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Each year, the Intelligent Community Forum presents an awards program for Intelligent Communities and the public-sector and private-sector partners who contribute to them. The awards program has two goals: to salute the accomplishments of communities in developing inclusive prosperity on a foundation of information and communications technology, and to gather data for ICF’s research programs. The Awards are divided into three phases, and the analysis becomes more detailed and rigorous at each successive stage.

**Smart21.** In the first phase, ICF develops nominations for candidates from its own research and information submitted by communities that describes the community’s background, challenges, strategies, programs and results. The nominations are reviewed by an ICF committee that scores each community.

**Top7.** The 21 top-scoring communities are then asked to complete the far more detailed Top7 questionnaire. These questionnaires are read by a team of academic Analysts. The Analysts score the nominations and the seven highest-scoring candidates are named as ICF’s Top7 Intelligent Communities.

**Intelligent Community of the Year.** In the final stage of the process, an independent research firm re-analyzes the same data to produce a new set of scores. At the same time, ICF co-founders visit each of the Top7 and write reports, which are reviewed along with the nomination data by an international jury. The jury ranks the Top7, and ICF combines the two scores on a weighted basis to select the Intelligent Community of the Year.

**Annual Theme**

ICF selects a theme each year to supplement the Intelligent Community Indicators (see page 32) on which the selection of the Smart21, Top7 and Intelligent Community of the Year is based. Weighted into the assessment of each community, the theme focuses on a particular success factor in their work, and allows nominees to highlight their achievements in this area. Past themes have included *sustainability*, *leadership*, *the education last mile*, *healthcare* and *platforms for innovation*, each the basis for solid progress by communities honored through the Awards program.

**Innovation and Employment**

In 2013, ICF will examine the relationship between *innovation* – one of the Intelligent Community Indicators – and *employment* in communities around the world. A massive body of evidence points to the fact that innovation creates prosperity. The prosperity flows from new demand – who needed an iPod or iPad until one was created? – or from empowering us to do more with the same resources of raw materials, people and money. But prosperity is not always the same as employment. In each recession of the past 50 years, job recovery has been significantly slower than in the previous recession. The recent recession in the industrialized world is only the most dramatic example of a "jobless recovery" – and that is in nations managing to post positive economic numbers at all.

Innovation creates jobs in the development, manufacturing, marketing and distribution of new and better products and services. But innovation also destroys jobs by making old products and services obsolete, automating routine and repetitive tasks, and substituting hardware and software for human beings in gathering and distributing information, as well as serving customers and countless other tasks. In making innovation the pillar of their economy, Intelligent Communities seek to balance its positive and negative impacts to generate economic growth and high-quality employment in an environment that delivers exceptional quality of life to all citizens. Their ability to carry off this balancing act may be the most important factor in their success.
What is Innovation?

To innovate means literally to renew or change something. Innovation is about coming up with a better process, creating a new product, improving an existing one, opening a new market, finding a new source of supply or creating a better way to organize ourselves. Innovation may be technology-driven but it is just as likely to focus on a new and better way for people to work together.

Why is innovation a hot topic right now? Simply enough, we believe it to be the primary driver of economic growth – and in the third year of a recession across the industrialized world, growth is a top priority. Innovation turns out to be surprisingly hard to measure, however, as it flows through ideas and experiments into services and products. We owe our understanding of its value to a remarkable Stanford University economist named Moses Abramovitz. 

Search for the X-Factor

Back in the 1950s, he decided to test economic theory on some real-world data. He set out to track the growth in the total output of the American economy from 1870 to 1950, and to analyze what caused it. It was a mighty undertaking in those days of paper records and mechanical calculators, but he got it done.

Economic theory of the time said that there are two kinds of inputs to the economy: capital and labor. Capital is the money invested by businesses, institutions and government. Labor is the people they employ. You invest a few million dollars or Euros or pounds in a factory and raw materials. You hire hundreds of workers to staff it. Out of the factory come products, and out of the economy comes growth.

Abramovitz assembled his data and was able to produce figures for the total output of the economy between those years. Then he measured the growth in the total amount of money being invested and the total workforce over the same period.

With two herculean tasks behind him, Professor Abramovitz then made what he thought were reasonable assumptions about how the much this growth in capital and labor inputs should add to the output of the economy. Growth in A plus growth in B equals growth in C. Simple, right?

Not so much. It turned out that the growth of inputs between 1870 and 1950 could only account for about 15% of the actual growth in economic output. Eighty-five percent of the growth was coming from some X-Factor and neither Professor Abramovitz or anybody else could say what it was.
It was a huge wake-up call to economists. It was like having a structural engineer tell you that she really couldn’t explain why the Brooklyn Bridge was still standing. By 1987, the search for the X-Factor earned Professor Robert Solow the Nobel Prize in Economics for demonstrating that the introduction of new technology was responsible for as much as 80% of the growth in a nation’s gross domestic product. No less an authority than the world-famous management consultant Peter Drucker wrote that the only business activities that actually create value are innovation (making something new) and marketing (finding a way to sell it). Everything else a business does – all of its visible aspects from buildings and assembly lines – are just costs that have to be paid from the proceeds of innovation and marketing.²

The latest research backs up this notion. A 2008 study of innovation in Germany, France, Spain and the UK concluded that “in manufacturing as well as in the service sector, product innovations have a positive impact on gross employment in innovating firms.” The authors found that sales growth of 1% due to new products leads to a 1% increase in gross employment.³

**Winners and Losers**

By now, we all accept the vital importance of innovation in growing our economy – despite the fact that innovation destroys jobs as well as creating them. In 1900, the second most common occupation in the United States was being a domestic servant. The introduction of labor-saving devices in the home reduced domestic servitude to a statistical blip by the end of the century.

The rest of the 20th Century was to see an amazing advance of innovation and subsequent obsolescence. The success of the mass-produced automobile gradually destroyed all of the production and services related to horse-drawn transportation. The introduction of electronic calculators wiped out production of the mechanical calculators on which Professor Abramovitz did his work. The computer replaced the typewriter – and so much more. Digital music all but eliminated vinyl records, digital video closed thousands of movie rental stores, and email sidelined both fax machines and snail mail, causing a funding crisis for postal services. Yet despite all the losers created by innovation, the success of the winners and the greater value delivered by The Next Big Thing kept making the economy grow.

A *BusinessWeek* study from 2007 concluded that innovative companies achieve average growth in profits of 3.4% per year, compared with 0.4% for the S&P Global 1200. Do that every year for a few years, and the difference becomes massive.
Growing economies need people to work in them, and the wages they are paid not only support the worker who receives but them but also accelerate through the economy, creating jobs for other workers. This is the employment “multiplier effect” well known to economic development professionals. Or in a phrase that may have originated with American President John F. Kennedy, it is an example of how “a rising tide lifts all boats.”

But it turns out that the connection between innovation and employment growth is more complicated that it seems. Changes in the global economy over the past two decades have created the very real possibility that, in the rising tide of the 21st Century, some boats may be more equal than others.

