pursuing economic development in health and life sciences, Intelligent Communities have a secret weapon: information and communications technology. Traditional healthcare has been slow to adopt ICT in the past but the coming years are expected to produce explosive growth in the application of computing and communications to every aspect of healthcare and the biomedical industry. Intelligent Communities have worked to provide the broadband infrastructure that such companies require to do business. Because they have experience with leveraging ICT to build a competitive economy, Intelligent Communities also understand the ecosystem that such companies require, from access to knowledge workers and the support of educational institutions to innovative partners in local government and a culture that supports change.

The global healthcare information technology market is expected to grow (CAGR) at 11% per year from 2008 to 2015, when it will be worth an estimated

\$24 billion. In the US, the healthcare IT business is forecast to grow at double-digit rates to exceed \$10 billion by 2015, while the Chinese market will grow at 12% annually. In January 2009, China announced a \$1.5-\$2.6bn incremental investment for 2009-2011 in the healthcare IT sector. The French market will grow 8% annually to exceed \$1 billion by 2015, partly due to a \$2.2 billion stimulus package announced in October 2009.

What does the new healthcare IT market consist of? There are few sectors of healthcare that will be untouched:

- Clinical trials management systems, clinical decision support systems and data mining systems will cater to the needs of clinicians.
- Hospital information systems, e-prescribing systems, ambulatory care management systems and patient management systems will find wide use in hospitals.
- Applications including electronic medical records, electronic human resources, computerized physician order entry and physician practice management systems will be used to improve patient care.
- Advanced imaging management applications with acronyms like PACS and RIS will eliminate traditional film and improve workflow.

Best Practices in Health in the Intelligent Community

All of the Top Seven face a challenge to deliver more and better healthcare at a lower cost. They are experiencing a rapid increase in the percentage of older citizens with greater healthcare needs in their population. Sedentary lifestyles and poor diets in industrialized nations are increasing chronic diseases like obesity and diabetes at epidemic rates. Governments are struggling to fund the spiralling costs of care. Through strategic use of information and communications technology, the Top Seven are finding imaginative ways to attack rising costs while improving health outcomes for their citizens.



Chattanooga

- Web-based medical records system Page 26
- Remote diagnosis of patients at outlying health clinics
- Digital transmission of medical image files that speeds diagnosis

Dublin

- Comprehensive electronic medical records system available wirelessly Page 30
- Fingerprint authorization and barcode scanning safeguards administration of medications
- Mobile carts in hospital provide data and video connection to specialists at bedside

Eindhoven

- 10-year plan to increase productivity 1% per year to reduce demand for 25,000 healthcare personnel, save €750 million and generate 150 new companies Page 33

Issy-les-Moulineaux

- Rest Home for elderly produces TV programs in partnership with the city's youth associations to keep residents updated and connected to civic life. Page 41

Riverside

- iTriage system on Web and smartphones guides patients through symptoms and possible causes to help them decide whether or not to visit emergency room Page 46

Stratford

- Hospital providing shared laboratory and radiological services to a regional healthcare system via broadband Page 52
- Investments in automated surgical technology that help recruit high-quality staff at rural hospital

Windsor-Essex

- Networked diagnostic equipment feeds data and images into electronic patient records Page 57
- Table-to-Table service moves critical care patients seamlessly across national borders
- Drug and dental benefits administrator uses advanced ICT to automate claims processing and mine data to create value-added programs

High-Growth Healthcare Companies of the 2011 Top Seven

While large, long-established organizations are typically seen as the major employers in a community, it is young, fast-growing companies that generate job growth. So it is no surprise that Intelligent Communities work hard to promote company start-ups and nurture the growth of small companies, particularly those in the high-potential sectors of the new century. The following are the young growth leaders in the health, wellness and medical sectors of the world's top Intelligent Communities of 2011:

Activaero America, Inc.	Dublin
www.activaero.de/en/contact/dublin-ohio.html	
Provides respiratory disease management systems combining Activaero's AKITA drug delivery device with pulmonary function monitoring from Cardinal Health and transmits patient data to the caregiver electronically.	
Ambryx Biotechnology	Riverside
Discovers, develops and commercializes naturally occurring bioactive peptides found in the human body into safe and effective therapeutic drug treatment products for cancer and obesity treatment.	
Cardiox	Dublin
Manufactures and sells a non-invasive right-to-left shunt (RLS) detection system for the prevention of strokes.	
Glenveigh Medical	Chattanooga
Commercializing successful experimental research on a drug for the treatment of pre-eclampsia, a pregnancy disorder, and creating a nationwide network for testing and commercializing other medical breakthroughs in obstetrics.	
Neoprobe	Dublin
www.neoprobe.com	
Develops and commercializes innovative biomedical products that meet the critical intra-operative, diagnostic and therapeutic treatment needs of patients and physicians, with a focus on improving cancer surgery outcomes.	
OIFactor Laboratories	Riverside
http://olfactorlabs.com	
Commercializing patent-pending technology that controls the ability of blood-feeding insects to detect CO ₂ , which can be used as a repellent or trap for mosquitos, black flies and others.	
Specialty Networks	Chattanooga
www.specialtynet.com	
Delivers solutions that allow radiologists to read diagnostic images online or through an iPod or iPad app without being onsite with the patient.	

Tactile Sight, Inc.

Stratford

www.tactilesight.com

Manufactures a tactile directional guidance belt that uses vibration to direct wearers, who may be visually or mentally impaired.

UnoSano

Chattanooga

Developing a mobile application that interfaces with patient monitors and medical devices to collect diagnostic information in real-time and aggregate the data in a cloud computing database.

Withings

Issy-les-Moulineaux

www.withings.com

Manufactures and markets home wellness products that use WiFi connectivity and iPod/iPad apps to monitor weight, body mass index and blood pressure.

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, because their communities are



connected by broadband. It is an economy based on digital collaboration and cooperation across time zones and cultures, which has opened markets, boosted productivity, created employment, and improved living standards. In the Broadband Economy, companies look for opportunities to locate their facilities where they can gain the greatest advantage in terms of cost, skills and access to markets. So does money: broadband has 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.

Communities With the Same Goals

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.

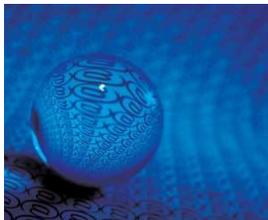
Powerful Tools for Community Development

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

In a study funded by the Province of Ontario, Canada, the Intelligent Community Forum defined five critical success factors for the creation of Intelligent Communities. This list of Intelligent Community Indicators, as the study termed them, provided the first conceptual framework for understanding all of the factors that determine a community's competitiveness in the Broadband Economy. It has become the working model of the global Intelligent Community movement.



Broadband

Broadband has been the fastest-growing communications technology in history. From 2000 to 2007, the number of Americans subscribing to broadband grew 684%. The French saw 2,800% growth during the same period, while the British boomed at a rate of 28,300%. The South Koreans saw only 264% growth during the period – because they got started deploying broadband well before 2000.

Yet not everyone benefited equally. Carriers in monopoly markets have had little incentive to invest in new infrastructure. Competitive carriers give priority to places with the best short-term business case: urban areas, high-income neighborhoods, and business districts. High cost areas, such as rural regions, and low-income markets, provide so poor a business case to for-profit companies that they remain perpetually underserved.

Where the private sector has deployed affordable and high-quality services, broadband is not an issue. But in other communities, local and

regional governments have found many ways to involve themselves in spurring access to broadband for their constituents. The most successful have all begun with the same first step: establishing a clear vision and communicating why broadband access matters. If constituents believe that broadband is just about downloading music or playing online games, they will not provide political support when it is needed. But if they see broadband as a path to prosperity and greater citizen participation, it will be quite a different story.

Once communities know what they want to do and why, they take different paths to get there. The Intelligent Community Forum has identified five approaches taken by the communities we have studied.

1. **Development Policy.** Remaining safely within the bounds of tradition, governments direct the usual tools of development policy at broadband deployment. They set broadband-friendly building codes. They conduct inventories of existing broadband networks and access points. They offer tax credits and craft rights-of-way policies to support network development.
2. **Networks for Government.** Local and regional governments are big users of communications, and they are generally as free as any business to build private networks for their own use. To reduce costs and gain new capabilities, they construct a fiber or coaxial network linking all government offices, schools, libraries hospitals and other public facilities. By making these investments in networks and services, governments become a vital anchor tenant for broadband and stimulate demand for broadband services.
3. **Public-Private Partnerships.** In other cases, government sets its sights on building a public-access network from the start but chooses not to build, own or operate it. Public-private partnerships take many forms, limited only by the imagination and legal framework in which the municipality operates. Some communities issue municipal bonds to fund construction of a network, which they lease to private carriers, with the lease payments covering the debt service. Others create nonprofit organizations to develop networks in collaboration with private carriers or provide seed investment to jumpstart construction of networks that the private sector is unable to cost-justify on its own.
4. **Open Access Networks.** Yet another variation on deployment strategy leverages the municipality's control of its roads and rights of way to encourage the private sector to invest. In these communities, government stops issuing permits to carriers to dig up the streets and install cable or fiber. Instead, it builds its own system of conduits and leases access to the provider. In some cases, the municipality or a municipally-controlled company installs its own cable or fiber as well and offers communications carriers instant start-up of service on its own facilities. By digging up the streets once and then closing them

to further construction, local governments protect their citizens from the disruption of repeated road work. The municipalities price the leases to cover their construction and maintenance costs as well as providing a positive return on investment. By lowering the cost of entry for new communications companies, open access networks tend to spur competition and promote better service at lower prices.

5. **Direct Competition.** The most aggressive posture a community can take is to invest public funds in setting up a broadband carrier, building a network and delivering service to outside customers. Local government typically takes this path after repeated attempts to interest incumbent carriers in upgrading networks have failed because the carriers could not make a business case for investment. Since municipalities need to earn a return sufficient only to pay capital and operating costs, they can frequently make such a case themselves. Communities that own their own water, gas or electric utilities – as many rural communities do – are in particularly strong position, because the build-out of telecom networks can often be cost-justified just by the operational improvements they offer to the utility. Additional revenue from communications services becomes mere icing on the cake.



Knowledge Workforce

The term "knowledge work" was coined by management consultant Peter Drucker, who forecast in 1973 that, within two decades, it would become impossible to maintain a middle class lifestyle by working with one's hands. 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. Today, all desirable jobs in industrialized economies – and increasingly in developing economies as well – require a higher component of knowledge than they did in the past. This is true not just in the research lab or design studio, but on the factory floor, the warehouse and the check-out counter of the store as well.

What are the tools available to a community to promote the development of a workforce able to do knowledge work? It is generally accepted that the opportunity to create healthy and productive citizens begins in infancy and continues throughout our lives, ranging from pre-school programs to secondary and graduate education to adult skills training. The challenge to communities is that only some of these assets are within their control. In most countries, school curricula are determined on a national basis; states or provinces set standards that must be followed. When communities tackle development of a knowledge workforce, then, they must do it in a complex dance of collaboration

with many levels of government, nonprofit institutions based in the community, and local business leaders.

Communities take different approaches depending on their situation and available opportunities.

- **Coordinating Assets.** Some communities have available a wide range of educational offerings and focus on making the "educational market" more efficient. They connect local employers to secondary schools, community colleges and universities in order to help students gain real-world experience and seize career and entrepreneurship opportunities in the local market.
- **Creating Assets.** Not all communities are blessed with the presence of institutions of higher education. They undertake the tougher job of creating educational institutions and services, from computer labs to public Internet kiosks, teacher training to online learning tools. They partner with distant universities and community colleges to bring education into the community via broadband, and encourage the formation of satellite campuses and relationships with local secondary schools.

Growing your own knowledge workers is one part of the task. Keeping them and attracting more is another. In general, knowledge workers seek a good quality of life and believe they should be able to afford it. Because they have skills, they are also willing to move in search of it. Intelligent Communities invest in e-government programs that deliver services online and engage citizens in governing partly to create an attractive culture for knowledge workers. Wise investment and smart deployment of these programs can make even small and remote communities highly competitive in the global battle for talent.



