



The Revolutionary Community

How Intelligent Communities Are Re-Inventing Urban and Rural Planning

Annual Theme of the
2015 Intelligent
Community Awards



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Inside the Report

“**B**roadband and inexpensive information technology will redefine how communities operate. As the commercial Internet celebrates its 20th birthday, no planner can afford to be in the position of recommending “dumb” development to communities of increasing intelligence.”

“**Y**ou have probably had the experience of visiting a company and seeing loads of empty cubicles, because so much of the 9-to-5 office space that was essential a few years ago is superfluous today. It is only one small trend – and yet how could it *not* be reshaping demand for office space, as well as commuting patterns, sidewalk traffic and much else?”

“**U**rban intensification is the only way to avoid continued suburban sprawl. Ultra-fast broadband, woven imaginatively into the fabric of urban life, offers a way to attract and retain residents with a quality of life that outlying areas will struggle to duplicate.”

“**B**asic economics dictate that rural areas can seldom compete with suburban and urban ones in terms of physical infrastructure and amenities. When it comes to understanding how digital infrastructure will fill that gap and create sustainable economies, planners have an important seat at the table.”

“**S**oftware developers, game designers and mobile app builders have labored for decades to make digital devices into the seductive sirens they are today. Take this digital wizardry and apply it to deepening citizen engagement in their community, and you can get a powerful and positive combination that every planner needs to understand.”

“**B**y sharing information rather than burying it in file drawers, and by empowering developers to self-serve, ePlanning lowers the barriers to engagement and reduces time spent waiting in line and time spent serving the people waiting in line. Both citizens and government come out ahead.”

What is an Intelligent Community?

Intelligent Communities are cities and regions that use information and communications technologies (ICT) to build prosperous economies, solve social problems and enrich their cultures in the 21st Century. Many people are familiar with the concept of the Smart City, which turns to technology for solutions to problems from traffic congestion to leakage from water mains, public safety to parking tickets. The Intelligent Community is the next evolutionary step, encompassing not just cities but metropolitan areas and rural regions. Intelligent Communities turn to technology not just to save money or make things work better: they also create high-quality employment, increase citizen participation and make themselves great places to live, work, start a business and prosper across generations.

Award Program

Each year, the Forum presents an awards program for Intelligent Communities. The program salutes their achievements in building inclusive, prosperous economies on a foundation of ICT. In the process, it gathers data for ICF's research programs, which the Forum shares with other communities around the world.

The Awards are divided into three phases, and the analysis becomes more rigorous at each successive stage.



Smart21. In the first phase, ICF develops

nominations for candidates from its own research and information submitted by cities and regions. Describing the community's background, challenges, strategies, programs and results, the nominations are reviewed and scored by a team of academic Analysts, who select the 21 highest-scoring communities.

Top7. In the next phase, the Smart21 complete the far more detailed Top7 questionnaire. These questionnaires are analyzed and scored by an independent research firm, and the seven highest-scoring candidates are named as the Top7 Intelligent Communities.

Intelligent Community of the Year. In the final stage of the process, ICF co-founders visit each of the Top7 and write reports, which are reviewed along with nomination data by an international jury. The jury ranks the Top7, and ICF combines the jury scoring with that of the independent research firm in the previous step to select the Intelligent Community of the Year.

Annual Theme

ICF selects a theme each year to supplement the Intelligent Community Indicators on which the awards program is based. Weighted into the assessment, the theme allows nominees to highlight their achievements and uncovers new success strategies of significance to community developers. Past themes have included sustainability, leadership, education, healthcare, innovation and employment and culture, each the basis for solid progress by communities honored in the Awards program.

2015 Theme: The Revolutionary Community

The work of creating an Intelligent Community often begins in crisis. It may be a severe economic downturn after major employers relocate. It may be accelerating brain drain as the community's most talented people leave in search of opportunity. Or it may be more subtle – a dawning awareness that the community faces profound risks to its future. In response to crisis, Intelligent Communities hold public consultations and launch programs. They build infrastructure that they hope will create a new foundation for prosperity.

But once the crisis is past, how do Intelligent Communities maintain their momentum and avoid being caught unprepared and undefended by the next wave of change? They

integrate their new-found understanding of 21st Century challenges into the **urban and rural planning** process – that time-tested method for designing, deliberately and collaboratively, a better future for the community.

But this is planning with a difference. Intelligent Communities recognize that today's disruptions in technology, the economy and the environment will only grow more intense. They understand the impact that the continuing broadband revolution will have on their physical form, the delivery of services and their competitive advantages. So they approach the planning of land-use and infrastructure, sustainability and community development in revolutionary ways. In the process, they are reinventing what it means to plan. ■

Planning for a Disruptive Future

Urban and rural planning is not a science. It's a combination of the arts, science, philosophy, sociology, economics and politics. Planning is a unique language focused on the use of land and the design of the urban, metropolitan or rural environment upon which the use is to be developed. Planning concerns itself with the total community – including air, water and infrastructure in, around and through it – and must take a true 360-degree look at everything related to its development.

