



Health in the Intelligent Community



How Intelligent Communities apply information and communications technology to improve their citizen's health, reduce costs and build competitive economies in healthcare and life sciences.

2011 ICF Theme and Guidance Paper for Communities Submitting a Nomination for the Intelligent Community of the Year Award

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Intelligent Community Awards

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. In the first phase, communities nominate themselves for the Smart21 using a simple, 6-question form that asks them to describe the community's background, challenges, strategies and programs, and results. The nomination forms are reviewed by an ICF committee that scores each community on the six criteria of the Awards process. The 21 top-scoring communities are then asked to complete the far more detailed Top Seven questionnaire.

The completed questionnaires are read by a team of academic experts. Each reviewer reads all of the Smart21 nomination forms and scores the answers in each section based on completeness and performance against ICF's Intelligent Community Indicators. Finally, the reviewers meet to compare their scoring of the Smart21, identify areas where scores significantly diverged and come to agreement on the most appropriate final score. The seven top-scoring candidates are named as ICF's Top Seven Intelligent Communities of the Year.

In the final stage of the process, an independent research firm engaged by ICF re-analyzes the same data to produce a new set of scores. At the same time, ICF provides the Web profiles of each community plus the site visit reports from ICF executives to an international jury, which ranks the Top Seven in their order of preference. ICF combines the two scores in order to select the Intelligent Community of the Year.

Each year, ICF selects a theme to supplement the Intelligent Community Indicators (see page 10) on which the selection of the Smart21, Top Seven and Intelligent Community of the Year is based. The Indicators provide a framework for understanding how communities succeed in building inclusive and sustainable prosperity in the global Broadband Economy.

The theme focuses on a particular success factor in the work of Intelligent Communities, and allows nominees to highlight their achievements in this area. The theme, when evaluated as the one of the ICF's indicators, is weighted into the assessment of a community's nomination for the Intelligent Community of the Year awards. Past themes have included *sustainability*, *leadership*, *culture of use* and *the education last mile*, each the basis for solid progress by communities honored through the Awards program.

Purpose

In 2011, our theme is **Health in the Intelligent Community**. ICF invites nominees to describe efforts by local government, institutions and businesses to improve the delivery and management of healthcare using information and communications technology in order to:

- Create business opportunities for local employers
- Reduce costs
- Enhance the health of residents

The purpose of this white paper is to explain and explore the 2011 theme in order to guide communities in completing their nomination process. We also hope to raise awareness of a vital issue in community development in the Broadband Economy.

The Challenges of Healthcare in the 21st Century

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).¹

However you calculate it, it's a lot of money. And it is expanding at a rapid pace. A 2004 report from the OECD² 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

Scientific advances and rising expectations are driving drastic growth in healthcare costs.

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.)³

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.⁴ 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.⁵ 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.⁶

How to boost efficiency, increase productivity and produce better outcomes?

Reducing inequities in healthcare

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 healthcare 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.⁷

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.⁸ 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 2009.⁹

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.

Lessons from Intelligent Communities

Intelligent Communities identified by ICF through its Smart21, Top Seven and Intelligent Community of the Year Awards offer superb examples of ICT-based innovation in all these areas. The following are summaries of recent strategies and results. More information is available from the Community Profiles section of ICF's Web site (www.intelligentcommunity.org).

Promoting a Growth Sector

In **Besançon**, the first French city to deploy its own fiber-optic network, local government became the lead investor in an €8 million, 130-hectare technology park called TEMIS. Joining the city were the local General Council, Regional Council and the Chamber of Commerce & Industry. TEMIS (Technopole Microtechnique et Scientifique) is principally focused on microtechnology, which leverages Besançon's long history of precision manufacturing and metallurgy for clocks and watches. But as more companies are exploring the applications of microtechnology to medicine, TEMIS has set aside 17 hectares for TEMIS Health, which offers development space for companies in health, biomedical engineering, biotechnologies and medical-surgical equipment. Strategic partners included Jean Minjot University Hospital, the University of Medicine, the University of Pharmacy, the National Institute for Health and Medical Research (INSERM), and the French Establishment for Blood. The park's incubator, TEMIS Innovation, markets space and services not only to companies in ICT and robotics but also biomedical engineering.