Innovation

The Broadband Economy is an innovation-driven economy. The spread of global and local connectivity has had a fundamental impact on the necessity for innovation, its speed and its economic value. Why?

- The first requirement for innovation is knowledge: of what customers want, of what other innovators are doing, and of what level of opportunity the market offers. Broadband has become the knowledge pipeline of the planet, making it possible for innovators to learn more faster than ever before.
- Another critical requirement for innovation is access to talent. Broadband allows both multinational companies and small business to efficiently tap the world's best and brightest. It adds to the quality of life in a community and makes it more attractive to knowledge workers.

- Innovation also requires access to markets. Broadband has made it far cheaper and easier to run a network of remote facilities or sales offices, to enforce standards of operation, branding and all the other factors in a successful marketing effort. And for innovators whose product can be delivered digitally, broadband opens the door to a global market.

By supercharging innovation, broadband has provided us with an amazing stream of better, cheaper, faster technologies for everything from healthcare to agriculture, entertainment to education. But innovation has also raised the bar for everyone who participates in the Broadband Economy. The challenge for communities everywhere is to ensure that they have what it takes to innovate or benefit from innovation, because it is the new basis of sustainable economic growth.

Creating, attracting and retaining knowledge workers are the most important steps a community can take to raise its innovation rate. Unlike traditional business as most of us conceive it, an innovative business is all about people.

In addition to building a knowledge workforce, Intelligent Communities focus on building the local capacity to innovate rather than achieving a few "big wins" in the business attraction game. Sustainable economic growth is no longer built on attracting the manufacturing facilities, R&D labs or distribution hubs of the world's biggest companies. Why? Because the world's biggest companies are not net creators of jobs. They have been shrinking in terms of total employment for decade.

Where do you look instead for local income growth? To new companies. In the 20 years between 1980 and 2000, all of the net growth in American employment came from firms younger than five years old. The US offers one of the world's friendliest economies for start-ups, but the same trend is visible throughout the industrialized world, according to the Organization for Economic Cooperation and Development.

Most small companies are not fast-growing. But a percentage of small businesses are what MIT researcher David Birch termed "gazelles" – nimble, aggressive start-ups with big ambitions, hungry for the resources needed to achieve them. Successful "gazelles" throughout the industrialized nations create the income growth on which the rest of the local economy feeds. To empower them, communities should work to:

- **Help companies to form, grow and accelerate.** If your nation, state or province makes it difficult to start a business – as so many of them do – find out what your community can do to make it easier. Provide potential entrepreneurs with advice, help them with paperwork, even represent them before the various licensing and regulatory agencies. Convince local universities and technical schools to help entrepreneurs license technology on straightforward terms and develop progressive intellectual property policies. Create business incubators and accele-

rators that connect local entrepreneurs to educational resources, laboratory or manufacturing space, advice on law, finance and business. Identify local angel investors or regional sources of risk capital, and find ways to connect them with new companies.

- **Create a pipeline for talent.** Improving the educational assets of a community is a big job, which can take years or even decades to bear fruit. But it takes far less time and effort to create a more effective "pipeline" through which local business can find the talent it needs. The work starts with talking to the significant employers in your community to learn what skills they need. From that point, communities conduct multi-faceted efforts to attract and channel talent to their employers.

Governments may not directly create the business innovation that powers economic growth. But local government can play a powerful supportive role. In addition to the steps described above, Intelligent Communities also invest in e-government programs that simultaneously reduce their costs while delivering services on the anywhere-anytime basis that digitally savvy citizens expect.

E-government has an impact at the local level that is both subtle and complex. Leading by example, e-government raises the public's "digital awareness" and helps to create a more innovative culture that attracts leading-edge individuals and businesses. Money spent locally on IT products, services and support increases local demand for them. Effective e-government also signals to businesses and citizens that the community is a good destination for the "digerati." In short, properly executed, e-government can do more than save money and improve service delivery. It can also become a robust economic development tool.



Digital Inclusion

When we talk about digital inclusion, we're really talking about preventing digital exclusion. As broadband deploys widely through a community, there is serious risk that it will worsen the exclusion of people who already play a peripheral role in the economy and society, whether due to poverty, lack of skills, prejudice or geography. Deeper exclusion increases income inequality and all of the ills that go with it, while raising yet another obstacle to social mobility.

When markets fail to create infrastructure that benefits society, it is generally agreed that government or some non-commercial entity has a duty to do something about it. This is why governments around the world offer investment tax credits, build roads and rails, and develop seaports and airports. It is why, in every industrialized nation, the government has played a role in ensuring widespread deployment of electricity, telephone, radio and television service. They view it as morally necessary, politically savvy and as increasing

the growth potential of the entire market, thus raising living standards across the board. And so it is with digital inclusion.

Typically, communities seek to promote digital inclusion through programs addressing:

- **Access.** When local governments conclude that market failure is preventing some segments of their population from having access to broadband, they respond by building networks or partnering with private-sector carriers to reduce business risk to acceptable levels.
- **Affordability.** Even when broadband is available, the cost of the computer and connection can be out of reach for some parts of the population. Communities typically respond by providing free access to computers and connections at public sites like libraries and community centers, as well as by subsidizing computers and connectivity for target groups.
- **Skills.** A computer and broadband connection are useless without the right skills, ranging from basic literacy to keyboarding, PC literacy and Web literacy. Communities respond to a skills gap with training programs for every age group in schools, libraries, community centers and special purpose facilities.

Every community that has addressed digital inclusion promotes the same set of achievements. So many public-access computers installed at libraries, municipal buildings, community centers and convenience stores. New classes on technology in primary and secondary schools. But successful Intelligent Communities go deeper. In crafting digital inclusion programs, they go beyond the basics to focus on fundamental change in the dynamics of digital exclusion:

- **Literacy and Numeracy.** The tools of the digital age require reasonable literacy and numeracy, or workarounds that allow illiterate segments of the population to access online services. In industrialized nations, illiterate adults typically deny their inability for fear of humiliation and often develop elaborate strategies to avoid exposure. Digital inclusion programs must make literacy and numeracy training readily available in ways that preserve the dignity of users. Web sites designed to provide essential information to citizens can also be written on a low reading level and make use of colors and images to guide users. In developing nations where literacy rates are far lower, communities have developed unique workarounds to help reach the excluded.
- **Relevance.** Not surprisingly, people who have never used a computer or accessed the Web may think they have nothing of value to offer. (Older adults are more likely than young people to feel this way.) Fortunately, local government and institutions are in a perfect position to change their minds. Community Web sites can offer information

and services on schools, careers, taxes, recreation, transit, health, and other topics important to people in their daily lives. Where segments of a community have strong religious, ethnic or cultural identity, government can work with institutions from houses of worship to social clubs to bring them online.

- **Capacity-Building.** The long-term solution to digital exclusion is to have members of excluded groups – whether the working poor, the homeless, the elderly, an ethnic minority or caste – involved in providing access, delivering content and developing services. Because they are members of the group, they understand the group's needs and interests better than any outsider can. They also, it is to be hoped, have a deeper and more long-lasting commitment to moving their group from the digital periphery to the center.



Marketing and Advocacy

In its 2001 study, *Benchmarking the Intelligent Community*, ICF included marketing among its five Intelligent Community Indicators. This may seem odd, because all communities engage in some form of marketing, and it is not immediately obvious how effective marketing makes one community more "intelligent" than another.

Yet both marketing and advocacy are vital to in helping communities survive and prosper in the Broadband Economy. Why? With markets, capital and business operations more global than ever before, employers and citizens enjoy the biggest range of location choices in history. Just like businesses facing greater global competition, communities must work harder than ever to communicate their advantages and explain how they are maintaining or improving their position as wonderful places to live, work and build a growth business. Marketing and advocacy are the final necessary pieces of the transformative process for Intelligent Communities.

The external marketing efforts of Intelligent Communities are distinct in two ways. First, Intelligent Communities make sure to focus on selling the strengths that make them competitive in the Broadband Economy. They expand beyond the typical "talking points" – location, transportation, cost of living, tax rates – to cover their Broadband Economy strengths: broadband connectivity, the quality of primary and secondary education, the availability of continuing education, the degree of economic inequality in the population, and the culture and practice of innovation in business, government and civil life. They are also unafraid to dramatize the story of their transformation. Many Intelligent Communities have executed – or are in the midst of executing – a shift from post-industrial decline to Broadband Economy success. Rather than glossing over the problems of the past, they use them to dramatize how far the

community has come. In so doing, they highlight the leadership, community involvement and innovation that have powered the transformation.

Advocacy is the process by which communities build an internal vision of their broadband future. It is important not only for building hope in the future and boosting "community spirit." It is also vital to job creation. Why? Job growth comes from new, innovative companies. They do most of their growing in the community in which they were founded. So "growing your own" is the single most powerful way to develop the local economy. There will always be a need for external marketing to attract outside businesses into a community, but increasingly, Intelligent Communities focus on:

- Creating a culture that attracts the "raw materials" needed by innovative companies: access to knowledge, markets and talented people.
- Positioning the community both externally and internally as one where innovative new companies will find the perfect fit.

The Intelligent Community Indicators provide communities with a framework for assessment, planning and development, as they work to build prosperous local economies in the Broadband Economy. The Indicators also reveal the interactions that can create a "virtuous cycle" of positive change. Broadband connectivity feeds the development of a knowledge workforce as well as creating the foundation of digital inclusion programs. Both contribute to a rising level of innovation in the community as well as increasing demand for connectivity. And Intelligent Communities make this wave of change the core "value proposition" in economic development marketing. ■

The 2011 Top Seven Intelligent Communities



Population
337,000

Labor Force
162,000

Size
543 sq. mi.

Top Industries
Education & health services, manufacturing, professional & business services, and leisure & hospitality

Broadband Penetration
80% household, 90% business, 100% govt.

Degrees Awarded Last Yr
Community college 2,724; undergrad 2,980; graduate 690

3-Year Job Creation
5,300, 1,030 depending on ICT

Key Leaders

Mayor Ron Littlefield

Jon Kinsey,
President, KPH Development

Sarah Morgan,
Program Officer, Lyndhurst Foundation

Chattanooga, Tennessee, USA

From pollution capital to smart grid leader

Every time you take a sip of Coca-Cola, you are tasting a bit of the history of Chattanooga. In 1901, the Atlanta-based company was selling its sugary syrup base to restaurants and drug stores, where it was mixed with carbonated water at the point of sale. Then a group of young Chattanooga businessmen persuaded Coke to sell them the right to pre-mix and bottle Coke. So sceptical was the company of their success that it sold the rights for \$1. The businessmen turned that modest investment into a nationwide empire of bottling plants that sparked the global distribution of today.

For a century following the end of America's Civil War in 1865, Chattanooga thrived on this kind of entrepreneurship. The tow truck was invented and commercialized there, and a number of national food brands were launched from Chattanooga. Chattanoogaans also founded two of America's largest insurance companies. But foundries, casting metal parts, were the mainstay of the economy.



Heavy industry created wealth and ample employment for blue-collar workers. It also produced pollution. Local joked about changing their shirts twice a day and turning on the headlights of their cars at noon, but in 1969, the US government cited Chattanooga for having the dirtiest air in America.

The designation shocked the community into action. The city council joined with local manufacturers and doctors to pioneer an air-quality control program a year before the creation of the US Environmental Protection Agency (EPA). An air pollution control bureau covering all of Hamilton County, which surrounds Chattanooga, motivated manufacturers to invest \$10m in pollution control. The effort proved so successful that the EPA recognized it as a national model in 1972.

Local government, business and institutional leaders did not know it at the time, but they had just created the team they needed to steer the community through tough times to come.

The Lost Decades

The 1970s began a period of long, slow decline as Chattanooga's manufacturers fell victim to the forces of rising global competition. Legacy companies shrank



and closed, and few new ones stepped up to take their place. The entire decade of the 1990s passed without producing a single new major employer.

The city did not go down quietly. The civic leadership, which had conquered the air pollution problem, organized and funded a massive effort to revitalize the urban core. In the 1990s, they constructed the Tennessee Aquarium, the world's largest freshwater aquarium when it opened, and a children's Creative Discovery Museum. They redeveloped the waterfront, built riverside parks and an 11-mile river walk to reconnect the city to the Tennessee River.