That makes planning an enormous undertaking. It means looking at yesterday as well as today and tomorrow, and at land use in neighboring areas and at the people and things surrounding the planning area. Everything connects to everything else, as in the environmental concept of an ecosystem, and the recommendations in the plan are supposed to take those myriad connections into account.

Good urban and rural planning includes consideration of infrastructure, of the efficient use of space and of mobility in all its forms, from car, rail, walking and biking to moving sidewalks and cable cars. It covers transit-related development, urban intensification, open space and parks as well as environmental sustainability. It considers how to create memorable spaces and conserve heritage, how to integrate buildings and neighborhoods within an urban, metropolitan or rural landscape, and where exactly people fit into the grand design. Ultimately, it is about providing clarity on the goals of the community and offering confidence to investors that the development risks they take can achieve a reasonable reward.



Asking a Lot of Planners

That is a lot to ask of a process that was born in response to the disorder and pollution of mid-19th Century industrial cities like Manchester and Birmingham in the UK. The discipline of planning has had its pendulum swings, from the smokestack-filled industrial past to the heavy-handed Robert Moses period, when massive urban renewal displaced people and obliterated neighborhoods in the search for something better, a process being repeated today in China's massive redevelopment areas.

It is also a lot to ask of a process run by fallible human beings. Sometimes City Councils and planning recommendations are at odds. Sometimes developers take local governments to court when they feel they are being treated unfairly. Sometimes the community is upset and issues of land use and urban or rural design turn unexpectedly into political issues that divide or paralyze. Sometimes the approval process is just too slow, too cumbersome and incomprehensible for mere mortals to follow. When the process gets bogged down in legislation or lawsuit, when animosity arises between planners, politicians, developers and citizens, the ideals of planning go out the window and the whole process can breed disaffection and cynicism rather than progress.



Progress or neighborhood destruction?

To avoid this outcome, urban and rural planners have become much more sensitive to their end-users and to the physical environment around them. The widely adopted Smart Growth paradigm is a clear example. It focuses on creating compact urban centers mixing residential, institutional and commercial space in a transit-friendly, bicycle-friendly and walkable environment. It brings into the planning framework such new issues as health, avoidance of economic inequality and the need to create a sense of belonging and civic engagement. Planning, in short, has become a guide to help ensure the orderly development of our communities and guide how members of a society share limited resources.

To do this properly, planners research and analyze all these aspects of urban and rural planning, coming up with theories and concepts to test and pilot, and develop visioning and thought leadership initiatives. Smart planners embrace other professions as part of the process, from engineering and architecture to economic development. They also undertake extensive public consultation prior to and during the development of their strategic plans. After all this, they develop public policy recommendations and, once plans are approved with appropriate budgets, they also help to implement and in some cases manage urban, metropolitan or rural infrastructure.

Adding Intelligence to the Mix

That is one big job description – and yet, something is missing. Something we work with every day, which has revolutionized every hour from waking to sleeping, and is even creeping into our dreams.

Information and communications technology (ICT).

Planners are heavy users of ICT for research, communications, design, mapping, budgeting and all of their other activities. Many are pioneers in the use of data

visualizations, GIS mapping and 3D imagery to illustrate the environments that planning policies will create.

The emergence of the Smart City movement and the Internet of Everything are also expanding the range of topics that planners need to understand and incorporate into their work.

Smart Cities deploy ICT into municipal infrastructure and institutional processes to meter, monitor and automate in ways that save money, increase efficiency and improve quality of service. It may be a network of cameras and environmental sensors that feed into an operations center for day-to-day traffic management or emergency response. It may be GPS units in every city vehicle to improve routing, provide location data and make sure that municipal workers are doing their jobs. It may be smart grid or water metering systems that detect problems early and prevent costly crises from erupting.

The Internet of Everything is Cisco's term for all of this machine-to-machine (M2M) communications.¹ In that company's vision, it extends beyond city streets or water mains to pills you can swallow containing sensors that report on doings in your digestive tract and disposable sensors in milk cartons that detects whether their temperature has remained in the right range. In the broadband economy, the network captures the value of billions of bits of useful data flowing through it.



Leading innovators in urban and rural planning are already taking these emerging technologies into account. But the leaders need more followers. All planners need to understand the fundamental revolution that these technologies are bringing about in urban and rural environments.

More importantly, the planning discussion itself needs to expand in scope. Broadband and inexpensive IT will not just “capture value” but redefine how communities operate in physical, social and cultural terms. Interactivity of people, things and place is transformative. As the commercial Internet celebrates its 20th birthday, no planner can afford to be in the position of recommending “dumb” development to communities of increasing intelligence. ■

The City, Physical and Digital

Jones Lang LaSalle is a commercial real estate broker operating worldwide. One of the most common things its brokers do is to advise companies on how much office space they need for their employees. For many years, the rule of thumb was 200 square feet (about 18 m²) per employee. But in a 2012 report, the company predicted that by 2014, the average space needed per employee would be only 50 square feet (about 5 m²). That's a fourfold decline, which is remarkable.²

What's causing it? In a growing number of industries, employees aren't spending their time in the office. They are visiting customers or suppliers. They are working from home. They are using the mobile tools of the information age – laptops, tablets and smartphones – to cut the physical tether to the office while remaining connected, accessible and accountable to their companies over



broadband. You have probably had the experience of visiting a company and seeing loads of empty cubicles, because so much of the 9-to-5 office space that was essential a few years ago is superfluous in today's broadband economy. At IBM – a name synonymous with information technology – 40% of employees today work from somewhere other than a company-owned or leased office.