The city of **Dundee**, on Scotland's north coast, has approached economic development in healthcare and the life sciences on many fronts. Once a "rust belt" city whose best days seemed behind it, Dundee has built a dynamic and entrepreneurial economy around high-quality universities and high-speed connectivity. The University of Dundee has one of the world's leading life science colleges, which has created a number of spin-out companies and itself acts as a major "draw" for scientific talent. The School of Life Sciences currently has employees from 60 nations and has been voted one of Europe's best places to work in this sector.



Another business sector that has emerged from Dundee's universities is video gaming. This field shares with medicine a need for expertise in imaging and simulation technologies. The University's School of Engineering, Physics and Mathematics has a research group called MoCASS (Mobile Computer and Smart Sensors), which is using a grant from the UK government to work with Dundee's largest gaming company to improve the realism of computer games. MoCASS also works closely with the Institute of Medical Science and

Technology at the University to commercialize ideas in medical imaging, especially those involving wireless and mobile communications.

Though the life-sciences sector already employs nearly 4,000 people in Dundee, the City Council has created programs to accelerate its growth. The Innovation Portal was launched with the support of Dundee's universities and the Scottish government to foster knowledge transfer in order to boost the competitiveness of local businesses. Its most recent project is a BioPortal, which will work with the life sciences industry to identify unused intellectual property created by companies and match it with post-graduates interested in launching new companies.

The city's longest-running such effort is the BioDundee strategic partnership among government, business and the university sector. It promotes collaborative projects that promote Dundee as a life sciences hub. Activities like the annual BioDundee conference have helped make BioDundee a brand recognized in life sciences throughout Europe. One of its projects is a summer school that offers paid placements at local companies to students taking life sciences courses at one of Dundee's universities. The students work on a specific project, on which they report at the end of the summer, and also take advantage of workshops, site tours and networking lunches to familiarize themselves with all of the career opportunities available in Dundee.

Cleveland, Ohio, another rust-belt city fighting to make a comeback in the information age, found a different public-private channel to promote growth in healthcare and life sciences. The city is home to the Cleveland Clinic, a multifaceted healthcare center that is one of America's top hospitals. Such an "anchor tenant" provides the critical mass needed to develop a cluster. But rather than leaving cluster formation to chance, the Clinic, University Hospitals, Case Western Reserve University, the private Summa Health System and the BioInnovation Institute created a business accelerator called BioEnterprise. Each year, BioEnterprise selects a number of start-up medical device, biotech and healthcare companies, which they provide with seed funding, strategic council and recruiting assistance. The accelerator raises funds from private, institutional and public sources - \$500 million in its first five years with the goal of adding \$50 million in the following three.

A key to the success of BioEnterprise is its connections with private venture capital. BioEnterprise views itself as part of the venture capital "deal flow," which funds start-ups and prepares them for second-stage funding. For venture capitalists, BioEnterprise is a partner that pre-screens deals and increases their success rate.



Improving Quality of Life

The city of **Windsor** and county of **Essex** in Ontario, Canada have made effective use of the Web to promote health and wellness in their population while simultaneously encouraging economic growth. The region is home to small farmers, greenhouse growers and vintners producing high-quality products but challenged, like all small business, to get them to market. Windsor-Essex recently launched an online farmer's market (www.welookforlocal.ca) to provide information on why and where to buy local produce, products and services, which contributes not only to healthy eating but a healthy economy as well.



Essex County has also used the Web to improve outcomes in chronic disease management, particularly asthma. The county funded development of an online assessment tool for use by physicians and nurses, in order to better identify asthma patients needing intervention and create effective self-management plans. More than 60 physicians have treated 1,300 patients with the program, and the county documented a 56% reduction in sick time from work and 60% reduction in emergency room visits among those treated.