In fact, Chattanooga gained a national reputation for downtown revitalization, which created confidence and produced a cityscape that made citizens proud. But once the construction stopped, the projects did little to change the economic fundamentals. Community leaders entered the new century realizing that they needed a new game plan. What emerged was not a single, coherent strategy but a set of coordinated actions by different members of a close-knit leadership. Decades of battling decline gave them the determination to move ahead on many fronts.

Addressing Education

Like many manufacturing cities, Chattanooga had an educational system designed to turn out large numbers of low-skilled workers. It gave secondary school students a choice between vocational and college preparatory tracks. In 2003, the Hamilton County school superintendent junked this system with the support of the Chamber of Commerce and began holding all students to the higher standard. In a world where traditional blue-collar jobs increasingly require problem-solving and technical certification, there seemed no other choice.

Hamilton County schools also partnered with local companies and business associations to develop more than 30 Career Academies, in which secondary school students learn core academic subjects through their application to a particular industry. At a construction academy, students learned math by applying it to costing and completing construction projects. They still read Shakespeare but also learned how to read a construction contract and write a job proposal. That project and a health care academy were instrumental in boosting student scores. In the 2009-2010 academic year, the school system increased its graduation rate by 10%.

Chattanooga is home to a branch of the University of Tennessee and the Chattanooga State Technical and Community College. Their leaders established a close working partnership with each other, the Chamber of Commerce and a dozen local organizations to bridge the education last-mile. With the help of 1,000 volunteers, they deliver school-to-work programs to 15,000 secondary school students. One program, "Reality Check," lets students role-play being a head of household at different levels of income based on their educational attainment. As they simulate paying utility bills, obtaining child care and making choices about transportation, they quickly learn that a single parent with a high-school diploma cannot afford to buy a sports car.

The two institutions have also partnered to help lower-income students start their education at Chattanooga State and finish it at the University, which can save the students tens of thousands of dollars. Chattanooga State offers a



full range of technical degrees in health sciences, robotics, mechatronics and other leading fields, while the University offers a high quality College of Business, programs in engineering, computer science and math, and the National SimCenter for computational engineering, one of the

world's pioneers in solving engineering problems through computer simulation. The state of Tennessee ranks 48th out of 50 states in education, but the percentage of Chattanoogans with bachelor's degrees exceeds the national average.

Putting Smarts into the Grid

When electricity was first commercialized in the US, the utility companies focused on America's largest cities, where they could get a faster return on investment at lower risk. (The same would later be true of telephone service and broadband.) Chattanooga shares with many smaller American cities a valuable legacy of that earlier commercial neglect: a local electric utility owned by the City Council. The Electric Power Board (EPB) has delivered electricity to the city since 1935, telephone service since 2000 and Internet service since 2003, always with a mission to improve quality of life and economic opportunity for citizens.

A decade ago, EPB began studying the installation of a fiber-optic network to better control electric distribution. The technology looked promising: the business plan forecast that real-time information from smart meters and distribution systems would let EPB reduce its transmission capacity by 40% while delivering a higher quality of service.

But fiber was too expensive to meet the utility's 25-year payback requirement. EPB's technology team put the plan on the shelf and waited. They watched as, after the dotcom bust, the price of optical fiber cable fell sharply then continued to decline year by year. When the price was right, EPB moved.

By the end of 2010, EPB had installed its network into all of the 170,000 businesses and homes in its service area. With each fiber install went a smart meter able to provide real-time data on energy usage at that location. The meters are also capable of controlling energy-hungry devices in the home or office as well, but EPB is taking it slow in exploring their use. Some smart meter installations in the US have been controversial. Customers have accused their utilities of using the new metering systems to raise rates. EPB has kept the good will of Chattanooga for decades by ensuring that the innovations it introduces actually make its customers happy.



A fiber network, of course, is not just a control system for electricity distribution. Each home or business receives 1 Gbps symmetrical broadband as a standard offering, making possible Internet, voice and television service. The interesting thing about the EPB deployment, however, is that the telecommunications services are almost an after-

thought in business terms. The network is fully cost-justified just for its impact on electricity distribution; revenue from communications is just a bonus.

Not only does Chattanooga have one of the smartest smart-grid systems in the world, it is providing every resident who pays for electricity –nearly every resident, rich or poor – with the world’s most advanced broadband network. The adoption rate in Chattanooga’s poorest neighbourhoods is little different from the rest of the community, and programs from its Housing Authority have provided training and computers to more than 600 housing units.

The network is also having an impact on Chattanooga’s healthcare system. The city’s three primary care facilities include a teaching hospital, children’s hospital and Level 1 Trauma Center. They are working with healthcare business ventures to leverage EPB’s broadband capabilities. A partnership between BlueCross BlueShield of Tennessee and Cerner Medical is implementing a Web-based medical records system able to store and transmit high-resolution medical images. Chattanooga’s public hospital has received a grant to use the new network for telemedicine: remote diagnosis of patients at outlying health clinics to determine if they can be treated locally or need hospital care. One radiological group has found that the EPB network has so reduced waiting time for large medical image files that the productivity gain is equal to having another doctor on staff.

Balanced Growth

What have all of these separate but coordinated efforts brought about? By its own admission, Chattanooga began the 21st century as an economic development non-entity, with lots of great parks and museums but not much in the way of long-term job generation. By 2007, a survey of US site selectors rated it among the “50 Hottest Cities.” The EPB fiber project played its part in that turnaround. Stories on the project have appeared in *The New York Times*, Bloomberg TV and dozens of other news sites, as well as garnering 9 million Twitter impressions. The city has attracted relocating customer care centers, which are bringing hundreds of jobs into the region. The National SimCenter at the University is in talks with IBM about locating one of its most powerful

computers – one not even commercial available – in Chattanooga to take advantage both of the highly reliable power and communications infrastructure. Its crowning achievement has been to land a \$1 billion Volkswagen assembly plant, which will provide both white-collar and blue-collar jobs and have a substantial economic impact.

There is also a steady uptick in the community's entrepreneurial spirit. Nonprofit organizations have stepped up to accelerate the base of small company formation and innovation. The Chamber of Commerce runs one of America's largest business incubators, with 60 companies employing more than 500 people under one roof. The Lyndhurst Foundation funds a program called CreateHere, which provides



business planning and support to sustain and grow Chattanooga's arts and artisan community. Culture and tourism are increasingly important parts of the local economy. Lyndhurst has also launched a second project, InnovateHere, which provides incentives for technology companies to locate in Chattanooga. Providing additional impetus is the Renaissance Fund, an angel investment group of Chattanooga investors seeking to build a pipeline of local companies that can mature to the point of attracting venture capital.

With its unemployment rate below state and national averages, Chattanooga received good news in February 2010, when the Moody's financial rating service named it among the first wave of US cities entering economic recovery. With so many different actors pushing forward in so many different sectors, the recovering economy is more flexible and balanced than at any time in the community's past. That leaves Chattanooga's leadership well-positioned to keep doing what they do best: adapting to a fast-changing world. ■



Population

41,000

Labor Force

70,000

Size

25 sq. mi.

Top Industries

Insurance, biotech, communications, financial, food service, pharmaceutical, information technology, professional services

Broadband Penetration

60% household, 98% business, 100% govt & nonprofit

Degrees Awarded Last Yr

Community college 3,576; undergrad 14,139; graduate 5,715

3-Year Job Creation

249, 100 depending on ICT

Key Leaders

Dana McDaniel,
Deputy City
Manager, City of
Dublin

Greg Gunn,
Attorney,
Schottenstein, Zox &
Dunn

Cheryl Herbert,
President, Dublin
Methodist Hospital

Dublin, Ohio, USA

Creating the infrastructure that enables growth

In the United States, the financial crisis of 2008 gave rise to plunging property values, massive government deficits on the national and state levels and an anguished round of budget-cutting. Which makes all the more remarkable the steady, long-term approach of the small city of Dublin, Ohio USA.

Most American cities and towns fund themselves on property and sales taxes, but Dublin has a local income tax. It provides a dependable stream of revenue that allows the city to maintain ample cash reserves and plan for the long term. Dublin also has a successful track record at using its income tax receipts as collateral for what is called tax-increment financing. This has helped make possible a virtuous cycle in which savvy investments by the city attract investments by business that create high-quality employment. With a population of 41,000, Dublin has a labor force today of 70,000, drawn to the city from throughout the Columbus metropolitan area.



Much of this investment in physical infrastructure Twenty-five percent of the 2% income tax is dedicated to capital improvements, which have included the Emerald Parkway, the Dublin Community Recreation Center, and a planned 1,300 Innovation Park, a next-generation technology business campus that aims to unite the community's strengths in ICT, research and development. Government services are also well-funded; all three secondary schools in the city were named to *Newsweek* magazine's 2010 list of top schools in the country.

But one form of infrastructure stands out in Dublin, and has become a connecting thread that unifies and powers its other economic and social assets. They call it DubLink.

Open Access

Following telecommunications deregulation in 1996, Dublin began installing a network of underground conduit to encourage deployment of broadband by private carriers. A public-private partnership with the Fishel Company soon followed, and by 2003, Dublin had built and lit the DubLink fiber network to connect city facilities and replace telephone company service. Dublin's contribution to the project came from those tax-increment financing bonds,



funded by future increases in tax revenue that would result from the improvements being financed.

In managing the network, the city drew a bright line between public and private use. The city delivers no services except for governmental use, and leases either conduit space or its own dark fiber to carriers serving the local market. It is an "open access" strategy that has proven successful in communities as diverse as Stockholm, Sweden (2009 Intelligent Community of the Year) and Loma Linda, California (2007 Smart21 Community).

As Dublin installed more and more fiber in its conduits, it began doing capacity-sharing deals other public and public-private entities. DubLink now



interconnects with Columbus FiberNet, which reaches the state capital and four other cities in the metro area. It partners with the Ohio Supercomputer Center (OSC), carrying some of the traffic on OSC's 1,600-mile fiber backbone. In return, the OSC and Dublin joined forces to create the Central Ohio Research Network (CORN), a fiber infra-structure connecting governments, schools and

businesses to Ohio colleges, universities, research institutes and Federal labs. Other fiber transport partnerships include Central Ohio Broadband, linking with other cities that have developed fiber networks, and agreements with two carrier hotels in Columbus to exchange traffic in return for giving DubLink customers connection to global carriers. A Dublin nonprofit, the Online Computer Library Center, was granted fibers on the DubLink network, and uses them to provide research services to nearly 70,000 libraries in 112 countries.

Invisible Infrastructure

This "invisible infrastructure" has had major positive impacts on the community. CORN allows schools, businesses and institutions to explore experimental networking technologies through Internet2, where the next generation of commercial networking technologies is taking shape. An annual Ohio Supercomputer Center project uses videoconferencing to bring together thousands of elementary and secondary school students for an all-day learning conference. DubLink is used to deliver robust e-government services, from online registration for classes, tax filing and permits to remote attendance at City Council meetings. The city also partners with state government to promote OhioMeansJobs, a career Web site currently hosting 8 million resumes and hundreds of job openings.

Dublin developed a city-center WiFi network, which uses DubLink as its backbone. It has now budgeted for expansion to cover the entire city. In this public-private venture, Dublin contributes its infrastructure (network and

hotspots on city property) and a private company, HighSpeedAir, provides services. The city uses the network for mobile computing by its first responders and field staff, fleet monitoring of snow plows and other city vehicles, and video monitoring of traffic. It is also used to support city-sponsored cultural events, like the Dublin Irish Festival weekends and the Jack Nicklaus' PGA Memorial Tournament. And HighSpeedAir markets access to small businesses through corporate buildings and office parks.

The city also views WiFi as a way to reduce digital exclusion. To support widespread, affordable connectivity, Dublin provides free computer training to adults and seniors through its recreation centers.

Entrepreneurial Opportunity

It takes more than information transport, however, to build a competitive economy. Dublin is a partner of TechColumbus, a regional nonprofit whose mission is to accelerate the growth of the innovation economy through business plan counseling, market assessment and help in gaining access to capital. More than 60 Dublin companies have benefited to date. The \$625,000 that the city invested in TechColumbus in 2009 has already yielded \$14.6 million in investment, debt financing and new revenue.