“We don't charge you to walk on our sidewalks. Why would we charge you to use our Wi-Fi?”

– Mayor Brad Woodside, Fredericton, New Brunswick, Canada

It is only one small trend – and yet how could it *not* be reshaping demand for office space in the central business district, as well as commuting patterns, sidewalk traffic and much else? In a March 2013 Webinar, Norman Miller of the Center for Real Estate at the University of San Diego, examined what would happen if

US tenants used 20% less office space. He estimated that the change in demand would create US\$250 billion in excess office capacity in a market worth \$1.25 trillion.³

If broadband becomes as important to the local economy and culture as the street or sidewalk, how will it change the places we live and work? What priority should be given, for planning purposes, to the physical aspects of the network: fiber optic or copper cables, wireless routers on towers or rooftops, repeaters within structures?

But there is another level above and beyond the physical issues of wiring, fiber cabling, power provision and regulating antenna placement. That is the level of technology's impact on people, and the impact of user demand on technology. Both are already changing how people use space, demand space and relate to space, and the changes will only become more radical with time.

Getting Kiwis to Take the Stairs

In Sylvia Park Mall in Auckland, New Zealand, some digital innovators decided to see if they could motivate shoppers to take the stairs up to the mall entrance rather than gliding effortlessly up on the escalator. One obvious strategy would have been to turn the escalator off, but that was a non-starter in a retail environment. Instead of using a stick, the project team decided to dangle a digital carrot.



www.youtube.com/watch?v=gKuyhfLIXzA

With support from *New Zealand Good Health* magazine, they covered the steps of a staircase with coverings that looked like piano keys. Each covering contained pressure sensors that were wired to a sound generator. Put your foot on a step, and you hear the sound of a piano key. Climb up or down and play a scale. Once shoppers discovered the climbable keyboard, the majority of them abandoned the escalator for the sheer fun of making music with their feet.

A similar project in a Stockholm metro station produced the same result. Given a chance to interact in an entertaining way with the urban environment, people vote with their toes.

The essence of digital technologies is interactivity. While the Internet had no part in these projects, the principle is the same as for a smartphone app, an online game or a cloud-based business application. You do something, the machine responds and a human-machine collaboration gets underway.

Digital technologies are already being deployed, as in Auckland and Stockholm, to give particular places unique attractiveness. As we integrate more sensors, screens and digital logic into infrastructure, our interactions with places are destined to become increasingly digital. According to a 2013 report from Cisco, machine-to-machine communications over the Internet, without any human influence, will grow at 82% per year (CAGR) from 2012 to 2017, when machines talking to machines will generate 3.9 exabytes of Internet traffic, or 3% of the global total.⁴ Much of that M2M traffic will have humans at the core, because it will be produced by sensors that monitor us, measure us, protect us and respond to what we do.

Changing the Urban-Rural Balance

Canada has been a global leader for years in thinking through the potential importance of the broadband revolution. Through initiatives like the Community Access Program, which launched in 1995, it has pushed Internet access into the rural areas that make up more than 99% of the country's land mass but contain only 20% of its population.⁵ This lengthy devotion to the topic has made Canada a great laboratory for researchers to evaluate the economic impact of broadband deployment.

A recent study from Queens University provides an analysis of broadband's impact on urban and rural economies over a 14-year period. Among its more surprising findings was that broadband has no measurable impact on employment growth in manufacturing (goods-producing) businesses. As manufacturers gained access to commercial broadband, their demand for labor saw no change. But where *services* are concerned, the impact is significant – and it plays out in even more surprising ways.⁶

The study found that deploying broadband promotes employment growth in rural regions *but not in urban ones* in specific service sectors: educational services, public administration, information, culture and recreation, and finance, insurance and real estate sectors. Even more startling, broadband deployment promotes employment growth *at the expense of urban regions* in professional, scientific and technical services, and in business, building and other support services.

To boil that down into a few words, there are quite a few industries in which broadband confers a marked economic advantage to rural areas, and in which urban areas either see no such benefit or actually suffer a decline in job growth once rural areas gain adequate broadband services.



At ICF, we have come to believe that this trend, like the decreased need for conventional office space in the central business district, points to a future that may be very different from the present. Despite the claims of the Book of Ecclesiastes, the broadband economy really is something new under the sun.

Broadband is doing more to reduce the impact of distance than any technology before it. In the process, it is providing rural areas with opportunities never seen before. The opportunity is to plug into the world at low cost regardless of location. To affordably import the world's learning and culture to enrich the lives of young and old, and to give local cultural traditions new life in a global community. To make rural areas as vital and exciting a place to grow a business or build a career as the busiest city center. All of this is possible in an economy and culture that are conducted increasingly online.