**Innovation and Job Polarization**

Throughout the developed nations of the world, policymakers are increasingly concerned about something called “job polarization.” The term was coined by economists led by David Autor of the Massachusetts Institute of Technology. Two colleagues, Maarten Goos and Alan Manning, extended the research to Britain and gave it a sexier name: the rise of “lousy and lovely” jobs:

*Thanks to technology, more and more ‘routine’ tasks can be done by machines. The most familiar example is the increasing automation of manufacturing. But machines can now do ‘routine’ white-collar jobs, too — things like the work that used to be performed by travel agents and much of the legal ‘discovery’ that was done by relatively well-paid associates with expensive law degrees.*

*The jobs that are left are the ‘lovely’ ones, at the top of the income distribution — white-collar jobs that cannot be done by machines, like designing computer*
software or structuring complex financial transactions. A lot of ‘lousy’ jobs are not affected by the technology revolution, either — nonroutine, manual tasks like collecting the garbage or peeling and chopping onions in a restaurant kitchen. ⁴

In other words, there is a tier of occupations at the top where machines are not able – yet – to replicate the mix of knowledge, experience, judgment and intuition that highly educated human beings can deliver. There is another tier of occupations at the bottom, consisting of manual tasks that it does not pay to automate – yet – or that require considerable interaction with human beings, something machines still do poorly. In between are routine and semi-routine jobs that have a bulls-eye on their backs when it comes to automation.

But wait – it gets worse, according to work by Nir Jaimovich and Henry Siu, economists at Duke University and the University of British Columbia respectively. They suggest that “job polarization isn’t a slow, evolutionary process. Instead, it happens in short, sharp bursts…Those spurts of change are economic downturns: Dr. Jaimovich and Dr. Siu have found that in the United States since the mid-1980s, 92 percent of job loss in routine, middle-skill occupations has happened within 12 months of a recession.” Dr. Siu told The New York Times that the big puzzle about recent business cycles is “why have we had these jobless recoveries over the past three recessions? These jobless recoveries are because you have these middle-skilled jobs that are being wiped off the table.” ⁵

**Blame ICT**

What makes it possible to automate more of those middle-skill jobs every year?

Three little letters: ICT or information and communications technology. The explosive progress of ICT, delivering ever faster, more powerful applications and making them instantly available over broadband, affects everyone from bank tellers (victims of ATMs) to payroll clerks (victims of software and cloud-based services). Those were just two of the many middle-skilled job categories that were found to be most vulnerable to automation in a study by MIT’s David Autor and David Dorn of the Centre for Monetary and Financial Studies in Madrid, based on US Department of Labor data from 1980 to 2005. ⁶

When it comes to job polarization, ICT is like the proverbial butterfly flapping its wings in the Amazon jungle and, by a chaotic sequence of unpredictable events, stirring up a hurricane in the South Atlantic.
A previous generation of factory workers was reduced in ranks by manufacturing automation and robotics. Today, ICT shifts the target to many categories of middle-skilled knowledge workers: secretaries, data entry clerks, call center operators, paralegals and bookkeepers. As ICT-based applications become cheaper and more powerful, people working in these jobs can no longer deliver enough value to the enterprise to justify the cost of their salary, benefits, training and physical support. This applies even to people on a path to becoming high-priced knowledge workers but who need more training and experience in order to justify what they are paid. American law schools are now being challenged to reduce the number of graduates that they have been so profitably pouring into a market where, in 2012, only 55% could expect to find work in the law, because automation has eliminated much of the grunt work where young attorneys cut their teeth.7

Which points to another seismic shift spurred by ICT. It gives serious economic advantage to those with the skills to use it to increase the value of their work to the employer. Yet another study, this one from the London School of Economics (LSE), used data from nine European countries, Japan and the US for the years from 1980 to 2004. It found that industries that adopted ICT at faster rates (as measured by their spending on ICT and R&D) also saw the fastest growth in demand for the most educated workers and the sharpest declines in demand for people with intermediate levels of education.8

Butterfly wings into hurricanes: it turns out that one of the big drivers of ICT adoption is...ICT adoption. That is, as investment in ICT makes companies more competitive, it spurs other companies to do the same in order not to fall behind. Another LSE study looked at a unique moment in history, when China was granted entry into the World Trade Organization and saw trade barriers for its products entering Europe automatically fall. IT adoption rates in Europe jumped from 2000 to 2007, and the study concluded that 15% of technology upgrading could be explained entirely by the increased competition from the Chinese economic juggernaut. When they feel the hot breath of competitors on the backs of their necks, executives invest in ICT and R&D to increase innovation and reduce costs.9

Globalization has one further impact on job markets around the world. Companies and individuals that are capable of selling across global markets can reap such rewards as the world has never seen. In 2000, Toyota’s annual revenues were $5.8 billion and the pre-iPod Apple made about $5.3 billion. Only eleven years later, the two companies had annual revenues of $236bn and $108bn, respectively, and were far outrun by resource giants like ExxonMobil ($489bn) and BP ($386bn).10

Actor Tom Cruise made $75 million in just one year ending May 2012 from standing, running, jumping, punching and glowering in front of a camera.11 J.K. Rowling, who had to live in her car before the publication of the first Harry Potter novel, is the first author in history to earn a billion dollars from her work.12
By contrast, the chief executives of the 500 biggest companies in the US took home a paltry total of $5.2bn in salary and bonuses in 2011.13 And European CEOs were paid only about 40% of that, on average, though executive compensation has risen sharply in the past 10 years as European firms have had to compete globally for talent.

This phenomenon goes by the name of the Winner-Takes-All Economy, and has spawned books and articles by the score. The winners are the fabled 1% of Occupy Wall Street fame, for whom globalization has been an unalloyed blessing.

**Why It Matters**

Put all of this together, and you have a recipe for major social and political strains, as the divide widens between people at the top and bottom of the economic pyramid, and technology change erodes the livelihoods of those in the middle. Concerns about job polarization have gone viral – a Google search will yield about 3 million hits. Hardly the 37 million that a search for the Eurovision song contest produces, but still impressive for a wonky topic.

It matters so much because middle-skilled jobs are the foundation on which local, regional and national economies rest. In the European Union, medium-skilled jobs made up about 50% of the total in 2010, comparable to the 48% of total American jobs they comprised in 2006.

These middle-skilled jobs generally require some education and training beyond high school but less than a bachelor’s degree. That post-secondary education may be an associate’s degree or certificate from a community college or technical school, on-the-job training, previous work experience or just some years at university that did not result in a diploma. Middle-skilled workers are construction supervisors, electricians and plumbers, office administrators, technical salespeople, medical technicians and dental hygienists, telecom equipment installers, welders and first responders.