The city's Dublin Entrepreneurial Center (DEC) opened in 2009 with one start-up tenant and now houses nearly 50 companies and support organizations, including the Center for Innovative Food Technology and the Ohio Fuel Cell Coalition. It hosts twice-monthly co-working events, where Dublin's business community participates in training and meets the community's newest entrepreneurial class. Inspired by its participation in ICF's programs, the city is also establishing a Center for Global Business Development at DEC to provide collaboration, education and support for Dublin companies seeking to do business overseas.

This ongoing effort to support and strengthen entrepreneurship helps explain why there are 3,000 companies in Dublin, with an average of just seven employees each, while the city is also home to multinational corporations such as Wendy's International and Ashland. Innovative young companies include Neoprobe, which develops biomedical devices to improve cancer surgery outcomes; EnergyGateway, which offers energy management services to commercial customers and was recently acquired by WorldEnergy; Sypherlink, whose software automates data-sharing across the enterprise; and Cardiox, which sells detection systems for the prevention of strokes.

Healthcare Advances

Healthcare has been a particular beneficiary of Dublin's high level of connectivity and the anchoring presence of Cardinal Health, a Fortune 17 provider of healthcare management services. OhioHealth, a nonprofit network of hospitals and healthcare facilities, uses DubLink and partner networks to

connect five major hospitals, billing centers and its corporate headquarters across Central Ohio. Three years ago, OhioHealth opened Dublin Methodist Hospital, the first new nonprofit hospital in the region in two decades, which has been named one of the “Most Wired” hospitals in America by *Hospitals and Health Networks* magazine every year since then.

The hospital has deployed technology to create a completely digital, wireless and near-paperless environment that better serves patients while increasing productivity. A comprehensive electronic medical records system provides access to physicians and clinicians both inside and outside the hospital. Fingerprint authorization protects drugs in the pharmacy system from abuse, and a barcode scanning system checks all medications to make sure that the correct drug is being used at the correct dosage. RFID tags keep track of all equipment in the hospital, which reduces losses to theft. Staff and physicians use a wireless system to locate and communicate with each other, saving countless hours, while mobile camera carts can be deployed to provide continuous video monitoring of patients anywhere in the facility.



Workforce of the Future

In 2008, Dublin began a major focus on workforce issues. The city benefits from proximity to Columbus, the state capital, with its many colleges and universities. Eighty percent of residents have a bachelor’s or graduate degree. But Dublin’s leaders understand the vital importance of creating a workforce that meets the specific needs of its major employers and fast-growing entrepreneurial companies.

The city began by hosting a series of education and business roundtables, which led to an annual Business-Education Summit on Workforce Development, now in its third year. Among other results, the effort led to a partnership between the state-sponsored BioOhio program and Dublin’s Tolles Technical & Career Center for the creation of a biotechnology program, and another between the city and the Columbus State Center for Workforce Development to bring targeted training programs to the city.

The old adage says that “slow and steady wins the race.” Through good and bad economic times, Dublin has shown remarkable steadiness in assembling the key elements of 21st Century economic growth. Slow, however, does not appear to be a word in the Dublin vocabulary. ■



Population
735,000

Labor Force
342,000

Size
1440 km²

Top Industries
High-tech systems and materials, automotive, life technology, industrial design, food processing

Broadband Penetration
86% households, 98% businesses, 100% government, 90% educational & nonprofit

Degrees Awarded Last Yr
Community college 13,680; undergrad 3,680; graduate 850

3-Year Job Creation
24,000, 3,500 depending on ICT

Key Leaders

Mayor Jack Mikkers, City of Veldhoven

Arjen de Koning, CEO, Paradigit Group

Arno Peels, President, Technical University Eindhoven

Eindhoven Region, The Netherlands

The open innovation model

The Eindhoven Region, south of Amsterdam, is a very successful place. Officially designated in Dutch as Samenwerkingsverband Regio Eindhoven (SRE), the region has long been the industrial center of Holland, with 730,000 inhabitants and a workforce of 400,000. Its major cities are Eindhoven (pop. 212,000), Helmond (88,000) and Veldhoven (43,000).

Eindhoven generates €24 billion of GDP and €55 billion in exports, one-quarter of the Dutch total. It absorbs 36% of all private Dutch R&D spending and is home to globally recognized companies including Philips, the healthcare, lighting and consumer product giant, and ASML, maker of photolithography equipment for the production of silicon chips. Eighteen percent of all Dutch automotive jobs



are in Eindhoven, and nine percent of all life technology employment. The Eindhoven University of Technology, with more than 7,000 students, is considered one of the top three research universities in Europe. The High Tech Campus Eindhoven founded by Philips houses over 80 companies employing another 7,000 residents.

Yet the region faces major challenges, and its ability to rise to them will determine whether its success can continue.

Eindhoven is a manufacturing center in a high-cost country. By focusing on producing high-value, technology-based products, it is in competition with fast-growing manufacturing centers in nations with much lower costs. Many are striving mightily to perfect the complex manufacturing capabilities that have made Eindhoven successful, which creates unceasing pressure for the region to boost productivity. Foreign competitors are also seeking to raise their own game in R&D and knowledge creation, and Eindhoven, which generates 50% of all Dutch patents, needs to stay ahead of the curve.

At the same time, however, Eindhoven is saddled with Europe's demographics, in which a low birth rate and aging population is reducing the regional labor force. To win the battle for the talent that provides its



2009
2010
2011

competitive advantage, the region must make itself economically and socially attractive to knowledge workers from around the world.

The Brainport Model

Eindhoven's answer to these challenges is a public-private partnership called Brainport Development (www.brainport.nl). Its members include employers, research institutes, the Chamber of Commerce, the SRE, leading universities and the governments of the region's three largest cities. A small professional staff meets regularly with stakeholders to identify their strengths, needs and objectives, then looks for opportunities for them to collaborate on business, social or cultural goals. Any stakeholder of Brainport has the opportunity to create new initiatives or partner with other stakeholders. Their work is based on a strategic plan called Brainport Navigator 2013 (with a 2020 version in the works funded in part by the Dutch government). It calls for focusing on five key areas for development: life technologies, automotive, high-tech systems, design and food & nutrition.

It sounds simple enough, and little different from strategies and collaboration groups at work in cities and regions around the globe. It could even be derided as a "talking shop" in which endless meetings take the place of action. But that would be a mistake.

Take healthcare. The region already has about 825 businesses active in the health sector, which employ 17,000 people. To drive further growth, Brainport created a project called Brainport Health Innovation (BHI). Its goals are to foster increased well-being for the elderly and chronically ill, to reduce healthcare costs and increase productivity, and to do so while generating economic opportunities for the region.



The total cost of regional healthcare is forecast to rise from €17bn now to €25bn by 2020, in large part because of the need for 100,000 new healthcare workers to meet demand. BHI's conservative goal is to improve productivity by 1 percent per year, which would reduce demand for new personnel by 25,000 and save about €750 million. Meanwhile, BHI's work expects to generate 150 new companies employing at least 10,000 people. It is a conscious effort to reduce employment demand in one area in order to increase it in another, where the region as a whole can benefit more.

BHI has involved hospitals, insurance companies, technology manufacturers, local government and individual patients to design and implement realistic technology solutions that offer a profitable operating model. In the works are the Living Lab eHealth project, in which aging people test new

services and products introduced by the BHI participants, including remote monitoring and diagnosis over broadband.

A Care Circles project aims to more efficiently share capacity among providers of home care for the elderly and disabled. The longer such patients can be cared for at home, the happier they generally are and the lower the costs of their care. The nighttime hours represent the biggest challenge to home care. Through Care Circles, all calls go to a central dispatch, which matches the location to the partner organization closest to the patient. The result is better quality and availability of care at a lower total cost.

Track Record in Collaboration

Some partnering, some pre-commercial testing, some cost-sharing – at first glance, the BHI projects sound worthy but hardly enough to light up the night. But that is the Brainport method. Bring together the players from business, government, institutions and citizens groups. Figure out specific projects on which they can cooperate for clear mutual benefit. Then manage the projects carefully until they produce results and gain the ability to become self-sustaining.

The range of Brainport projects is extraordinarily wide. The Automotive Technology Center involves 125 organizations in collaborative projects that, from 2005 to 2008, generated €4.5m in new investment. The start-up of new high-tech systems and ICT companies is stimulated by incubators with names like Catalyst, Beta II and the Device Process Building.

Design Connection Brainport manages a wide range of projects in design and technology, in order to encourage the industrial design expertise that is as essential as information technology to all of the SRE's industrial clusters.

Paradigit is a systems integrator founded in a university dormitory that built a fast-growing business producing build-to-order PCs and name-brand systems. Through membership in Brainport, the company identified an opportunity that turned into a program called SKOOL. This program provides over 800 Dutch primary schools with a combination of hardware and software that vastly simplifies the integration of information technology into education. Students receive SKOOL laptops from Paradigit. When students start up the laptops for the first time, the systems automatically connect to the SKOOL server, download all of the applications specified for that school and configure themselves. SKOOL provides remote management of all servers and PCs at its client schools, as well as an online interface for students and teachers to communicate and share content securely. So "bullet-proof" are the hardware and software that SKOOL's technical support department consists of just three people.

The Taskforce Technology, Education and Employment program (abbreviated TTOA in Dutch) focuses on promoting the interest of young people in engineering, attracting foreign knowledge workers, career counseling and lifelong learning. A project called Technific has created an award-winning

game called Medical Investigators, in which the student is an investigator accused of committing a crime. His goal is to prove his innocence by collecting evidence throughout the game using an electron microscope, infrared equipment and DNA testing. Each completed experiment helps the students advance to the next level. Another 1,500 kids take part in BrainTrigger, in which they work with local companies to develop innovative solutions in the fields of sustainability, mobility, safety and health.

Responding to Crisis

As the financial crisis gripped the region, TTOA funded research projects for more than 2,000 workers who faced layoffs in order to preserve their skills until the economy recovered. An additional €670,000 went to retraining personnel within businesses. A Dutch entrepreneurs organization identified Helmond, the SRE's second largest city, as offering the Netherland's best response to economic crisis.

TTOA also goes on the road to international career fairs in the US, Europe, Turkey, India and China to promote opportunities in the Eindhoven region. Its Expatguideholland.com Web site provides information and services to smooth the path of highly-skilled immigrants and their families.

Information and communications technologies are also brought to bear on creating a quality of life that attracts and retains the digitally literate. Digital City Eindhoven attracts a half-million visitors monthly to a Web-based social media tool that encourages residents to learn more



about the region. A WMO Portal involves 20 organizations in answering resident questions on health care, social services and housing. Bestuuronline puts political meetings in the city of Eindhoven online, while Virtual Helmond involves residents of that city in decision-making about planning, building designs and street furniture.

An online game called SenseOfTheCity allows anyone with a GPS-equipped mobile phone to create a personal map of the city and identify what they like best and least. A 12-day festival called STRP, which attracts 225,000 visitors, features music, film, live performances, interactive art, light art and robotics. GLOW is another festival that celebrates Eindhoven's history as home to the Phillips lighting division. The center of the city of Eindhoven is

transformed for 10 days into an open-air museum of design in light, much of it interactive, for 65,000 visitors.

The Enabling Infrastructure

The most long-standing innovation projects of Brainport and the SRE concern broadband. From 1999 to 2005, the Dutch government funded a pilot program called Kenniswijk ("Knowledge City") to subsidize installation of fiber to the home. The program ended after connecting 15,000 homes, but it was followed by a classic Brainport project: Be-linked, which brought together companies, institutions, social organizations, governments and residents to promote broadband deployment and applications. Over the ensuing years, it has stimulated a remarkable range of activity.

A commercial provider, Reggefiber, has aggressively expanded in municipalities where at least 40% of residents commit to taking service. It is now serving more than 230,000 households. Eight industrial parks, backed by loan guarantees from the city of Eindhoven, have installed their own fiber networks. The City of Eindhoven has offered its 100+ schools service on a fiber network at low fixed costs, as well as help in using it streamline management processes and improve teaching outcomes.