ICF's Rural Imperative project (www.ruralimperative.com) seeks to learn specifically how ICT can ensure rural areas a vibrant economic future through robust connections to the global economy. The United Nations expects 2/3 of humanity, in

pursuit of a higher standard of living, to be urban dwellers by 2030 and the number of megacities over more than 10 million people to more than double. Is that the future? ICT may offer an alternative: a way to overcome the structural weaknesses of rural economies – distance and lack of population density and resources – compared with urban ones. If so, it could relieve the pressures driving migration to the cities and create breathing space, in which the inherent appeal of rural living could shine through.

We do not yet understand how to use ICT to seize the unique opportunities and overcome the distinct challenges of rural living. When the first commercial Web browser was released in 1994, practically no one foresaw what the Internet could become. We are at the same stage of this exciting challenge: to figure out how to give the rural areas of our nations a competitive advantage using ICT that preserves their way of life into the foreseeable future. For the first time since population growth tilted toward the city, ICT makes that possible.



Planners can make an invaluable contribution to this process of discovery. It requires, however, a new viewpoint: putting digital infrastructure *first* in the planning process. Basic economics dictate that rural areas can seldom compete with suburban and urban ones in terms of physical infrastructure and amenities. The hope for rural areas is to fill that gap with digital infrastructure, which costs so much less than highways and rail lines, office towers and convention centers. When it comes to understanding how the Rural Imperative will reshape the place we call home, planners have an important seat at the table.

The Revolutionary Community

When Intelligent Communities approach urban and rural planning, they start with a revolutionary assumption: that today's disruptions in technology, the economy and the environment will grow more, not less, intense. They also accommodate the increasingly vital need of human beings as knowledge workers, which means encouraging the mash-up of people, ideas and the unplanned elements of collaboration can occur. In rural areas, they have embraced the notion that "the middle of nowhere is no more." They believe that rural communities, if planned properly, can be just as effective and hip as SoHo in New York, the Koenji area of Tokyo or the Gangnam-gu district of Seoul. We are still in the early stages of weaving a digital infrastructure throughout the physical infrastructure of our cities, suburbs and rural areas. Intelligent

Communities recognize that, as digital infrastructure and its applications take root, they will have the most profound impact on our need for space, our use of place, how and when we move from place to place and the services we require. So planning for them becomes an exercise in encouraging continuing transformation within the physical confines of location.

In the examples studied by ICF, we find three ways in which communities are adapting the traditional disciplines of planning to the needs of ongoing revolution:

ICT That Transforms

Intelligent Communities take into account the impact of digital infrastructure on people's use of the physical infrastructure of the city or region.

ICT That Enhances

Intelligent Communities use digital technologies to create valuable services and memorable spaces that attract, inform and connect, significantly improving quality of life.

ICT That Engages

Intelligent Communities use digital tools to explain their plans, outline the future shape of the community and engage the broadest range of stakeholders in planning decisions.

In the following pages, we look deeper into each of these aspects and show how Intelligent Communities have put them to work. ■

ICT That Transforms

Planning decisions influence the spread of ICT, and the spread of ICT can have revolutionary impact on the physical future of the community. Decisions made in another era, when another type of economy prevailed, have consequences today – some anticipated, some not – that help determine whether cities or regions become technology clusters. The success of high-tech industries can, in turn, subsequently shape the conditions that planners have to work with.

Back in the Eighties, the leaders of Arlington County, Virginia in the USA made a decision with far-reaching consequences. Washington DC was planning a metropolitan transit system, and Arlington decided to involve itself heavily in the process, at a substantial cost in effort, expense and community engagement. The successful lobbying effort led to the extension of the Washington Metro through an existing commercial corridor rather than a less costly route along a future interstate highway. Once transit was in place, high-density economic growth took root around 33 Metro stations, which created a set of “urban villages” where 85% of development is concentrated in 10% of the county’s land. Surrounding them are lower-density neighborhoods interwoven with parks, playgrounds and bicycle paths.

That mix has created an enviable quality of life. Office space surrounding the Metro stations house government agencies, software companies, government contractors, research and consulting firms and a rising tide of start-up companies. The rest of the county provides high-quality housing and green spaces for recreation and relaxation.



But competitive advantages do not last forever. In the second decade of the new century, Arlington’s planning model has been challenged by further extensions of the Metro system, which have brought competing centers offering cheaper land within reasonable travel distance of Washington. The national government has also chosen to consolidate military bases and office space in order to save money, and Arlington is losing 3.2 million square feet (297,000 m²) of leased space and 13,000 jobs as a result.