If middle-skilled jobs are indeed being “wiped off the table” by innovation in information and communications technology, it poses a terrible threat to the economic and social well-being of communities around the world. If rising incomes are highly concentrated in 1-2% of the population while the rest of us get poorer, the developed nations of the world will come to bear a startling resemblance to those chaotic countries at the bottom of the income ladder, where despots or oligarchies control most assets and everyone else lives off their table scraps. Karl Marx, call your office.

If you want to make a forecast and ensure that it is dead wrong, there is one sure way: take a trend from today and draw it out for five or ten years in a straight line.
Societies, cultures and communities adapt. The high rate of technology change today may be challenging that adaptability, but the story is far from over.

When Menial Labor Isn't Menial

Job polarization is clearly happening – but is it a crisis? In the US, the rate of decline in middle-skilled jobs has been about 0.6% per year since the start of the ICT revolution in the mid-1980s. As professors Jaimovich and Siu have shown, it surges in recessions, then declines in times of growth, but the overall trend has been steady.

Put another way, the slow decline in middle-skilled knowledge-based jobs – those that do not require a physical presence in a particular location – is inevitable. It was inevitable in manufacturing as soon as the first automated machinery was put into place, which is why those Luddites in 19th Century England who destroyed automated looms knew just what they were doing, though they did not do themselves any good. As the Industrial Revolution continues in a digital age, we are increasingly capable of automating jobs that require not just a strong back but a bit of knowledge and judgment as well. So we are doing it. It is not business doing it to us. It is not a plot to destroy unions or failure of government policy. It is all of us doing it to all of us, as we seek a higher quality of life, which can only come from being more productive. We may well want government to have a policy response, but the best that laws and regulations can do is to cushion change while job markets adapt.

There is another change, however, that has gone little noticed until recently but which is every bit as profound:

_We have come to expect more from our businesses without noticing the ramifications it has on the skill sets needed to perform these jobs. We want goods and services faster, at cost-effective prices, and with improved customer service. Today’s delivery person confirms orders and shipments of goods using a tablet; the shelf stocker no longer places stickers on products, but rather uses a complex personal digital assistant device to control stock supplies; and your local coffee shop barista not only serves your coffee, but is also expected to troubleshoot the WiFi. These new responsibilities are no longer the exceptions, but rather the rules…The direct result of companies keeping pace with technological advancements has meant that positions previously requiring low skills now demand solid digital skills: the ability to access, use and interpret digital information in the workplace._
In this view, the really big change is not our increasing ability to automate away routine middle-skill jobs. The really big change is in those non-routine, manual, menial occupations that are traditionally considered low-skilled. The authors of a report called *Menial is Menial No More* put it this way. In the past, for entry level jobs in the hospitality industry, “workers only needed to show up at a hotel seeking work, and as long as they were responsible and reliable, they were fit for the job…Today workers must independently complete an online application process before they are even considered for an interview. At one hotel chain all staff must pass an online customer service course, while another chain requires all cleaning staff to operate a PDA.”

Today’s job polarization studies forecast that job growth will be concentrated in high-skilled positions. In the European Union, demand for high-skilled employees is projected to rise by more than 3.5 million as the share of high-skilled jobs increases from 29% in 2010 to about 35% in 2020. The share of jobs employing those with mid-level skills will remain steady at about 50%. But the share of jobs for the low-skilled will drop from 20% in 2010 to less than 15% in 2020.

The US Bureau of Labor statistics estimates that the number of total jobs for middle-skilled people will grow 11% from 2006 to 2016, while those for high-skilled individuals will grow 15% and those for low-skilled will grow only 8%.

But the missing link in the discussion is the fact that a growing percentage of traditionally low-skilled jobs now require basic digital literacy and fundamental information-processing skills. To put it another way, they are becoming more middle-skilled. The availability of jobs for the truly unskilled is likely to see an even more severe decline than the forecasters say.

**What is a Community to Do?**

Communities succeed economically and socially when they adapt to changing times rather than wishing and hoping that times will somehow change in their favor. If being home to innovative companies and institutions is critical to your future, and if innovation demands a wholesale raise in the skill level of your population, then the policy prescription becomes pretty clear.

- **Ensure that primary and secondary schools equip students with digital skills – and transform learning for the better.** When students enter school for the day, they should not be stepping back in time: leaving behind technology that they use at home in favor of the technologies of paper, pencil and book that were state-of-the-art in 1950. After a long period of ambivalence, educational decision-makers now seem to be grasping the value of ICT in education and making serious investments in computers, tablets, networks and educational applications. Just as important, they are putting teachers through training programs to help them evolve their teaching practices.
to take advantage of it. For example, teachers at the secondary and higher education levels are experimenting with "flipping" their classrooms. Instead of taking class time for lectures, they require students to get lecture content online as their homework and reserve class time for discussion, interaction and skills practice.

None of this is easy. Naysayers still consider ICT to be a frill in education rather than a necessity – and with some evidence on their side. When businesses began to invest in ICT in the last century, they got very little out of it for a very long time. It was not until they began to reorganize work to take advantage of ICT that the enormous productivity gains we see today began to occur. The same thing will happen in education.

We do not know today what works best in educational ICT – but only a period of serious and sustained experimentation will reveal it. Budgets are also a serious concern, whether in an industrial nation grappling with recession or emerging market nations where spending on public education has long lagged behind. And as we come to expect that all students have access to ICT at home, we risk further marginalizing low-income families who do not. But the overall trend seems clear. As computers, tablets and smartphones become the essential tools of the educated person, they will inevitably infiltrate every corner of education. Those communities that get there first will have a competitive advantage.

- **Make education better and more accessible at all levels.** Educational excellence is the foundation of innovation. It is also one of the greatest determiners of the economic success and social well-being of every person in the community. To be well educated makes the difference, over a lifetime, between being able to seize the benefits of the innovation economy and having to suffer its consequences.

  It does not mean that every child needs to have a graduate degree or even a college diploma. It does mean that every child needs to be educated up to his or her potential, and to have opportunities to update that learning throughout life.

  Every community, every state or province, every nation faces different obstacles to delivering a high-quality education to citizens at the primary, secondary, 2-year, 4-year, graduate and continuing (adult) levels. It may be a legacy of entrenched poverty that makes parts of the population hard to educate and hard to keep in school. It may be the interest of bureaucrats or teachers unions in preserving the status quo. It may be a failure of decades to create apprenticeship programs or to demand that community colleges and technical schools do their jobs effectively. It may be long distances and low population density, cultural habits and beliefs, or a citizenry that resists tax increases needed to fund change.

  But despite the obstacles, successful communities find ways to continuously improve how education is delivered and who it is delivered to. They work to build a culture that makes educational excellence a point of pride. And they encourage
citizens, schools, businesses, 2-year and 4-year institutions to see themselves as members of one team working for a better future for the next generation.

- **Create the Innovation Triangle.** There are very few "cookie-cutter" solutions for Intelligent Communities – strategies that can be copied wholesale from one community to another. But the Innovation Triangle appears to be one. It refers to active, innovative collaboration between education, business and government to boost the community's innovation rate in the private, public and nonprofit sectors.