A nonprofit Eindhoven Fiber eXchange Foundation, established by the city of Eindhoven and the Eindhoven University of Technology, interconnects service providers throughout the region to let them make the most efficient use of assets. Its members include a broadband consortium of 21 social organizations, which share their own networks through the exchange. In 2010, eight of the region's 21 municipalities set up a €24m fund to create a virtual regional network made up of interconnected service providers.

In the small village of Nuenen, two residents successfully lobbied the Dutch government to capitalize deployment of a fiber network, called OnsNet, which achieved a 97% penetration within 3 months of start-up. That remarkable goal was achieved through a cooperative ownership model. Property owners were asked to pay for the "last-mile" connection from the core network into their buildings. The case for citizens to put their own money into operating the coop was simple: they were investing in a home improvement that would increase the value of their property.

The citizens of Nuenen own 95% of OnsNet and join technical and operational executives at meetings to identify new ideas and solve current problems. And the pace of innovation has been unceasing. An online exercise and weight-loss program, with a "virtual fitness coach," is popular. A "Window on Nuenen" channel provides access to video cameras strategically positioned around town, which allows the housebound elderly to stay connected to the life of the community. The OnsNet community TV service trains locals in the use of video equipment and makes it simple to upload video clips. Clubs and societies post video of their meetings and events. A local church offers live

broadcasts of baptisms and weddings on a paid basis. Parents and grandparents chat over video with children and grandchildren far away.

Open Innovation

OnsNet is an example of something Brainport calls “open innovation.” The Brainport nonprofit terms itself is an open innovation platform, in which many players pursue their own interests in collaboration with others, with Brainport acting as instigator, facilitator, negotiator and traffic cop.

The model is simple to explain in theory but hard to carry out in practice. World markets are changing fast and demographics are presenting challenges to growth all around the globe. The hope of the Eindhoven region is that years of practicing open innovation, on a foundation of information and communications technology, provide an advantage that competitors will find it hard to match. ■



Population

64,000

Labor Force

70,000

Size

4.25 km²

Top Industries

Information technology, communications, broadcasting, financial services, pharmaceuticals, publishing.

Broadband Penetration

85% households, 100% businesses, 100% government, 100% educational & nonprofit

Degrees Awarded Last Yr

N/A

3-Year Job Creation

5,000, 3,500 depending on ICT

Key Leaders

Mayor Andre Santini

Eric Legale,
Managing Director,
Issy Media

Ginette Broncy,
Chairwoman, ICT
Committee,
Economic and Social
Counsel of Issy-les-
Moulineaux

Issy-les-Moulineaux, France

Three decades of doing the right thing

Issy-les-Moulineaux, a city just across the Seine from Paris, has an employment rate close to 96%. More than 75% of its companies are in information and communications technologies, and they created 3,500 new jobs over the past three years. Issy's employers today field a workforce that is slightly larger than the city's population, because so many companies have moved out of central Paris to take advantage of its infrastructure, business-friendly climate and innovative services.

It was not ever thus.

Prior to World War II, Issy-les-Moulineaux (which translates into English as Issy of the Windmills) was the factory zone of the Paris metro area. It was also home to an army base that, in 1908, saw the historic first 1-kilometer circuit flight of aviator Henri Farman. After the War, Issy resumed its role as the industrial engine of the region – but then watched its economy erode in the de-industrialization of the 1970s and 1980s. Many of the world's great cities have industrial sub-cities like Issy, and many remain decimated by the collapse of manufacturing employment.

But the fate of Issy-les-Moulineaux was to be different, and to a greater extent than in most places, the difference was made by a single individual. In 1980, the people of Issy elected Andre Santini as their Mayor. Over the next 30 years, his administration provided leadership that was by turns visionary, daring and enormously persistent.

Envisioning the Future

First came the vision. With its proximity to the French capital and a major Army base, Issy was already home to a small cluster of IT, telecommunications and R&D organizations. Mayor Santini came to believe that they represented the city's future, and made it his top priority to create a business environment that would attract many more.

What would such a business environment look like? It would include the things that traditional economic development stresses: reasonable tax rates and good infrastructure, transparency and efficiency in government, access to labor and transportation. But long before it became accepted wisdom, Mayor Santini





2005

2007

2009

2011

saw that would include an innovative culture comfortable with technology and adept at using it to solve problems.

As the Eighties gave way to the Nineties, the Mayor's government made a series of investments that signaled its technology priorities. Issy became the first French city to install outdoor electronic information displays and the first to deploy a cable TV network. In 1993, schools introduced a smart card allowing pupils to pay for lunch electronically. The following year, the City Council rebuilt its meeting room for multimedia and began broadcasting Council meetings over the cable system.

In 1994, the Mayor also challenged city departments to create a comprehensive Information Plan based on study of the evolution of the Internet in the United States. The Internet was then in its infancy: 1994 was the year when Netscape, creator of the first commercial Web browser, was founded in California. Under the plan, completed in 1996, a Steering Committee representing municipal departments and elected officials was created to oversee investment in projects and maintain focus on objectives.

But policymaking was never a substitute for action. By 1995, Issy had free Internet access – with the fledgling Netscape browser and the new Internet Explorer – in its Media Library. Issy's first version of an e-government portal was already online in 1996. By 1997, the Council added interactivity to its cable and Internet broadcast of meetings, inviting citizens to ask questions by telephone or email and get an immediate response. Public participation began to climb. Whereas few residents bothered to attend Council meetings in the past, nearly half regularly participate remotely today. In 2002, Issy created a Participative Budget-Making Platform that enables citizens to help in setting local investment priorities. (Its latest generation includes an online game for children 7 to 14 that challenges them to test their knowledge of local finances.)

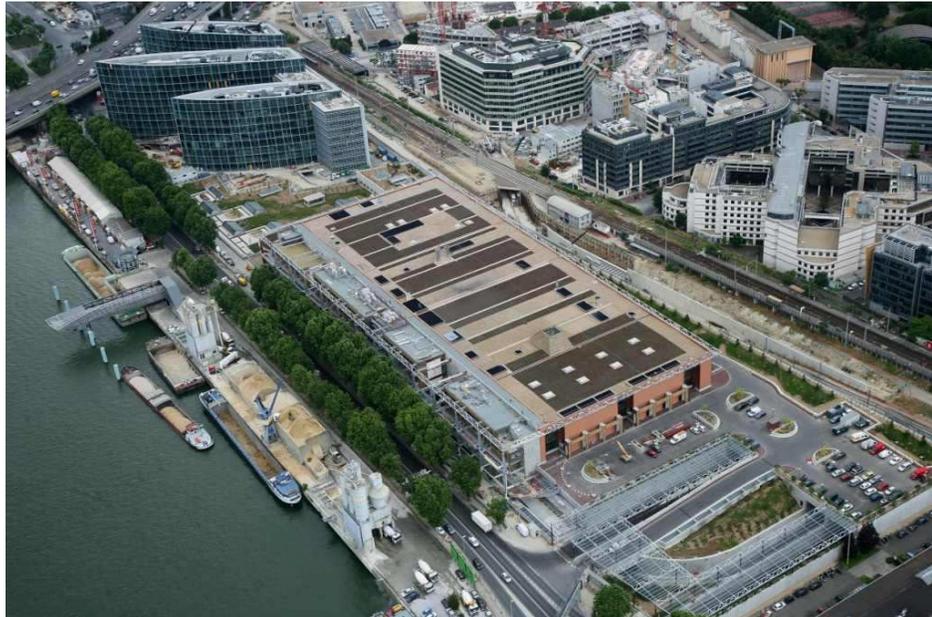
Service was expanded in 2005 with the IRIS "citizen relationship management" system, through which citizens could make inquiries or lodge complaints online, via telephone, email or mail. Today, the portal (www.issy.com) was providing local news, online public procurement, online applications for certificates and permits, access to more than 15,000 documents, and was receiving over 1 million visits per year. By 2009, Issy had extended e-government to the mobile user, with mobile phone payment of parking fees and an array of mobile remote support services for the elderly.

As a result of this rich array of offerings, nine out of ten Issy citizens are daily users of the Internet, and 98% told a pollster that it has fundamentally changed their lives.

Betting on Broadband

The Santini administration also dared to place big bets on the future. In 1998, the city made headlines by deciding to outsource its entire IT infrastructure to Euriware, a 10-year-old Paris company. The goal was to create an efficient service organization that could quickly turn ideas from municipal departments

into reality. Mayor Santini promoted it as the first essential step in transforming Issy into a "digital city."



The following year, the state-owned France Telecom lost its monopoly on telecommunications. The history of liberalization in telecom has been mixed at best. It has succeeded in lowering prices, particularly for long-distance service, but has failed in local markets around the world to loosen the grip of incumbents. Not so in Issy – because, well before the deadline, Mayor Santini's team launched negotiations with alternative carriers, which agreed to enter public-private partnerships with Issy to deploy networks. As a result, on the same day that the monopoly ended, Issy became the first city in France to offer businesses a choice of carriers. Over the next decade, as it continued to welcome competitors, Issy gained a total of six alternative broadband networks, passing 100% of businesses, government agencies, institutions and households. Issy also operates a network of 100 WiFi access points, with speeds up to 20 Mbps, around the city. Today, 85% of Issy's 35,000 households have broadband connections, compared with the French average of 70%.

With a robust broadband infrastructure in place, Issy's government has concentrated on encouraging citizens and businesses to make it an essential part of their life and work. Cyber Kindergartens provide parents with access to in-class Webcams that let them check on their children whenever they want. Issy TV, which garnered 400,000 hits in the year of its launch in 2009, has a successful series called Issy 2.0, which shows the daily life of citizens in the digital era. Computer training courses are provided to all ages in the Issy Media Library and the Cube, a digital arts center.

An annual Cube Festival involves the public in showcasing the many facets of digital creation through digital arts exhibitions. In 2010, the Festival introduced a multimedia urban adventure game, in which players use new

technologies to solve puzzles, moving back and forth between the real and the virtual worlds.

Issy's latest program is the Urban Planning and Sustainable Development Center, which is a public area for consultation and communication about the city's urban development projects. The Center offers innovative digital applications for politicians, professionals and citizens to exchange information and ideas on urban design. Issy 3D is one example. It allows users to move within a digital 3D model of the city that shows urban projects, construction sites and building permits, with access to statistics, media presentations and more. In the 2D world, users walking the streets can take mobile-phone pictures of bar codes affixed to buildings and monuments, and receive information on each through their Internet connection.

Staying the Course

The transformation of Issy from declining industrial district to booming tech corridor has hardly been an overnight success. Over three decades, the community has worked persistently and consistently to promote both digital business *and* a prosperous digital lifestyle for all of its citizens.

Issy's strategy envisions an "innovation triangle," with businesses as technology facilitators, citizens as the users and the government as the initiator and coordinator of projects. Through partnership agreements with companies like Microsoft and European Union programs like Living Labs, Issy has become a test bed for new technologies.



Senior citizens can learn how to use computers and access the Internet in the familiar and comforting environment of Cyber Tearooms. A campaign launched in 2006 refurbishes older computers donated by business and government and provides them at affordable prices to low-income families.

Issy is not a university town and has no higher education in the formal sense. But with encouragement from government, France Telecom R&D conducts training for students in the telecom sector and the community's many IT companies are active recruiters of students for internships. Studec TV, a Grande Ecole offering continuing education for broadcasting professionals, welcomed its first students to Issy in 2009, and the Paris Bar School, which has trained more than 23,000 lawyers since 1988, is moving into new offices in the city.

More decades, Mayor Santini has insisted that no segment of the population be left behind when it comes to technology. In June 2010, he joined the French Minister of Health to officially open the first rest home in France to

combine leading-edge technologies and health services with architectural comfort. With its own video production studio and video-on-demand network, the Lassere Rest Home uses video to help seniors stay in touch with the world and each other. A regular “Lassere Infos” TV program, produced by a senior resident and a youngster from one of the city’s youth associations, keeps residents updated on events in the Rest Home. A series of interviews called “Petals of Life” allow 100-year-old residents to share their experiences and memories with Issy’s inhabitants.