To raise its competitive game, the county is investing in digital rather than physical infrastructure. It has constructed a fiber-optic network to serve governmental needs and lease “dark fiber” to meet the connectivity needs of technology firms. The network is also the backbone of a free public Wi-Fi network that the county is installing in the

urban centers surrounding the metro stations to enhance their value. Arlington has also created two high-tech economic zones for aerospace, communications, security, energy management and IT services companies. In a place that one entrepreneur says feels like a “blue collar place with white collar incomes,” the county has a business launch program which supports 72 events each year, which it claims reaches 27,000 entrepreneurs. It has significantly enhanced its arts community, with the construction of the Artisphere, one of the nation’s most imaginative performance spaces, with its own New Media Curator. Beginning in 2014, these changes will help revitalize physical infrastructure that has exhausted its original power to create a better future.

Planning for the New Economy

Whittlesea is a suburb of Melbourne, capital of the Australian state of Victoria. Like many suburbs, its economy depends on the income of commuters to the metropolis. Whittlesea’s leaders believed strongly that the city needed its own economic base, and that this required high-quality broadband. That is something generally lacking in Australia, despite its economic success, because of a history of dependence on telecom monopolies and duopolies.

Whittlesea’s solution was a classic of urban and rural planning. In 2001, City Council introduced a requirement that all greenfield developments install an underground conduit network able to support optical fiber and then transfer the asset to Council. Over the next decade, Australia’s strong economic performance created a boom in residential construction and made the Council the proud owner of more than 560 kilometers of fiber-ready conduit. The city has been able to use the existence of the conduit to attract early optical-fiber investment into new housing developments, which has given Whittlesea one of the highest penetration rates for +50 Mbps broadband in Australia. Only the Melbourne central business district has more +50 Mbps connections. The extent of this network, in turn, persuaded Australia’s National



Broadband Network (NBN) project to make the Whittlesea region a second release site, which will boost speeds to 100 Mbps.

What impact does the city expect from this connectivity? Not an inrush of top Australian or international companies fleeing Melbourne. Instead, the city is focused on raising the digital skill level of existing businesses by administering an ICT scorecard to thousands of companies and then offering training to

fill the gaps. Co-working spaces for self-employed and telecommuters are also on the development agenda.

The introduction of ultra-fast broadband, and of programs to help users turn it into economic impact, will have a profound impact on Whittlesea. They are likely to raise population growth rates as people and companies are attracted to the city, and to give a substantial boost to prosperity over time. But it will come, not in major corporate campuses or factories, but organic growth, the relocation of sole proprietors and the start-up of companies attracted by massive bandwidth and enviable quality of life. Planning will need to create an environment that supports the needs and wants of these new economic players as well as integrate ultra-fast broadband into every aspect of civic life.

The NBN is a daring and difficult effort to jumpstart a broadband economy across an entire nation, and Whittlesea's planners have an opportunity to set an example for urban and rural regions across Australia. But they are not the only ones.

Trading Digital for Physical

Far to the northeast of Whittlesea, about 500 kilometers north of Sydney, lies a coastal town called Coffs Harbour. This city of 70,000 believes in planning. It published a strategic plan called Vision 2020 in 1993, and in 2007, it updated it in a new plan called Vision 2030. The plan contains nearly 50 objectives covering the economy, education, community welfare, the environment and transportation. It promotes an increase in urban density that is pedestrian-friendly and well-provided with services, in keeping with the tenets of Smart Growth, which focuses on walkability, connectivity, a mix of residential and commercial, and the creation of neighborhoods with unique identities.

What is striking is how many of these objectives are to be met using ICT. "Develop community resilience, disaster preparedness and response mechanisms" is one. This objective grew from two major floods endured by Coffs Harbour and much of New South Wales in 2009. The rapid rise of floodwaters cut off parts of the community and inundated the sewer network, which created unacceptable health risks to its people. Analyzing the disaster and its own response, City Council identified lack of information and control systems that could withstand flooding as the biggest problems. The



city operates more than 130 sewer pump stations, which are monitored and managed over a cellular telephone network. As in most natural disasters, mobile networks were quickly congested with callers and mobile towers were frequent points of failure, which left Council guessing about which of its pumps were in jeopardy and where to dispatch resources. The solution was to create a multi-tiered communications infrastructure over optical fiber and the robust digital radio network used for emergency services, allowing what communications engineers call “failover” to backup networks.

Another objective is to “provide a full range of quality health care services for all.” The emphasis in Vision 2030 is not on constructing new facilities but on creating telehealth services operating over the National Broadband Network to reach underserved populations and those with chronic conditions. One project, “Staying Strong,” targets +50 Aboriginals and their families, and delivers remote care to homes or local telehealth service clubs. A Feros Care Telehealth pilot is testing telehealth strategies for reaching seniors with chronic health conditions who live outside Coffs Harbour’s urban center, where transportation options are limited and general practitioners are scarce. Adoption of these services will drastically change the physical footprint of healthcare delivery in ways that could be highly disruptive or highly advantageous, depending on how planning anticipates it.

Re-Orienting a City and Its Economy

Oulu is a city of 188,000 people located 200 km south of the Arctic Circle in Finland. It is the birthplace of Nokia, and has over the decades built a well-deserved reputation as an innovation center for wireless technology. The University of Oulu, public-private research laboratories, Nokia and its vendors have turned out a steady stream of industry firsts and, in 2011, the Oulu region generated the largest number of patents in Europe and had Finland’s largest per-capita expenditure on R&D.