  The goal of the Innovation Triangle strategy is to equip young people with the knowledge and skills needed for productive, fulfilling lives in an innovation-driven economy – and to ensure that as many of them as possible choose to stay in the community as young adults and contribute to its success. It does a community no good to churn out ranks of skilled workers if they subsequently leave town. Education can make its contribution but the community must also create career opportunities that attract and retain young knowledge workers.

  Creating the Innovation Triangle is not for the faint of heart. It is best explained through stories, and you will find many of them in the following pages. But a few success factors reappear over and over again in Intelligent Communities everywhere:

  - **Schools need to understand the skills that are in local demand.** Educators at the secondary, 2-year and 4-year levels need relationships with business and government leaders that keep them up-to-date on career opportunities for their students, and that inspire them to bring the outside world into their classrooms.

  - **Businesses need to provide an on-ramp for young talent.** Programs funded by business, schools and government can acquaint students with local career options, provide direct exposure to the work experience, and offer internships and apprenticeships to ease the transition to work.

  - **Government needs a strategy for business attraction, formation and acceleration developed in close collaboration with business and education.** Local governments have great power to shape a brighter future but can only do it by crossing over the normal bureaucratic boundaries and involving all of the key stakeholders in the community's future.

  The economic and social challenges of the 21st Century are too vast to be met by business alone, educators alone or government alone. The opportunities are too exciting to be forfeited because we are stuck in old ways of thinking and behind old organizational walls. The communities of the 21st Century are laboratories where we can prove what works best and share it with a world much in need of such guidance.
Intelligent Communities identified by ICF’s award program are some of the world’s most successful creators of innovation ecosystems that build local employment and advance quality of life. The following is a selection of their strategies and results. More information is available from the Community Profiles section of ICF’s Web site (www.intelligentcommunity.org). Users must log-in for access to profiles, but access is free.

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Expanding Opportunity for the 95%
Austin, Texas, USA • Top7 Intelligent Community 2012

Austin is two cities overlayed on the same 300 square miles (777 km²) of central Texas, about 160 miles (257 km) west of the oil capital of Houston.

One of these cities is a hotbed of innovation in information technology, telecommunications, transportation and energy, driven by the talents of graduates from the University of Texas, as well as the home of such American cultural icons as the South by Southwest (SXSW) music festival. It is also the state capital, with all of the economic and political power that implies. And it is the home of SEMATECH, a Federally-sponsored consortium of semiconductor manufacturers that, since 1988, has created advances in software development, advanced manufacturing and clean technologies. SEMATECH is one reason why, back in the 1990s, direct flights between Austin and San Jose in Silicon Valley were dubbed the Nerd Birds.

In the other city, less than 5% of the population attends a college or university. Government, education, healthcare, tourism and retail are the primary
employers. This is the population of people born and raised in Austin, 95% of whom fail to participate in the broadband economy despite the city’s enviable 6.3% unemployment rate.

In this contemporary tale of two cities, Austin is simultaneously striving to strengthen its position as a platform for tech innovation while also labouring to topple the barriers that block the majority of its citizens from opportunity.

Response to Crisis
The dot-com bust of 2000, which caused the loss of $5 billion in the market capitalization of US companies, sent Austin’s unemployment rate to 6.7% by 2004. In response, the City of Austin partnered with the Greater Austin Chamber of Commerce to develop the first comprehensive economic development strategy for the five-county metropolitan area. The plan, called Opportunity Austin, aimed to put the region on the road to economic recovery after the loss of thousands of high-wage jobs.

Introduced in 2004, Opportunity Austin sought to create 72,000 new jobs and add $2.9 billion to the regional payroll by 2009. It focused on collaboration among Austin’s outstanding university sector, business and government to stimulate business retention and growth.

One of its more successful efforts was the Emerging Technologies Program. Serving as a network and information clearinghouse, the ET program built partnerships among the Chamber, local incubators and skills development organizations to connect entrepreneurs to talent, advice, resources and funding. It was also a relentless marketer of Austin as a home for the coolest of emerging technologies, which has engaged thousands of followers through active use of the tools of social media. The ET program succeeded so well because it had many powerful assets to link with its network. Among them is the University of Texas at Austin and its internationally recognized computer science and technology programs. UT Austin graduates 13,000 students per year and is home to the IC² Institute, an interdisciplinary research unit founded in 1977. The Institute studies the theory and practice of entrepreneurial wealth creation – not a bad asset to have in a city that has bet its future on technology entrepreneurship. The Institute operates the Austin Technology Incubator, offers a Master of Science in Technology Commercialization and runs the Global Commercialization Group, which trains business people in venture incubation, global business acceleration and technology licensing. Since its founding in 1989, the Incubator alone has worked with over 200 companies and helped them raise over $750 million in investor capital. In the past three years, its alumni companies have realized over $300 million in exit value.
Opportunity Austin exceeded its creator’s wildest expectations. Instead of creating 72,000 new jobs, it clocked 124,000 new jobs by 2009, and added $5.7 billion to regional payrolls, nearly double the $2.9 billion goal. Austin is now home to 3,300 technology companies with 100,000 employees, including Dell, Samsung Austin Semiconductor, Apple, IBM, Freescale Semiconductor, Advanced Micro Devices, Intel and Facebook. In addition to IT, its tech companies and research facilities excel in life sciences, clean energy, wireless, and media and graphics.

Helping the 95%

Austin’s hard-driving economy is based on a vital import: talented students entering UT Austin, St. Edwards University, Concordia University or one of the region’s other institutions of higher learning. With the local economy offering so much opportunity, many choose to stay and prosper. But the native born live in a completely different economy, largely cut off from opportunity by poor educational attainment, low expectations and a culture that does not encourage upward mobility.

Austin has attacked this problem with energy and ambition. Focusing on secondary school, the Chamber of Commerce tapped business, public education and government leaders to form a Matriculation Task Force. The Task Force created and funded a program called “20,010 by 2010,” which focused on ways to increase the metropolitan area’s university enrollment by 20,010 more students through 2010. Though the initiative, many schools hired College Enrollment Managers, who advise students on how to get into college, including the filing of the Federal application for student aid known as FAFSA. By October of 2011, 21,000 more Austin Metro students were enrolled in post-secondary education, including community college and technical schools. While saluting the attainment of another goal, the Chamber also estimates that 75% of jobs becoming available in central Texas through 2018 will require higher education. To meet that need, the Chamber set a new goal: to increase higher education enrollment to 100,000 or 6% of the home-grown population, by 2015.

Another partnership between the Chamber and the Austin Independent School District (AISD) aimed at ensuring that Austin students graduate “college and career ready.” In 2009, AISD approved a strategic plan that called for the district
to graduate 90 percent of the Class of 2014 and ensure that 77% of them enrolled in higher education. For the Class of 2009, the overall graduation rate was 76%, and the proportion of graduates who were college and career ready was 50%, unchanged from the prior year. Clearly there is more work to do, but in an encouraging sign, the graduation rate of low-income students jumped 14% to 75% overall.