ICF recognized Issy’s vision, daring and persistence in 2009 when it names Mayor Andre Santini (pictured here to the right) its Intelligent Community Visionary of the Year. His vision has guided the city for longer than most of us have lived in the places we currently reside, and it has left Issy of the Windmills well prepared to continue prospering in the decades to come. ■





Population
300,400

Labor Force
160,200

Top Industries
Government,
educational & health
services retail.

Broadband
Penetration
78% households,
93% business, 100%
government, 80%
education

Degrees Awarded
Last Yr
Community college
2,400; undergrad
5,000; graduate
1,000

3-Year Job Creation
-20,000, +1,550
depending on ICTG

Key Leaders

**Mayor Ronald
Loveridge**

**Brad Hudson, City
Manager**

**Steve Reneker,
Chief Information
Officer**

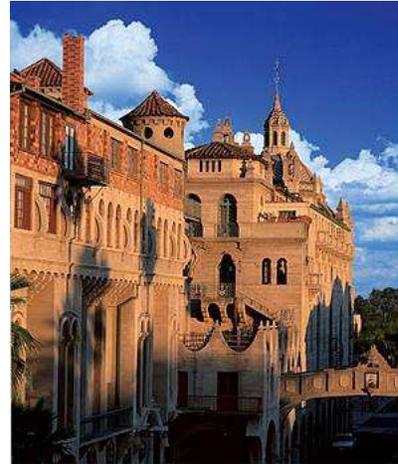
Riverside, California, USA

Success in high-tech is just the start

The year was 2005, and Riverside was in trouble.

It had been a long time coming. In 1873, a resident named Eliza Tibbets received two Brazilian navel orange trees sent her by a friend at the US Department of Agriculture. The trees thrived in Southern California's climate. A decade later, Riverside was home to half of the estimated 500,000 citrus trees in the state. The development of refrigerated railroad cars and advanced irrigation made Riverside the wealthiest city per capita in America by 1895. The legacy of that prosperity can still be seen today in the city's Mission Inn, Civic Center, and other registered historic landmarks.

But by the 1970s, the citrus economy was played out and Riverside had ceded its prosperity to the coastal metropolitan areas of Los Angeles and San Diego 60 miles (96 km) away. With less expensive land than the coast, the city developed a warehouse-centric economy supporting the nearby Ontario Airport and became a transit point for more than 120 trains a day carrying cargo from coastal ports to the rest of America. Another major segment of the economy was education: nearly 55,000 students at four universities in Riverside made up 20% of citizens. The student population drove demand for bars, nightclubs and entertainment, which created jobs but also led to increased crime. The still-important agricultural sector was served by a large population (+30,000) of poorly-educated and economically struggling residents, which provided fertile ground for gang recruiting.



By 2005, Riverside had a growing but two-speed economy. Well-educated residents commuted two hours daily to the coast for high-paying careers, while local jobs were generally low-skilled and low-paying.

And to make matters worse, the city seemed to have become unmanageable. The population had swelled by 100,000 over the previous 15 years. Five different city managers in seven years confused residents with frequent changes of direction. Streets went unpaved or unrepaired. Graffiti became a significant eyesore. The city had outsourced its IT department in the search for efficiency, but lack of oversight led to a worst-case situation in which the outsourcer felt free to maximize revenue and minimize service.



2009
2010

Turning Point

By 2004, Riverside's leadership had reached consensus on the need for change. Mayor Ron Loveridge (the current President of the National League of Cities) and Assistant City Manager Michael Beck worked to form the Riverside Technology CEO Forum. The Forum served as an arena for tech CEOs to identify issues and take collective action to improve the environment for their industry. The Forum's first act was to establish a High-Tech Task Force (HTTF) to determine how to transform Riverside into a hub of high technology. HTTF included city, university and community leaders as well as the CEOs of the city's research-oriented high-tech firms, most of which were located at the University Research Park, a joint development of the city and the University of California Riverside.

The HTTF report, completed in 2005, identified eight strategic initiatives. They ranged from business incubation, acceleration and tech transfer programs to a one-stop concierge service at City Hall for tech-related business development and a technology master plan for the city.

Public-private Forums and strategic plans are common enough among communities struggling to change their destiny. Riverside matched its strategic ambitions by investing in leadership. In 2005, it recruited Brad Hudson as its new city manager. He brought in a new management team and focused them on economic development, with a goal to transform Riverside into a beautiful city with an abundance of high-paying jobs and a high quality of life. Mr. Hudson, in turn, recruited Steve Reneker as the city's first Chief Information Officer.

In an unusual move, Mr. Reneker was also named Executive Director of an organization called SmartRiverside. Its mission was to attract and retain tech businesses and university graduates, create tech-centric jobs through collaboration with business and educational institutions, and bridge the digital divide. It is the rare CIO who is handed a formal economic development mission, much less one responsible for the Intelligent Community success factors of education, collaboration and digital inclusion.



Riverside Renaissance

The tightly-knit team began moving on multiple fronts in close collaboration with the educational and business sectors. SmartRiverside developed a request for proposal for a downtown WiFi network, which was awarded to AT&T using a model in which the carrier agreed to build out the network at no cost to the city in return for the city's guarantee to be its anchor tenant. The city also

built its own fiber-optic network to serve 60 public facilities and reduce communications costs.

To address digital inclusion, SmartRiverside required that the WiFi network deliver 1 Mb service at no cost, with faster service available on a paid basis. The city supported free access with a project to provide free technology to low-income residents.

SmartRiverside also launched a tenant improvement program at the University Research Park that offered high-tech companies a \$20,000 grant to start up or relocate in Riverside. The program pays high-tech employees who



move into the city a \$1,000 bonus and discounts on a home mortgage as well. The Riverside Community College established a TriTech Small Business Development Center to hold quarterly workshops for start-up companies on writing business plans, obtaining legal help and creating investor presentations. It also established a Tech Coast Angels venture capital group that uses the

Center to identify investment opportunities; through 2011, the group has invested \$2.8 million in local companies.

Physical infrastructure was also on the to-do list. A Riverside Renaissance Program, established in 2006, began investing \$1.6 billion in improving traffic flow, replacing aging water, sewer and electric infrastructure, and improving police, fire, parks, library and other community facilities. Information and communications technology are embedded in every aspect of redevelopment. The program is on track to complete more projects in five years than had been completed in the previous three decades.

Five-Year Track Record

Before 2005, commercial broadband service was available in only selected parts of Riverside. By 2010, the AT&T-built WiFi network covered 77% of the city, and the cable TV company, AT&T and Verizon offered a mix of coaxial and fiber services with speeds from 20 Mbps through 50 Mbps.

As anchor tenant on the WiFi network, the city used the service for credit card processing on its parking meters, which replaced mobile broadband service that had cost \$30 per month per meter. WiFi is also used for video monitoring and the control of train crossing and stoplights at more than 30 intersections from the city's Traffic Management Center. Control of signals allows the city to adjust traffic flows for trains in transit and downtown events, which has reduced average commuter time by up to 30%. The same network provides

broadband links to police cars for in-vehicle video streaming, and from surveillance cameras that monitor hot-spots for graffiti and gang activity.

The Riverside school district has introduced an accredited, tuition-free virtual public secondary school. With the same graduation requirements as conventional schools, the Riverside Virtual School provides opportunities for course acceleration, enrichment programs, online mentors and access to virtual clubs. Technology courses include Cisco Academy, AP Computer Science, Web and offline programming. Technology aside, students have the opportunity to participate in team sports and arts programs in physical schools.

Business innovation has prospered from the intensive focus of the city and its universities and colleges. To tap the potential of the 55,000 students who pass through Riverside, the city and UC Riverside created the Riverside Innovation Center. This incubator serves as the launching pad for life sciences and software companies, and offers office and wet lab space, business mentoring, access to expertise, a network of contacts and business assistance programs. Within three years of start-up, the incubator had become headquarters for eight new high-tech firms. Successful Riverside companies include StockTheHacker.com, which analyzes Web sites for vulnerabilities and applies security solutions; Surado, which makes award-winning customer relationship management software; Avisio, a publicly-traded technology commercialization venture; and OmniPlatform, which develops applications for emergency room management. Surado and Avisio have their own incubator spaces, where students and new companies are invited to turn ideas into patents.

ICT innovation is also transforming healthcare in the city. The emergency dispatch system uses communications and software to match emergency calls to the closest unit, monitor travel in real time and provide remote support to the response team. Riverside Community Hospital has deployed an iTriage system on the Web and smartphones. It guides patients through symptoms and possible causes to help them decide whether or not a trip to the hospital is needed. Texting the initial "ER" to a local number generates a reply with the current average wait time at the hospital's emergency room and a number to call to speak with a nurse.

Leading by Example

In addition to promoting innovation, city government has led by example. Mr. Reneker, the CIO, renegotiated the city's outsourcing contract to "cost plus," which saved the city more than \$4 million. The savings were invested in a refresh of data center technology and state-of-the-art network operations and help desk centers.

The city created a 311 center as a non-emergency point of contact for citizens and added Riverside Resident Connect, an online app for smart phones that allows anyone to take a picture and email it with a problem report to the 311 Center. Input from WiFi surveillance cameras is used to track every piece of graffiti in the city. The data is shared with a police database that creates a

GIS map of the locations with links to the pictures and stored data about the incident. The police department's Graffiti Task Force uses it to search for other examples of graffiti by the same "tagger." This information helps the police to track gang activity and also creates a proper chain of evidence for the city attorney. Since the 2007 start-up of the system, the city has collected more than \$150,000 in restitution from successful prosecutions.

SmartRiverside's Digital Inclusion Center is bringing training and free hardware and software to more than 200 new families per month, and has benefited 4,000 families to date. The work is performed in a partnership called Project Bridge with local schools, the county department on aging, the Salvation Army and gang prevention youth programs.

Two features of Project Bridge stand out. It is staffed by troubled youth, typically ex-gang members, who receive technical training and perform all computer refurbishing. They emerge from the program equipped for a full-time technology support position at almost any company. SmartRiverside is also the largest collector of e-waste in the region, drawing from businesses and institutions throughout Southern California. Working equipment is refurbished and unrecoverable hardware goes to a local recycler that pays by the pound. E-waste other than PCs is placed on eBay and sold; the eBay business, operated by Project Bridge staff, makes enough money to pay the staff's wages. In 2009, the Center helped recycle 203 tons of computer and electronic equipment.

Each year, SmartRiverside hosts the Inland Empire Technology Week, which includes a technology expo, a conference on sensors and surveillance, and an entrepreneurship boot camp at which 25 start-ups pitch their products or ideas to investors. Annual attendance exceeds 1,000 people.

The housing bust of the Great Recession hit Riverside hard. The city saw a 24% fall in median house prices, which triggered a \$2.8 billion drop in the property tax base and a \$10 million cut in the city's budget. It also threw the construction industry into a tailspin: construction employment declined 10% in the region from 2009 to 2010. Yet in 2009, *Relocate America* magazine selected Riverside as one of America's Top 100 Places to Live, citing its diversity, active and involved neighborhoods, safety, technology and emerging high-tech sector. In the face of global economic trends and the budgetary chaos of California, Riverside has chosen to take control of its own destiny and build a community that can prosper in the new century. ■





Population
32,000

Labor Force
18,000

Top Industries
Live theater,
healthcare,
manufacturing,
information
technology.

Broadband
Penetration
+90% households,
100% business,
100% government,
100% education

Degrees Awarded
Last Yr
Community college
9,165; undergrad
13,564; graduate
3,663

Key Leaders

**Mayor Dan
Mathieson**

John Wilkinson,
Member of the
Provincial Parliament

**Dr. Doug
MacDougald,**
Doctor of Veterinary
Medicine,
MacDougald & Jones

Tom Parisi,
President, Stratford
Summer Music
Festival

Stratford, Ontario, Canada

Delivering on a vision for a new economy

In 1952, a Canadian journalist decided that his home town needed a Shakespearean theater. The town was named, after all, for Shakespeare's birthplace of Stratford, and like that English city, it lay on the banks of a river called Avon. More to the point, the city was facing the loss of its economic reason for being as a railroad junction and locomotive maintenance center for the Canadian Railroad. Tom Patterson, the journalist, envisioned a summer Shakespeare festival as a new economic engine. With the support of Stratford's Council, he went to New York City and through enormous persistence persuaded British director Tyrone Guthrie to be the festival's first artistic director and Alec Guinness to star as Richard III in its opening production.