But the region’s reliance on Nokia has proven to be a profound risk. That company’s well-publicized travails have led to thousands of job losses. In June 2012, the Oulu region had an unemployment rate of 13.4%, well above the Finnish average of 9.3%.

Oulu has had two significant responses to recession. The first has been to combine with five smaller surrounding municipalities into a larger City of Oulu, which should be able to deliver the vast array of services required of Finnish cities more cost-effectively.

Planning began in 2008 and amalgamation went into effect in 2013. Like any change to boundaries, this one has been fraught with politics. Instead of about 200 former

Council members in five municipalities, the new Oulu has just 67 Council seats. But alleviating these concerns has been strong pressure to begin delivering on the promise of greater cost-effectiveness right away. Due to job losses, municipal tax collection was expected to drop by 8%, while the cost of social services and healthcare was certain to rise, due in part to an aging population. The urgent need is to shrink the physical footprint of government while maintaining or even improving its value for taxpayers.

ICT is the platform that must carry the load. The Oulu10 Municipal Service Center now provides traditional face-to-face service for citizens as well as handling telephone and email inquiries. Supplementing these are a new Aino videoconferencing service and an expanded Citizens Portal. The Aino service, targeting seniors, provides advice on using e-government services and step-by-step help in completing online forms. The Citizens Portal provides access to 50 services through computer and mobile phone, including information, reservations for services and licensing. Every citizen registered for the Portal has a customizable profile page, access to social networking and Web-based email. One of its more successful services is OulunOmahoito, which provides 15,000 users with a personal health service for tracking diet and exercise, registering such health metrics as blood pressure and blood sugar, booking laboratory times, reading lab results and communicating with municipal health personnel. Another popular service, with 20,000 users, provides work time and attendance control for children and personnel in 70 educational institutions.

In the Oulu10 service center today, a mere 10 full-time service clerks handle over 2,500 phone/video calls, 1,500 cash transactions and 700 online portal transactions each month for nearly 190,000 citizens. With each passing year, service delivery becomes less about bringing people to a physical location and more about bringing services to people across the network.

The Planning Cycle That Never Ends

The city of Hsinchu is home to the oldest and most successful science park in Taiwan. The first-generation iPhone was manufactured there. Tenants including Acer, Foxconn, Logitech and Taiwan Semiconductor Manufacturing generated US\$36.7 billion in revenue in 2013, equal to 3% of national GDP, and gave Hsinchu the second-highest household income in Taiwan.

Until the election of Mayor Hsu Ming-Tsai, however, Hsinchu Science Park was an island, generating jobs and wages but lacking fundamental connection to the life and culture of the city. That is not an unusual pattern for such innovation centers. Mayor Hsu was determined to change that. He wanted the ethos, the excitement and the opportunity that the Science Park represents to become part of the fabric of city life.

Like Oulu, Hsinchu has invested in integrated government services: a single point of contact for services by phone, app, Web site and TV interface, with records of all inter-

actions populated throughout all relevant government databases. His administration has rolled out a GPS-based system that reports to mobile apps on the exact location and schedule arrival of buses and garbage trucks.

But none of Mayor Hsu's programs has more potential impact than the Resident Card. This city-issued card, containing an embedded chip readable by near-field scanner, replaces senior discount, student, government staff and special needs cards, and is gradually being adopted by companies as employee ID. The card links to government support services for seniors and students. Users can load money on the card, whether for transit or snacks from the convenience store, a feature that the parents of school-age children particularly appreciate. It is also used to provide social subsidies: because a poor person's card looks just like anyone else's card, it reduces discrimination. To stimulate demand for the card, the city works with retailers to roll out periodic campaigns offering 5-10% discounts for purchases made with the card.

It is a nice citizen convenience. But the real value lies not in the card but in the "cloud." The card contains only sufficient data to identify the user. Everything else – services used, where they are used and any stored monetary value – resides in Hsinchu government servers. That makes the Resident Card a source of rich, detailed data on mobility, use of facilities, social services and retail trends. By analyzing this information, the city can continuously update the assumptions that underlie planning. What bus routes are over capacity and which are losing ridership? How is the flow and timing of traffic changing? How are city services actually being used? How are different retail environments prospering? Citizens enjoy a new benefit from local government, but the more profound development is that the data they generate contributes in vital ways to decision-making about the city they live in. Rather than being static or subject to periodic update, planning in Hsinchu operates in real time to keep up with a city in constant flux. ■



Mayor Hsu presents Resident Card
to ICF's Robert Bell

ICT That Enhances

Two of the most remarkable aspects of ICT are its ever-declining price tag and ever-increasing capability. A US\$20 million Cray supercomputer of the 1980s would barely be able to run the Windows operating system that powers a \$300 laptop or tablet today.⁷ The smartphone that helps people in Toronto find the best pizza is far more powerful than the one that guided Neil Armstrong and Buzz Aldrin to the surface of the Moon 45 years ago.