Austin’s efforts do not stop with secondary school. The Skillpoint Alliance of government, business and institutions provides training that aims to equip secondary-school graduates for careers as electricians, computer technicians and office administrators. It operates Community Technology Training Centers to equip young people for a workforce in which 70% of jobs require digital technology skills. The program graduates 90% of its students, and 80% of graduates are successful in finding work.

The city invests over $1 million per year in Capital IDEA, a nonprofit partnership of employers and community-based organizations that prepare low-earning adults for higher-value careers. Its board is made up of senior executives of the metro area’s technology companies. It has placed nearly 900 program graduates in careers including electronic technicians, power utility technicians, network administrators, solar power technicians and health care technicians. Studies of the program show large gains in employment, and a 17% annual return for taxpayers. A survey by a Southwestern University student documented further impacts on the children of Capital IDEA graduates, including a 90% secondary school graduation rate and 65% university enrollment rate.

**Turning Education into Enterprise**

**Taichung, Taiwan • Top7 Intelligent Community 2012**

Taichung is home to 13 universities, many of them located in science parks where research institutes and leading-edge businesses congregate. The largest is Feng Chia University with 21,000 students, followed by Tunghai University with 17,000 and Chung Hsing University with 16,000. Feng Chia alone has launched more than 40 research institutes, which it seeks to fund entirely through private-sector projects and government contracts. Its 15-year-old GIS Institute has over 150 full-time staff as well as interns and students involved in developing digital mapping, remote sensors, robot vehicles and flying drones to monitor severe weather and changes to the Earth.

Altogether, Taichung’s universities house 13 incubation centers focusing on everything from digital technology and biotechnology to plastics, footwear and recreation services. Connecting them is the Taichung Incubators Business Alliance, which aims to nurture the growth of the more than 400 businesses that operate from the incubators. The city also facilitated the development of Taiwan’s only Academia-Industry Training Alliance, which aims to sharpen the skills of both established and
new businesses. The Alliance offers training courses in precision machinery, machine tools, mechanical and electrical control and photovoltaic systems. More than 120 manufacturers have sent 800 employees to Alliance Courses since 2006.

Taichung’s industrial parks play a key role in economic growth. The Central Taiwan Science Park opened in 2003 and has attracted companies in solar energy, touch-panel displays, optoelectronics, precision chemicals, semiconductors equipment, aerospace and ICT. In 2011, those companies had combined revenues exceeding US$8 billion. Nine other parks at various phases of development, including the Precision Machinery Technology Park, are expected to generate 60,000 new jobs.

**Arts, Culture and Digital Opportunities**

Arts, culture and overall quality of life are important contributors to Taichung’s success in the broadband economy. They create the environment that attracts and retains innovative individuals and companies. So do Taichung’s “Fair Digital Opportunities” programs, which connect elderly and low-income residents, as well as those living in remote areas, to digital skills. Three Digital Opportunity Training Centers offer more than 100 courses in digital literacy and life and work skills, as well as projects that seek to promote local culture online. Taichung also taps national government funding to provide low-income children with free computers and subsidized connection to the city’s high-speed broadband. Free Internet access is available at over 300 locations in the city, from libraries to cultural centers and government offices.

In 2007 Taichung introduced an online reading certification program for elementary and middle school children. The system allows teachers to establish an online book database and assessment library. Students read books at varying levels, both in school and at home, and take an online comprehension test. A passing grade gets them a
printable certificate. Dedicated teachers have posted nearly 10,000 books to the system, and students have received 5.5 million certificates. The system helps students build strong reading habits while incorporating digital literacy into the curriculum.

Building an Innovation Economy for All
Saint John, New Brunswick, Canada • Top7 Intelligent Community 2012
A small city like Saint John (population 68,000) has certain advantages that big municipalities can only envy. It is big enough to have the infrastructure of a modern city but small enough to have an intimate network of community leaders. In Saint John in particular, that network prides itself on collaboration. These advantages proved powerful as Saint John responded to an economic crisis in 2000 that saw manufacturing employment fall by 26% and caused one-quarter of its population to fall below the poverty line.

By 2003, the municipal councils of Saint John and four surrounding towns had agreed on a coordinated development strategy and tasked the economic development agency, Enterprise Saint John, with implementing it. The strategy, called True Growth, aimed to harness business, institutions and three levels of government to jointly focus on development of sectors including ICT, life sciences, tourism, energy and advanced manufacturing.

Doing Its Part
Local government did its part. It made investments in e-government including an analytics platform for the police department, modeled on New York City’s CompStat, which gave managers timely intelligence on areas where crimes were most likely to occur. In its first year of operation, the police force achieved a 27% decrease in breaking-and-entering and an 18% decrease in motor vehicle thefts.

Enterprise Saint John (ESJ) worked with employers to identify needs, recruit skilled workers and strengthen company human resource practices through labor market research, recruitment campaigns and job fairs. It created an Emerging Entrepreneurs Program to educate young people on starting their own businesses and matched them with mentors, entirely through Facebook and Twitter. An Arts Entrepreneur Program focuses specifically on the needs of artists and producers in crafts, literary arts, music, performing and visual arts.
ESJ's most recent effort is the Business Immigrant Mentorship Program, which provides immigrant entrepreneurs with the chance to network with local business people. The program has been a success because of the eagerness of local business people to engage, from business training to one-on-one mentoring. Newcomers learn how to set up a business while they are establishing their first professional network; mentors gain insight into business and cultural practice in other parts of the world.

As a publicly-funded university, the University of New Brunswick Saint John has a mission to contribute to the community's growth. Rejecting the ivory tower academic model, it develops joint programming with the New Brunswick Community College in Saint John and Dalhousie University to equip a wide range of students with the skills needed by a new generation of companies. The university houses a state-of-the-art distance learning center for Dalhousie's medical school and the community college's Allied Health Building, which provides training for medical technicians. The Saint John campus also uses UNB's alumni network to recruit students from Asia, the Middle East and Europe, bringing essential talent into the community.

Since its founding, UNB Saint John has launched research institutes linked to emerging economic sectors in the region. The Integrated Multi-Trophic Aquaculture Systems Group researches the cultivation of fish, shellfish and seaweed, and was instrumental in establishing an aquaculture industry in the Bay of Fundy. The university's intellectual property policy vests ownership in the faculty members and students who create it, rather than seeking to generate royalty income for the university. This kind of policy has been instrumental in the success of Canadian technology leaders like Waterloo, Ontario, the 2007 Intelligent Community of the Year.

But innovation in Saint John is not all high-tech. The Saint John Community Loan Fund is Canada's first microcredit community investment group. Its first-ever loan went to a man who wanted to start a business salvaging sunken logs from the bottom of a river. He was successful enough to repay the loan and obtain a second one for a new business venture. To date, the fund has disbursed over C$200,000 in loans, with an average value of $1,250, and has generated over C$3 million in new income for the community.