Trikala, in central Greece, uses a wireless broadband network to improve management of cardiovascular disease, asthma and chronic obstructive pulmonary disease. Patients who register for a tele-health service receive a portable device, similar to a mobile phone, which monitors their vital signs and location as they move around the city. When medical professionals recognize a pending crisis, they contact patients and direct them to the nearest hospital.



Online communication also had a dramatic impact in **Porto Alegre**, the capital city of an agrarian state in Brazil. Porto Alegre constructed a wireless broadband network serving the urban core and extended it to healthcare centers located in low-income, at-risk areas surrounding the city center. Using the network, the city introduced remote obstetric ultrasound exams, with doctors working from a specialized hospital downtown connecting with healthcare workers at the clinics. Within a few months of the start of service, the service caused waiting time for obstetrical exams to drop from 4 months to 34 days. Just as important, poor women were far more likely to actually receive exams; an average absenteeism rate of 40% dropped to less than 10% when women no longer had to lose a day of work in order to travel to a distant hospital.



Bristol, Virginia participates in a 17-county initiative in the US states of Virginia and Tennessee called CareSpark, which is bringing hospitals and healthcare

facilities into the digital age. More than 1,200 physicians and 18 hospitals use the network to exchange patient information electronically in order to improve diagnosis and reduce duplication in testing and procedures. The local CareSpark office has enrolled 24 healthcare providers and made more than 170,000 clinical documents available online. Funding comes from local organizations, corporate foundations, hospitals, physicians and state governments.



The 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

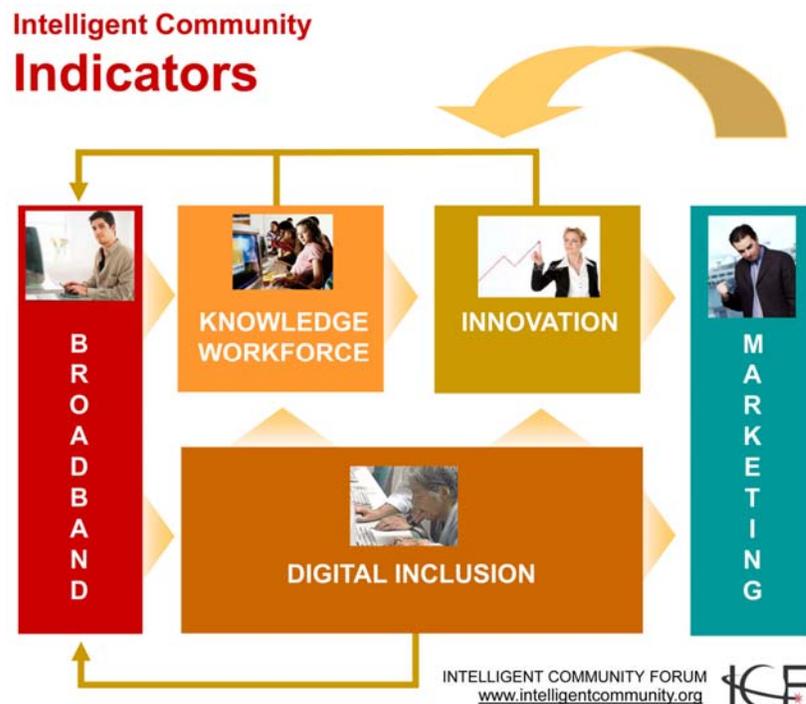
As broadband deploys widely through a community, there is serious risk that it will worsen the exclusion of people who already play a peripheral role in the economy and society, whether due to poverty, lack of skills, prejudice or geography. Intelligent Communities promote digital inclusion by creating 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.

In its annual Awards program, ICF includes as a sixth criteria a theme that changes from year to year but focuses on a particular success factor in the development of Intelligent Communities. This white paper has been devoted to exploring the 2011 theme, "Health in the Intelligent Community." ICF asks communities completing the Intelligent Community Award nomination forms are asked to provide specific information on their efforts and successes in this area.

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. 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.

The Author



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 Seven 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*.

Friends of the Forum

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