In 2011, the Stratford Shakespearean Festival entered its 58th season as the community's largest employer, which generated C\$135 million in local economic activity and C\$70m in tax revenue for all levels of government. Mr. Patterson's dream had come true – but the dreams of 21st Century Stratford were just getting underway.

A History of Adapting to Change

Stratford started life in 1832 as a millpond, saw mill, grist mill and woollen mill – as a place, in short, for creating economic value from Canada's natural abundance. When the national railroad set up a locomotive maintenance shop in 1871, Stratford's population doubled, with most working-age men employed at the shop. During the first half of the 20th Century, the city developed a furniture-making cluster responsible for one-sixth of all production in Canada. That industry waned, however, after the World Wars. The locomotive shop finally closed its doors in 1964 but post-war auto parts manufacturing took up the slack, and gradually diversified into precision bearings, industrial machinery and aerospace components.

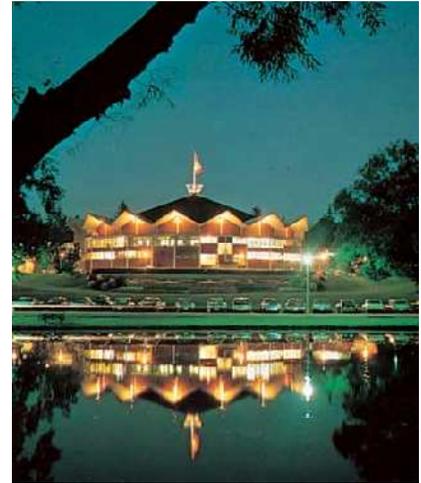


By the new century, Stratford's economy was a three-legged stool, with automotive and related manufacturing at the south end of the city closest to the US border, agriculture in the north, and culture – represented by the Festival – in the center. But the long-term stability of that stool was in question. It had been clear for some time that the North American automotive sector was in



trouble, but the shock of the Great Recession and bankruptcy of both GM and Chrysler still had a terrible impact, nearly doubling unemployment. It was clear that agriculture, though economically important, could not fill the employment gap. And community leaders knew that Stratford's economy was already far too dependent on the Festival, which for all of its cultural cachet was still a tourist attraction, subject to the ups and downs of that industry.

In 1997, Stratford's leadership began conducting a visioning exercise to chart a new economic direction, and published the results as "Community Vision 2010." They had the advantage of basing that vision on some existing competitive advantages. Like many rural cities, it owned its own electric utility, Festival Hydro, which offered a potential pathway for broadband deployment. The city also boasted a well-educated workforce, with 59% of residents having advanced certificates, diplomas or degrees, compared with 51% for Canada and 39% for the US. And it had its Shakespeare Festival, a source of artistic content and expertise if only the community could find new ways to capitalize on it.



Broadband Assets

In 2003, Stratford elected Dan Mathieson as its Mayor. Serving on Council or as Deputy Mayor since 1995, Mayor Mathieson had participated from the start in the community's effort to build a new economy. It was on his watch, however, that Stratford really began to move. It turned out that "Community Vision 2010" was well-named. For 2010 was the year in which many different development efforts began to pay off.

Back in 1992, Festival Hydro had invested C\$1.2m to run 40 km (25 mi) of optical fiber to the utility's biggest industrial customers and began to generate significant revenue from telecommunications. In the new century, the city and Festival Hydro decided to spin off the fiber assets into a new city-owned company called Rhyzome Networks, which was also charged with developing a WiFi network. By 2010, the fiber network had grown to 60 km (37 mi) offering 1 Gbps connections to 125 locations including city facilities, schools, the Shakespeare Festival and commercial customers. It also provided the backbone for 300 WiFi hubs throughout the city. The Rhyzome WiFi network was designed to be open, with the company providing physical connectivity but local cooperatives and commercial ISPs delivering service.

The network connects smart meters in 18,000 homes and commercial sites, which allow customers to see their power usage and adjust energy habits to save money and reduce peak load. The city has cut C\$60,000 from its annual

phone bills by switching employees from mobile phones to WiFi devices. In addition to paid services, the WiFi network provides free access to 18 Web sites of public interest including the resources of the public library, which also provides free broadband access to patrons onsite. Rhyzome and Festival Hydro are also extending WiFi coverage to utility customers in six rural towns and villages beyond the Stratford city limit. This supplements a Rural Connections program funded by the province, and has helped make broadband available to 99.9% of residents in the rural areas around the city.

The Breakout Year

In October 2010, Stratford signed a memorandum of understanding with the University of Waterloo to create a new campus in Stratford. Beginning in September 2011, it will offer an undergraduate degree in Global Business and Digital Media, and graduate studies in Business Entrepreneurship and Technology as well as Digital Innovation. The project is funded by the city, province and Federal government as well as by Open Text, a Waterloo-based provider of enterprise content management systems. Headquartered in ICF's 2007 Intelligent Community of the Year, the University of Waterloo has an international reputation in computer sciences, math and engineering. It operates the world's largest cooperative work program and its liberal intellectual property policies led to the creation of Open Text as well as Research in Motion, maker of the BlackBerry.

The new campus will be home to two other major projects also announced in 2010. The Stratford Institute aims to be a think tank staffed with leading digital technology experts involved in research and development, product commercialization and policy. A new technology business incubator will provide office space, support services and consulting expertise in finance, accounting, law, product development and market. That will complement the existing Stratford-Perth Centre for Business, where consultants offer training, mentorship and financing programs in Stratford and surrounding communities.

These are major developments for a city of Stratford's size. According to Mayor Mathieson, "When the full contingent of 500 undergraduate students is onsite, it will bring a \$30-40 million annualized benefit to the city, including 300 jobs and \$60 million in construction." The long-term gains are expected to be greater, because Stratford is betting its future on digital technologies as a means to accelerate business start-up and growth.

Entrepreneurial Foundations

Stratford is already home to a number of tech start-ups and is becoming increasingly attractive to technology operations seeking a new location.

Five young Web developers from Stratford and Toronto founded Conceptual Pathways to build Web-based systems such as Bill Circle, a collaborative bid management system for general contractors and their subcontractors, trades and specialist services, which drastically reduces the time and paper used to

compile contracts and bid. Perth County, of which Stratford is the county seat, has adopted the system, as have a number of general contractors and thousands of subcontractors.

PicoWireless has created a free, ad-supported email client called PicoMail that allows low-end mobile phones to mimic the user experience of a more expensive smartphone. Its global market ranges from shopkeepers in Delhi to teachers in Nigeria, who can now do online work from a standard mobile phone with a bad CEPU, tiny screen, limited bandwidth and no memory.

Tactile Sight equips users with a belt containing tiny vibrators, a GPS unit, compass and inertial sensors. A Bluetooth interface downloads landmarks from



a map application on an attached mobile phone. The result is a wearable computer interface that offers the wearers directional guidance in the form of vibration. The user – who may be visually impaired, suffering from memory loss, or a first responder working in darkness or smoke – walks toward the perceived source of vibration and can be safely guided to a

destination. A seamstress at the Shakespeare Festival advised the company how to make its belt not only functional but appealing to wearers.

Stratford is also succeeding at traditional business attraction. In June 2010, RBC Royal Bank broke ground on a 4 million square-foot (371,000 m²) data center, where 100 employees relocating from Toronto will soon begin work. Over 200 Canadian cities vied for the project but Stratford put on a coordinated campaign to win the project, going so far as to have Festival Hydro build a C\$17m redundant power station and grid upgrade for its Wright Business Park to deliver the robust infrastructure the data center requires.

Knowledge Workers and Digital Healthcare

The region's public school district has moved to strengthen skills up and down the curriculum. In Stratford Central Secondary School, the district has supplemented popular Communications Technology courses with two Specialist High Skills Majors in ICT and Digital Media, which include co-op work placements. The school system and the local Conestoga Community College collaborate on a C\$1.5m program, led by a local documentary filmmaker, to develop the Stratford Digital Media Center, which will offer studio, editing and learning facilities to students and local digital media artists.

Digital media and online resources are also used to attract and motivate the educationally challenged. An Online Co-Op program, developed by the school

district, is a digital media outreach to secondary school dropouts who can complete their diplomas online, using credit for work experience gained. Reach for Success is an adult education program for struggling teens and young adults, which provides them with online job search, online co-op and self-study courses in a classroom environment.

As the county seat, Stratford is also the center of a regional healthcare system. Stratford General Hospital owns its own 1 Gbps fiber loop connecting with other hospitals and providing 100 Mb connections to desktops. This is the core of an extended network riding on Rhyzome that connects with 80% of the physicians groups and family doctors in greater Stratford.

Connectivity is having a major impact on quality and cost of care. Participating physicians share access to their patients' electronic health records, online tools, administration and after-hour clinics. The Inter-Hospital Laboratory Partnership, based at Stratford General, conducts 70,000 tests for patients in surrounding counties. Physically linked by twice-daily courier, lab results are turned around in hours and, for connected facilities, are available instantly. The interpretation of medical images is likewise centralized, so that four radiologists at Stratford General can serve the entire region – with another radiologist in Austria available for off-hours service. A planned extension of the medical network onto the Rhyzome wireless system will allow secure mobile access to electronic medical records anywhere in the coverage area.

The hospital has also made major investments in the Canadian Surgical Technologies & Advanced Robotics (CSTAR) system. Very high capacity broadband connects its operating rooms with the London Health Sciences Center (LHSC), a medical research center located an hour away that is a global leader in robotic surgery. Surgeons at LHSC have performed robot-assisted surgery in Stratford using CSTAR, as well as being available for video consultation right in the operating room. Innovations like these, and Stratford's high quality of life, make it easy for Stratford General to recruit the talent it needs to keep healthcare strong.

Stratford's leaders are holding their collective breath as they await the outcome of the big bets placed on the community's future. But having navigated so many industrial transformations over the past century, the community seems well-positioned to create a Stratford 3.0 for the new age. ■



Population
City of Windsor:
216,500; County of
Essex: 393,400

Labor Force
City of Windsor:
108,200; County of
Essex: 203,700

Top Industries
Advanced
manufacturing,
services, trade,
transportation &
warehousing,
healthcare, social
assistance,
education, tourism,
culture & recreation.

**Broadband
Penetration**
92% households,
93% business,
100% government,
95% education

**Degrees Awarded
Last Yr**
Community college
3,620; undergrad
3,523; graduate 713

Key Leaders
**Mayor Eddie
Francis**, City of
Windsor

Warden Tom Bain,
County of Essex

Windsor-Essex, Ontario, Canada

Taking inspiration from crisis

Your town is a one-industry town and your industry goes belly up. What do you do?

That was the situation faced by the City of Windsor and the County of Essex when both General Motors and Chrysler were forced into bankruptcy in 2009 as part of a rescue effort by the United States government. For decades, the region had enjoyed the benefits of a symbiotic relationship with Detroit, America's Motor City. The automotive industry very nearly *was* the economy of Windsor-Essex. When the financial crisis struck, the impact was immediate and shocking. Over 7,000 jobs vanished as the percentage of the workforce employed in manufacturing fell from 30% to 20%. Windsor-Essex climbed to the top of a chart where no community wants to be: in 2009, it had Canada's highest unemployment rate at nearly 15%.

People respond to a crisis in different ways. Some freeze, some despair. Others rally. The people of Windsor and Essex discovered themselves to be the rallying kind.

With the crisis upon them, they realized that, over the years of relatively stability, they had developed bad habits. Windsor and the seven much smaller municipalities in the county operated in their own small silos, as did the county's major employers. Institutions of higher education were of fine quality but punched far below their weight in the region's economy. The Detroit River separating Windsor from its US counterpart might well have been an ocean for all of the effort the two governments made to cooperate.

In a remarkably short time, all that went out the window. Collaboration among government, business and academia – and across the international border – was transformed from empty words into concerted action. From a one-industry economy, Windsor-Essex soon developed more moving parts than can easily be accounted for.



Ivory Tower No More

The University of Windsor is responsible for a considerable number of those moving parts. Serving nearly 16,000 students, the University has long con-



2010
2011

ducted research for auto manufacturers and hosted a multi-school R&D program called Auto21. But under President Alan Wildeman, appointed in 2008, UWindsor has sharply raised its game as a generator of economic value.