**Innovation in Poverty Reduction**

One day in 1998, Royal Bank vice president Bill Gale looked into the face of poverty in Saint John and decided to do something about it. A man approached him for spare change – no unusual thing. But on that day, for some reason, Mr. Gale did more than dig into his pocket. He asked the man his story.

He was a roofer who had been injured, had run through his employment insurance and was now on welfare. He was trying to get by on about C$10 per day. Mr. Gale was appalled. He began calling people to confirm the man's story and learn the dimensions of poverty in his city. He convinced 35 friends and colleagues to attend a
workshop, where they listened to their fellow Saint Johners describe what it was like to be poor in the city they shared.

It was the beginning of a volunteer organization called the Business Community Anti-Poverty Initiative (BCAPI). It began work by retaining Deloitte & Touche to undertake a study, funded by Irving Oil, of the best practices in poverty reduction. The study had two major conclusions: children of single parents living in poverty were the group most at risk to be poor themselves, and the most effective way to help them was to ensure they received a secondary school diploma.

Using the report's conclusions as its roadmap, BCAPI has worked ever since to make poverty reduction a community priority and to increase opportunities for poor children, youth and single parents. It engages, not in direct action, but by employing the business skills of its members to make community groups more effective and conducting research to measure that effectiveness.

BCAPI currently supports five community organizations, from First Steps, a safe haven for homeless mothers that helps them move to self-sufficiency, to the Resource Center for Youth, which offers teenagers recreation, self-development, health and wellness services, and help with school studies and employment. The Partners Assisting Local Schools (PALS) program was created by J.K. Irving based on his involvement in BCAPI. It sends Irving Oil employees into schools to provide one-on-one mentoring for low-income students and funds educational technology. PALS received a Global Best award from the International Partnership Network, which celebrates outstanding community partnerships.

In the last three years, Saint John has seen net growth in jobs while the rest of New Brunswick – with the exception of 2010 Top7 community Moncton – has watched employment decline. Saint John is now home to more than 40 ICT companies as well as a thriving health and life sciences cluster in Tucker Park, where the university and Saint John Regional Hospital are located. Heavy industry remains part of the economic landscape: Canada's first liquified natural gas terminal began operation in Saint John's harbor in 2009. And in October 2011, Irving Shipbuilding announced a C$25 billion, 30-year contract with the Canadian navy. The vessels will be built in Halifax, in the province of Nova Scotia, but Saint John companies will provide components and
services. When that contract runs out in 2041, it is likely to leave in its wake – not a crisis – but a community with a diverse, globally competitive economy that has found new ways to share the wealth with all of its citizens.

Finding Educational Assets for a New Economy
Stratford, Ontario, Canada • Top7 Intelligent Community 2011-2012

Stratford is home to one of North America’s best-known Shakespeare Festivals, which has become the community’s largest employer, generating C$135 million in local economic activity and C$70 million in tax revenue for all levels of government. Stratford’s leaders realize, however, that the Festival is much more than an employer. It gives this city of 32,000 people a unique opportunity to create a digital media cluster that generates employment, new companies and a year-round source of prosperity.

Creating a cluster from the ground up, however, is challenging work. Stratford has gone about it with the same mix of high ambition, careful planning and the strategic use of outside resources.

A digital media cluster requires a highly-skilled population. Stratford sits at a center of a rural region that is losing population to larger cities and is challenged to afford the public education system it needs. With the support of the province, Stratford’s school board has created an online high school called the Avon-Maitland e-Learning Center or AMDEC for short. It can provide a complete education for grades 9-12 through online text and interactive content, live chats, discussion boards and email. But most of its 1,200 students use it to supplement classroom learning. The availability of e-learning ensures that every school in the district can offer a full and challenging curriculum while dealing with the rural reality that the physical footprint of schools must shrink to match the population. AMDEC also reaches out to drop-outs to help them earn credits and connect with employment opportunities.

In Stratford, two secondary schools offer specialized “high skills major” programs in digital media and information technology. In addition to learning such skills as videography and digital animation, the students engage in work-study with the Festival, where their talents find use both on stage and online, as well as with Rhyzome Networks and other employers.
Creating a University

In 2010, Stratford announced that the University of Waterloo would create a new campus in the community offering a Masters of Digital Experience Innovation. It took five years of work – involving three levels of government, local business leaders and the University – to bring it about. U Waterloo Stratford welcomed its first class in 2011. When both the graduate and undergraduate programs are fully operational, they will bring 500 students and about $43 million in new economic activity to the city.

The payoff for a digital media cluster is new companies. Stratford has attracted a commercialization center of the federally-funded Canadian Digital Media Network to the city. Stratford Mayor Dan Mathieson has also persuaded the Greater Toronto AngelNet Investors (GTAN) to extend its reach to Stratford, where a GTAN-funded company, PowerNoodle, is already in operation. PowerNoodle’s cloud-based system helps organizations to collaborate online in brainstorming, prioritizing ideas and taking action. Another Stratford start-up, eJust Systems, provides a management system that lets police and public attorneys exchange arrest and charge data electronically, and which is already in use by one-quarter of the province’s police forces.

Stratford is ready to see historical trends reverse themselves – for a long-term brain drain to become a brain gain, as it builds industries including digital media. Its cultural strengths and lifestyle also equip it as a destination for “lone eagles,” those high-skilled and entrepreneurial individuals who can work where they please so long as they have access to fast broadband. The latest cycle of reinvention will be underway for the next decade. But the elements in place today, and Stratford’s record of adaptive, entrepreneurial leadership, suggest that success is within their grasp.

Turning Learning into Growth

Dundee, Scotland, UK • Top7 Intelligent Community 2008

In the 19th and early 20th Centuries, Dundee was a flourishing city known throughout Britain for trading, whaling, textiles, food manufacturing and shipbuilding. But in the mid-1970s, deindustrialization took hold with a vengeance. Large-scale plant closures threw thousands out of work and caused an out-migration of skills and talent. In a city that appeared in terminal decline, population losses hit the retail sector hard, discouraged inward investment, and sharply eroded quality of life.

In the 21st Century, the loss of low-skilled industrial jobs slowed – but Dundee still suffered a net decrease of 3,000 jobs over the past three years. Yet that statistic masks a significant trend. Over the same period – in spite of the recent global recession – Dundee added more than 1,000 jobs in the industries of the future: life sciences, digital media and renewable energy. When NCR sent nearly 800 manufacturing jobs out of the city to a lower-cost location in 2007, they chose to keep their R&D center in Dundee.
The Dundee Partnership

In 1991, the leaders of Dundee formed a collaborative body called the Dundee Partnership. Evolving from a project that focused on the physical regeneration of the city, the Partnership brought together all of the city's stakeholders: local and national government, business, education, the nonprofit sector and citizen leaders. Their mission was to forge a broader economic development vision for Dundee.