This characteristic is hugely important, given what ICT is used for: to help us do just about everything faster, less expensively and more effectively. When we inject ICT into any process – provided we do it properly – we make it faster, cheaper and better, and we do so using a tool that is itself getting faster, cheaper and better year after year. That’s the underlying reason why the word “revolutionary” is justified in talking about ICT’s impact on the city, suburb and rural area as we know them.

While the interweaving of digital into the physical fabric of the city is paradigm-changing, it can also be of immense practical help. Software developers, game designers and mobile app builders have labored for decades to make digital devices into the seductive sirens they are today. And they have become very good at their jobs. Unless we consciously ration our time, we easily find ourselves bouncing from email to instant message, social network to YouTube video, Candy Crush to whatever new means to waste the precious hours of our lives is suddenly trending. Take this digital wizardry and apply it to deepening citizen engagement in their community, and you can get a powerful and positive combination that every planner needs to understand.

On the Waterfront

Waterfront Toronto is currently the largest urban redevelopment project in North America and the hoped-for solution to one of the city’s most urgent problems. Funded by three levels of government as well as the sale of prime real estate to developers, the Waterfront is revitalizing 800 hectares of brownfield shoreline with 40,000 residential units, parks and one million square meters of commercial space. Ten percent of housing is set aside for low-income residents and plans call for the Waterfront to offer a home to 40,000 new jobs in knowledge-based industries.

What’s the problem? Like many major cities, Toronto (2014 Intelligent Community of the Year) has experienced a steady decline of its urban core as growth businesses and new residents take root on its edges, where costs are lower and landscapes are greener. This trend, plus decades of underinvestment in infrastructure, have given Torontonians some of the longest commute times in the world and made traffic congestion a headline

item. In one bold stroke, Waterfront Toronto seeks to upend the outward flow and make the downtown the most desirable location to both live and work in the region.

In the broadband economy, putting up a few buildings and landscaping a few parks isn't going to get the job done, even if they do face onto Lake Ontario. The Master Plan for Waterfront Toronto relies heavily on digital enhancements to give the development truly magnetic attraction. Central to the design is a fiber-to-the-premise network delivering up to 1 Gigabit of capacity to every home, office and facility on the Waterfront. The costs are bundled into the condominium fees paid by residents – and discounted to zero for low-income residents – to remove any barrier to adoption. Blanketing the large amount of open space is a high-speed Wi-Fi network whose data rides on the underlying fiber. The development agency is working with IBM and Cisco to develop public-service applications unique to the Waterfront, which will be accessible by computer, smartphone and kiosks scattered across the property.

The network is being deployed by Beanfield MetroConnect, a competitive service provider that already serves Toronto business and institutions. What's most striking is how the Waterfront



project is affecting the overall demand for its service: customers across Toronto want to know why they can't have the same gigabit connectivity that is a built-in amenity on what has become known as the New Blue Edge.

Waterfront Toronto is a long-term project whose success will take decades to demonstrate. But when you consider the cost of the network and its services – nearly nominal when compared with the site preparation, road-building and building construction – and its enormous contribution to the plan, you see in dramatic relief the power of invisible connectivity to enhance the aspects of the city that we can see. More important, you gain insight into how Toronto will cope with an expected doubling of its population over the next two decades. Urban intensification is the only way to avoid continued suburban sprawl and even greater pressure on commuting routes. Ultra-fast broadband, woven imaginatively into the fabric of urban life, offers a way to attract and retain residents with a quality of life that outlying areas will struggle to duplicate.

The City in the Palm of Your Hand

Go to the App Store on the iPhone or Android and search for MyColumbus. Downloading this app (rated 3.5 out of 5 by users as of June 2012) will put the City of Columbus, Ohio, USA into the palm of your hand.

MyColumbus started out as a student project at Ohio State University. Students worked with the IT department of the city to identify publicly-accessible databases that could provide the most up-to-date information on city services, location of facilities and schedules of public events. They then built an app to access the data and turn it into easy-to-understand information. The city's IT department was so impressed with the result that, with the students' permission, it hired a software company to expand the app and put a professional gloss on it.

The resulting MyColumbus provides MyNeighborhood (location-based mapping and information about community resources, refuse collection and health inspections), GetActive (links to events, bike and trail guides and healthy lifestyle tips), GreenSpot (with information on sustainability) and 311 (where residents can log service and information requests). Service requests submitted via MyColumbus are resolved 3.3 times faster, on average, than telephone requests. Why? Because users can submit photos and GPS coordinates with their service requests, which helps maintenance workers show up with the right tools and materials to get the job done.



MyColumbus is so effective because of the rich data that Columbus's IT department makes available to it. The city's geographical information system (GIS) has hundreds of layers and supports applications including One-Stop-Shop Zoning, Utility Dashboard, Capital Improvements Planning, Fire Hydrants Inspection/Maintenance, and that all-important function in snowy southern Ohio, Snow Removal. The data derived from databases, sensors and GPS flows through to operations managers, planners,

businesses and citizens in a never-ending stream.