An Institute for Diagnostic Imaging Research (IDIR) does pioneering work in the uses of ultrasound for testing. The Institute has developed a way to use ultrasound for fingerprint recognition that detects tissue patterns beneath the skin as well as the conventional fingertip whorls. It is now ready for commercial development and the University, which allows inventors to retain the rights to intellectual property they create, is helping to find the right commercial partners. In another lab, scientists have solved the problem of testing spot-welds made between two pieces of flat metal. Because the welds themselves are hidden by the metal, they have traditionally been tested by pulling a random sample off the assembly line and tearing them apart. The new system is already on the line at a Chrysler assembly plant in Windsor and has given a significant boost to quality and productivity.



The university is now in the midst of the largest capital expansion in its history. The centerpiece is a C\$112 million Center for Engineering Innovation. In addition to labs and classrooms, it provides collocation facilities where companies can install industrial equipment and trouble-shoot problems and pioneer new techniques. It will house the Windsor-Essex Economic Development Corporation and the university's Center for Smart Community Innovation, a group that has played an essential role in coordinating Intelligent Community initiatives among 54 participating organizations. President Wildeman envisions the new building as an innovation destination in eastern Canada for academia and industry.

UWindsor is not the only academic institution seeking to build a stronger future. St. Clair College is a 2-year institution that serves over 7,000 students



in Windsor. Among its recent innovations is the MediaPlex. Opening in 2010, the building is one of only three places in the world that teach "convergence journalism." Graduates of the MediaPlex program learn not just conventional journalism but also how to record, edit and produce finished TV and radio news, write blogs and use social media for reporting. Despite the shrinking job market for journalists,

students with this "backpack journalism" training find themselves in high demand. Overall, 82% of St. Clair graduates find employment within six months.

Broadband Foundation

Advances in engineering, medicine, media and communications require a robust broadband foundation. To supplement commercial networks, the Center for Smart Community Innovation's WEDnet program coordinated a network build beginning in 1996 funded by its public-sector participants. The fiber network, built and operated under contract by Cogeco Cable, delivers 1 Gbps-capable links to 200 sites including schools, libraries and government buildings throughout Essex. A second project, the Broadband Rural Community Connector, was launched in 2009 to create an optical backbone for the county's rural areas. Funded by Cogeco, the County and the Province, it has connected over 8,000 underserved residences to date and aims to pass 96% of Essex households.

The industrial legacy of Windsor-Essex had created a population in which 22% of adults had failed to graduate from secondary school and another 30% had only a high school diploma. Schools and local volunteers have stepped forward to change that dynamic. Local school boards throughout the county cooperate in annual programs designed to teach online skills. St. Clair College offers a program to secondary school students called Career Innovation Program that uses hands-on multimedia to explore careers in technologies and trades – simultaneously recruiting future students while serving the community.

Computers for Kids is a volunteer-led program founded in 2004, which refurbishes computers and donates them to low-income families. The program has donated more than 1,000 computers and opened over 40 computer labs throughout Windsor-Essex. It has also recycled over 2 million pounds (900,700 kg) of e-waste that would otherwise have wound up in landfills.

Leadership in Government and Business

If the educational institutions of Windsor-Essex have provided the "brains" for transformation, the elected leadership has provided the will. The region's leading political official is Windsor Mayor Eddie Francis, who was elected to office in 2003 on a promise to revitalize the city. His administration has overseen the expansion of St. Clair College, the opening of the Caesars Windsor convention center, hotel and casino, and the creation of a Windsor International Transit Terminal. In the process, Mayor Francis managed to slash the city's long term debt by 27% while keeping city taxes low.

He has not worked alone. He is one of eight Mayors in a county-wide Council led by Tom Bain, Mayor of the community of Lakeshore. Close cooperation among the Mayors has led to shared service contracts that reduce costs. It also helps individual projects to achieve multiple goals benefiting the county as a whole.

Despite the blows it has absorbed, the auto industry remains important. Ford has chosen to centralize worldwide engine research in Windsor to take advantage of its concentration of talent, and the Windsor's Chrysler assembly plant remains the company's largest. Tool, die and precision manufacturing companies continue to serve these giants but have also diversified into fields as diverse as aerospace and dentistry.

Quantum Technologies is a private company that has adapted CAD/CAM technology from the automotive sector to revolutionize the way dental implants are manufactured. Traditionally, crowns, bridges and other implants are hand-crafted and colored by skilled technicians. Quantum Technologies equips dentists with handheld scanners and software, which produce data for the company's digital design and manufacturing systems. The resulting product is a better fit, a better color match and can be produced in a small fraction of the time required for manual work. The company now ships thousands of implants per week from Windsor.

Windsor-Essex is also home to start-ups that focus on the weightless cargo of information. For an international roster of clients, Red Piston builds apps that run on the iPhone, iPod and iPad. The firm's apps were downloaded more than 275,000 times in 2010, its start-up year.

Innovation Under Glass

Perhaps no company better represents the sheer ingenuity at work in Windsor-Essex than Nature Fresh Farms. Founded in 2000 by Peter Quiring, the company now operates 67 acres (217,000 km²) of glass greenhouses that produce over 7 million kilograms (2.2m pounds) each of bell peppers and tomatoes, which are sold throughout North America.

Agriculture contributes 14% of the region's GDP, but Nature Fresh is no traditional farm. Every aspect of production is monitored and managed. In thousands of rows, vines grow vertically on ropes.



Water with a precisely controlled mix of nutrients is fed to each plant, and a daily sample of the run-off is conducted to determine the right nutrient mix for the following day. Workers use data cards to swipe in to their shift and to the individual rows they are responsible for. This system supports their compensation – they

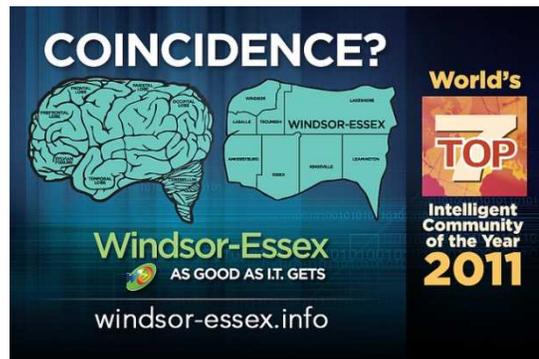
are paid based on acceptable produce shipped, with wages well above the averages for the industry. It also enhances food security. If any contamination incident should occur, NatureFresh could track it to the greenhouse, row and employee.

The nonprofit healthcare sector of Windsor-Essex has been equally quick to seize the benefits of ICT. Windsor's public hospitals share electronic medical record systems that connect wirelessly to diagnostic equipment, so that patient readings are automatically captured and images are instantly available to caregivers. When EMS crews wheel a new patient into the emergency room, portable monitors begin downloading the readings taken during the ride even before a triage nurse can speak to the patient. Such efficiency extends across the international border. Detroit's hospitals have extensive acute care facilities unavailable in Windsor. When Windsor's facilities are full, a process called Table-to-Table can move a patient from the emergency room in Windsor to an emergency room in Detroit, including immigration clearance, in 10 minutes.

Green Shield Canada is a not-for-profit insurer whose business model depends on its ability to do more with information than its competitors. The company administers drug and dental benefits for over 1.4 million participants. Barred by statute from negotiating down the prices it pays for drugs, the company's competitive advantage is efficiency. It operates a point-of-sale network that provides automatic claims processing for pharmacists nationwide. It mines data to create value-added programs for employers. One example is a narcotics management program that tracks prescriptions to guard against the same patient ordering from multiple pharmacies, flags physicians if patients are not filling prescriptions and evaluates the prescribing habits of physicians compared with guidelines.

Windsor-Essex is second to none among Intelligent Communities in advocating for its vision inside the county and marketing it outside. Political leaders stay "on message" in speaking about issues and projects. In a campaign coordinated by the Center for Smart Community Innovation, Web

sites, billboards, online videos, newspaper articles and local news features all convey a unified message of local transformation. A recent engaging advertisement noted the resemblance between a map of the county and the human brain viewed from the side. It asked the question, "Coincidence?"



Improving the Border

On a trip to Germany, Windsor Mayor Francis met an entrepreneur who has made Frankfurt Airport the European Union's security clearance point for cargo. Every bit of cargo entering the Union is processed through his immense facility to ensure its safety. The Mayor left Frankfurt determined to bring this concept to Windsor-Essex, which is the busiest crossing point on the Canada-US border.

At the Mayor's urging, the City Council commissioned a report that recommended creation of a new intermodal transportation system and additional international bridge crossing, which are now being constructed at a projected cost of C\$1.2 billion. Mayor Francis has spent the time since in consultation with the Canadian and Provincial governments as well as US Federal agencies about creating a central security clearance facility at Windsor's existing airport. Canada is in favour and the US agencies see the project as a means to help meet a Congressional mandate to inspect 100% of cargo entering the US. Lufthansa has already been engaged as a systems integrator to adapt its implementation in Frankfurt. If the plan goes through, the impact on the economy of Windsor-Essex should be vast.

Meanwhile, the community has rallied again to deal with an unintended consequence of progress. The new border crossing and highway system require the demolition of more than 1,000 homes and businesses. Rather than seeing the debris go to landfills, a project called W.E. Pay It Forward has organized a vast salvage operation entirely online. The Province agreed to support 30 temporary jobs to assist with deconstruction of the buildings. Community groups, local businesses and individuals have contributed their time and effort. Within a week of the project start, the local Habitat for Humanity facility was filled to overflowing with recovered building material as well as plumbing, heating and electrical supplies. They go to the facilities of local charities in need of renovation or expansion.

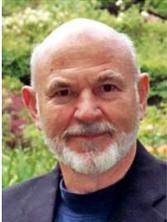
That mix of ambition and compassion is typical of this community, which has seen hard times but is determined not to repeat them. It is still early in the transformation of Windsor-Essex. Goals set and programs established two years ago will take many more years to come to fruition. But rarely has a community made a faster turnaround in its vision or more quickly assembled the building blocks of future prosperity. ■

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, ICF develops nominations on hundreds of communities during the late spring and summer. Information for the nominations comes from the communities themselves, through formal questionnaires that they complete and submit, as well as independent research by ICF. 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 in October 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. The analysis was conducted by ICF associates based at Laurentian University in Sudbury, Ontario, Canada; Ohio University in Athens, Ohio, USA; and a Komazawa University in Tokyo, Japan.

- **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. Don Flournoy** is a Professor of Telecommunications Studies at the School of Media Arts and Studies at Ohio University. His research focuses on the application of information and communication technologies to the solution of human problems and the establishment of public policy that facilitates free and 

open public access to broadband communication networks. Dr. Flournoy is the author of eight books and numerous scholarly and professional articles. He is the Editor of the *Online Journal of Space Communication* (www.spacejournal.org) and the Education VP of the Society of Satellite Professionals International (www.sspi.org).

- **Dr. Tomoko Kanayama** is a professor of Global Media Studies at Komazawa University in Tokyo. She specializes in the study of media utilization to empower the nonprofit organization and local community. She has served on the Advisory Committee for Multimedia Broadcasting for Mobile Device and the Research Group for Future Radio and Media for Local Information at the Ministry of Internal Affairs of Communications. She is also a contributor to the university's Institute for the Mass Communication Research and GMS Laboratory. At the same time she has been closely involved in future planning for community-building and ICT utilization by local government in Japan. She is an author of four books, including *Media Strategy for Nonprofit Organization* (2005), *Community Media* (2007) and *Social Capital and Civic Society* (2007) and number of scholarly articles. She holds Ph.D. and M.A. from Ohio University and M.S. from Syracuse 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 and an international jury of experts, one of the Top Seven is named Intelligent Community of the Year.

The Author

Robert Bell is co-founder of the Intelligent Community Forum. He has led economic development missions to cities in Asia and the US; authored articles in *The Municipal Journal of Telecommunications Policy*, *Telecommunications*, *Public Power*, *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 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. But it also provides communities with powerful new tools to develop their economies, strengthen community ties and improve government. 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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