Many communities have such blue-ribbon commissions. Dundee’s was particularly successful because it kept the blue ribbons out of the process. The participants were front-line staff who gradually built trust and collaboration over years of working together. Political and administrative leaders in government were strongly supportive but resisted the urge to make everything a public relations exercise. In the past two years, collaboration has become so strong that all of the organizations represented in the Partnership sign an annual Single Outcome Agreement that sets high-level targets to achieve for the year.

Early on, the Partnership commissioned research to identify economic strengths and weaknesses, gains and losses. As Dundee entered the 21st Century, the research uncovered the first net job growth in decades, despite a continuing fall in manufacturing employment and levels of unemployment higher than the national average. It was Dundee's university sector - including the University of Dundee, University of Abertay Dundee, the Ninewells teaching hospital and Scottish Crop Research Institute – that was creating jobs, not only in established sectors like publishing and scientific research, but in such new fields as software, animation, computer games, film and television.

The Partnership threw its energy into fanning the flames of entrepreneurship and accelerating the R&D that was the new engine of economic growth. Universities established graduate business incubators and policies promoting the spin-out of new companies. The University of Abertay Dundee opened the IC CAVE research center to support the computer game and digital entertainment sector. A Technopole located at the University of Dundee incubates science and technology start-ups that originate there.

A £20 million Digital Media Park entered into development and, by 2007, opened its first phase, consisting of 100,000 sq. feet (9290 m2) of space for e-businesses. A government-funded Business Gateway project began providing e-business training and
support to small and mid-size companies, helping to improve the e-readiness of nearly 600 companies in 2004 and 2005. Two new marketing partnerships, bringing together public, private and academic leaders, launched Web sites, e-newsletters and conferences promoting "BioDundee" to attract life science companies and "Interactive Tayside" to the digital media sector.

Dundee’s public schools have a robust IT infrastructure, and digital technologies have been integrated into art, music, science and humanities classes. Dundee was an early adopter of Scotland’s GLOW intranet for schools. It provides a collaboration program for students as well as teachers – with document sharing, discussion boards, chat and videoconferencing – and is beginning to be used to bring outside expertise into the schools. A recent project connected a well-known Scottish artist, Willie Rodger, online to art classes engaged in a print-making curriculum. Over several weeks, students uploaded scans of their developing work. They engaged in peer review with students in other schools as well as videoconferences with Rodger, who offered his own critique and advice. It was a model for interfacing the worlds of work, art and science into the classroom.

**Daring to be Digital**

Life sciences and gaming industries continue strong growth. The Wellcome Trust Biocenter is an R&D facility at the University of Dundee that focuses on translational medicine: finding biological mechanisms that offer new prospects for treatment, then turning them into the chemistry needed to create new drugs. It added 160 high-skilled jobs to Dundee, plus the many ripple effects that spread outward from the facility. Realtime Worlds, Dundee’s biggest game company, is developer of Grand Theft Auto and Mist, and is expanding into publishing of its own multiplayer online games. The company recently attracted $50m in venture backing. BrightSolid is another Dundee company that provides IT business services and is Scotland’s largest digital media firm. Dundee also has become the headquarters of Insights, a leading learning and development company operating in 20 nations.

Probably no single activity better represents Dundee’s unique blend of ICT-driven innovation, education and marketing savvy than Dare to be Digital. Founded by Abertay University, Dare to be Digital is a contest for students from throughout
the UK and, increasingly, around the world. They submit ideas and designs for new video games to the Dare to be Digital contest. The finalists come to Dundee for 10 weeks of intensive development with Abertay instructors and games industry professionals at the end of which they have a finished game that is unveiled to judges and the public at a festival. Dundonians of all ages attend to play the games and vote on their choice for best game. The judges present awards as well – but the real prize for contestants is exposure to leading game designers and investors who come to Dundee from throughout the UK for the festival.

So successful has Dare to be Digital become that the city has created a smaller version for secondary school. The Digital Challenge takes two weeks and provides students with ready-to-use templates on which they can execute their game ideas. The young people get a chance to learn and apply digital skills while connecting to future employers – and having a lot of fun at the same time.

**Building an Innovation Economy from Scratch**

**Riverside, California, USA • Intelligent Community of the Year 2012**

In 2004, Riverside Mayor Ron Loveridge and John Tillquist, Dean of Economic Development at Riverside Community College, convened a High Technology Taskforce to see if something could be done about getting a bigger share of California’s tech-driven prosperity for their community. The Taskforce included government and university leaders as well as CEOs from Riverside’s small number of research-oriented tech companies. It spurred creation of a second group, the Riverside Technology CEO Forum, which became a place for business leaders to discuss their mutual concerns and formulate plans for action. Together, the groups solicited feedback from business, community groups, city department heads and university leaders. They produced a roadmap that would be familiar today to the leaders of any Intelligent Community. It focused on promoting technology businesses and creating the information infrastructure they needed, fostering entrepreneurship in higher education, improving the skills of the population and demanding that city government set an example of tech-based innovation for others to follow.

**Assembling an Innovation Ecosystem**

The High Technology Taskforce and CEO Forum were not meant to be just talking shops. They were the core of collaborative teams that set out to assemble an innovation ecosystem for Riverside.

Business did its part. Supporting the city’s efforts, Riverside’s tech companies began to set up their own incubators to spur innovation. ISCA, which uses electronic technologies to solve pest problems, began offering office space and production facilities to start-ups in 2008. In 2009, Bourns, a manufacturer of electronic components, established the second incubator. A maker of customer relationship
management systems, Surado, included incubator space in its new Surado Corporate Center. And Avisio, a publicly traded technology innovation company, established an Innovation Economy Initiative to assist in the commercialization of emerging technologies.

Businesses took these gambles because they saw the ready-made supply of entrepreneurial talent represented by Riverside’s 48,000 university and community college students. And the academic sector proved to be a willing partner in connecting classroom and laboratory innovation to opportunities in the marketplace. UC Riverside has become a leading research center for nanotechnology and solar energy. Riverside’s first incubator, the Riverside Innovation Center, was created by the city and UC Riverside. Within three years of start-up, it became the headquarters of eight new high-tech companies. Surado and Avisio both got their start there, as did OmniPlatform, developer of online applications for emergency room management.

**Partnership with Educators**

The Riverside Community College, with nearly 20,000 students, operates the Titech Business Development Center. Using funding from the US Small Business Administration and local sponsors, TriTech provides free counseling, networking and workshops. Its counsellors are successful local entrepreneurs in high-tech fields. Together with the Tech Coast Angels investor group, it has trained 270 potential entrepreneurs and established 20 technology start-ups. It also partners with the city, CEO Forum and universities to host an annual venture creation competition, The Big Idea, that awards cash prizes and in-kind services to students and start-up companies invited to pitch their product or idea to a group of investors.

In 2009, the city partnered with UC Riverside and its Bourns College of Engineering, as well as sister city Sendai, Japan and Sendai’s Tohoku University, to launch the Southern California Research Initiative for Solar Energy (SC-RISE). In collaboration with Federal agencies, SC-RISE researches new solar technologies such as high-temperature solar thermal energy storage. It is testing and implementing new technologies like thin-film solar cells with researchers at Tohoku University and rare-earth yttrium batteries with Winston Global Energy in Shenzhen, China.
Winston Global Energy is partnering with Riverside’s SolarMax Technology to build a 2 MW solar generation and storage project at UC Riverside, and is working with the city and Riverside Public Utilities to develop a 20 MW solar generation strategy for the city. SolarMax has joined forces with the city to create a renewable energy program that has won the right from the US government to offer up to 160 foreign nationals permanent US residency in exchange for investment of $500,000 in a Riverside business that creates at least 10 jobs. The program has generated $15 million already, focused on installation of rooftop solar systems, and expects to create 1,600 direct and indirect solar installation jobs in Riverside.

Riverside residents recognize the transformation that these many efforts have brought. In 2009, the Chamber of Commerce, City and UC Riverside sponsored a program to involve the entire community in establishing a vision of prosperity and a detailed roadmap to reach it, which was branded “Seizing our Destiny.” In a recent survey, two thirds said they would continue to support the government’s push for high-tech opportunities even if it meant higher taxes – this in the region that gave birth to America’s taxpayer revolt of the 1980s.

**Prosperity Cannot be Imported**

Riverside’s leadership has also recognized that prosperity cannot simply be imported. Community leaders have formed groups including the Education Roundtable and Higher Education Business Council to focus on improving education and extending it to every segment of the community. They report regularly to City Council and document progress on the city’s “Seizing our Destiny” Web site.

Dr. Rick Miller, superintendent of the Riverside Unified School District (RUSD), has committed his schools to getting technology into the hands of students. RUSD provides 10,000 electronic mobile devices and digital textbooks for students. RUSD’s Ramona High School was the first in California to have all 2,100 students using digital (Coby Android) textbooks with wireless connectivity to teacher Web sites.

The Science and Technology Education Partnership (STEP) is a nonprofit organization established by the US Congressman for Riverside’s district. Every October, 3,500 students from 30 schools attend STEP’s science and technology conference at the Riverside Convention Center. It aims to ignite the imaginations of students about the exciting career opportunities available to students in science and
technology, and to provide teachers with innovative ideas for math and science lessons. The program has reached 25,000 students and 2,000 teachers since its start in 1999.

In 2009, the Bill and Melinda Gates Foundation and the National League of Cities chose Riverside as one of four cities receiving $3.1 million to increase the number of young people age 16-26 who complete post-secondary education with value in the marketplace. Riverside used its grant to create Completion Counts, a Web-based public information hub offering educational, social and community services. Its goal is to double the number of Riverside students who complete college by 2020.

The final component of the innovation ecosystem in Riverside focuses on those who have been left out. Digital inclusion is a top priority for the Mayor and Council, and implementation is the responsibility of an organization called SmartRiverside. It is headed by CIO Steve Reneker.

SmartRiverside operates a Digital Inclusion Center that gets technology and training into the hands of the excluded. The technology comes from a unique collaboration between a computer services company that collects e-waste, and a gang prevention program called Project Bridge. The company hires and trains former gang members recruited by Project Bridge to refurbish the used PCs. Equipment that cannot be refurbished is sold to a certified local recycler. Working equipment other than PCs is refurbished and sold on eBay, and these sources of revenue help pay for the program.

SmartRiverside provides the refurbished computers to school districts in the region for computer labs, as well as directly to 200 new low-income families per month. After school hours, teachers provide certified computer training in the labs to families at no or low cost. SmartRiverside also partners with Riverside County and The Salvation Army, a faith-based social service organization, to offer free technology training, Internet access and PCs to low-income seniors. Add to this the 3,500 hours of computer time amassed by residents monthly at Riverside’s Eastside Cybrary (a library without books), and Riverside is clearly on the leading edge in digital inclusion. ■
Robert Bell is co-founder of the Intelligent Community Forum, a think tank that focuses on the use of broadband and information technology for economic development in communities around the world. During his work with the Forum, Mr. Bell has led economic development missions to cities in Asia and the US; authored articles in *The Municipal Journal of Telecommunications Policy*, *IEDC Journal*, *Telecommunications*, *Digital Communities*, *Asia-Pacific Satellite* and *Asian Communications*; and appeared in segments of ABC World News and The Discovery Channel. He is a frequent speaker and moderator at municipal and telecommunications industry conferences. He is also the author of ICF's pioneering study, *Benchmarking the Intelligent Community*, the annual *Top 7 Intelligent Communities of the Year* white papers and other research reports issued by the Forum, and *Broadband Economies: Creating the Community of the 21st Century*.

ICF gratefully acknowledges the support of leading individuals and organizations for its awards, research and educational programs.

anyCOMM

Affiliated Computer Services

Canadian Consulate General in New York

Cape Code Chamber of Commerce

Central European University

Cisco Systems

Fleetcom

Global Mobile

Globecomm

Libro Financials

Hewlett Packard

Hargreaves Stewart

Holst Centre

Hunton & Williams

Hyde Construction

New York Grant Company

Orr Insurance
Paul Hastings  
Polytechnic Institute of NYU  
ProTech Security  
Province of Ontario  
Rhyzome Networks  
Riverside Public Utilities  
Royal Bank of Canada  
Samsung  

Schottenstein Zox & Dunn  
Southwest Enterprise Region  
Team Fishel  
Toshiba  
Tulix Systems  
University of Windsor Centre for Smart Community Innovation  
US Internet
Intelligent Community Indicators

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. In its work since then, ICF has also identified a number of success factors for Intelligent Communities in both industrialized and developing nations.

1. **Broadband Connectivity**
   Broadband is the new essential utility, as vital to economic growth as clean water and good roads. Intelligent Communities express a clear vision of their broadband future and craft policies to encourage deployment and adoption.

2. **Knowledge Workforce**
   A knowledge workforce is a labor force that creates economic value through the acquisition, processing and use of information. Intelligent Communities exhibit the determination and demonstrated ability to develop a workforce qualified to perform knowledge work from the factory floor to the research lab and from the construction site to the call center or Web design studio.

3. **Digital Inclusion**
   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. Intelligent Communities promote digital inclusion by creating policies and funding programs that provide “have-nots” with access to digital technology and broadband, by providing skills training and by promoting a compelling vision of the benefits that the broadband economy.

4. **Innovation**
   For business, broadband has become to innovation what fertilizer is to crops. Intelligent Communities work to build the local innovation capacity of new companies, because these produce all of the job growth in modern economies, and invest in e-government programs that reduce their costs while delivering services on the anywhere-anytime basis that digitally savvy citizens expect.

5. **Marketing and Advocacy**
   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. Effective marketing shares this story with the world, while advocacy builds a new vision of the community from within.
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 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, Shenzen and Bangladesh live right next door to the hard-working people of Montreal, San Francisco and Berlin, because their communities are connected. 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.

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

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

NOTES

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