By making the city more efficient and accountable, ICT contributes something exciting and new to the quality of life in Columbus, helping to differentiate it from other midsize cities. And by putting information literally into the citizen's hand, MyColumbus changes the relationship of people to the city they live and work in.

Getting the Glow

Eindhoven (the 2011 Intelligent Community of the Year) is the capital of North Brabant province and center of the Eindhoven Region, a mix of high-tech-facilities, mid-size cities and rural villages. It is the birthplace of Philips, the lighting and electronics behemoth, and home to ASML, which manufactures more than



Getting the GLOW in Eindhoven

90% of the world's machines that produce silicon chips.

In a city that embraces technology, no effort has been spared to use ICT to enhance the lives of citizens and create pride of place. A Web-based social media tool called Digital City Eindhoven encourages residents to learn more about the city and region, and attracts a half-million visitors monthly. An online game called SenseOfTheCity allows anyone with a GPS-equipped mobile phone to create a personal map of the city and identify what they like best and least.

But it is through events bringing high-tech to the streets that Eindhoven most visibly enhances life in the region. A 12-day festival called STRP attracts 225,000 visitors with live music and dance, but also film, interactive art, light art and robotics including drone-flying competitions. At recent festivals, the University of Eindhoven's High-Tech Campus has hosted Night of the Nerds to educate citizens and visitors on the latest technology. An installation created a virtual forest of hundreds of laser beams that responded to the slightest movement of visitors. A Walk With Me app connected sound clips, video and texts to specific geographic locations around the city.

GLOW is another festival that specifically celebrates Eindhoven's history as the birthplace of the Phillips lighting division. The center of the city of Eindhoven is transformed for 10 days into an open-air museum of design in light for 65,000 visitors. The buildings, plazas and sidewalks of the central business district become a playground of light and color that responds to visitors, allowing them to shape the experience for others as well as themselves. Apps for the iPhone and Android lead visitors from installation to installation and let them post their reactions to social media.

Festivals like STRP and GLOW come and go, leaving behind no permanent imprint. But because they use the physical structure of the city as their canvas, they change how citizens and visitor relate to that structure, imbuing it with connection and meaning that is otherwise missing. The contribution to the life of the city and region are not easy to measure but Eindhoven seems to consider the investment highly worthwhile.

Finding the Hot Spots

New Taipei City (NTPC) became the nation's most populous city with its official creation from the county surrounding the nation's capital in December 2010. With amalgamation came large-scale investment in new infrastructure. New highways and transit lines are being built to connect the city's urban districts and more than 1,000 villages. The city and national government are installing more than a thousand kilometers of conduit, which is encouraging service providers to install fiber-to-the-premise networks, and more than 1,800 hotspots provide free Wi-Fi in city facilities, parks, tourist areas and ferries.

But NTPC's most impressive form of enhancement using ICT is behind the scenes. The city's Research, Development and Evaluation Commission has introduced a system called Hot Spots Analysis. It draws on posts to the city's Web portals, the logs of the emergency response center, and traffic on social networks to identify issues raised frequently by citizens that are not being properly addressed. Monthly meetings of the heads of all city departments review known and new Hot Spots and determine what actions the city should take to solve them. Going one step beyond, the decision-makers examine *why* the problem was not being addressed: whether a single agency was at fault or the issue was one that crossed over the boundaries of multiple agencies. Each Hot Spot is developed as a case, from identification of the problem to solution to the lessons learned, and each case becomes an online reference document accessible to both government officials and citizens.



NTPC Emergency Management Center

In one example, citizens repeatedly flagged a problem on express buses bringing commuters into the city: the lack of enough capacity to handle rush hour passenger traffic. Investigating the issue, the city found that its own regulations prevented the buses from loading more passengers than they had seats for when the buses would be traveling on freeways at high speed. The city was unwilling to relax this safety regulation, so it instead negotiated with the bus companies to offer a different service: shuttle buses operating on routes that connected outlying areas to train stations. This encouraged more passengers to take the train, which in turn reduced rush-hour wait times on the express bus routes from an average of 20 minutes down to less than 10.

The city also noted a high level of complaints from its indigenous citizens about receiving education subsidies for their children on time. It did not take long to identify the responsible agency. The Commission ordered the agency to standardize its processes, eliminate unnecessary paperwork and establish deadlines for turnaround. Processing time quickly dropped from an average of 35 days to only 15 days.

There is nothing sexy about these ICT-based applications: no illuminated buildings, steps masquerading as piano keys or cool apps for your smartphone. Quietly and consistently, citizens receive better services. The city addresses its real problems and avoids unnecessary investment in services or infrastructure in the process. Sometimes the most powerful enhancements are the ones that nobody sees. ■

ICT That Engages

There is a third way in which ICT is revolutionizing how communities plan and what those plans take into consideration. Because ever-cheaper, ever-more-powerful ICT has become part of most citizens' lives, it has become a means to engage them in decision-making about the community's future.

It is a profound change. Far too often, the only citizens truly engaged in planning are those most passionate on particular issues or those with the most time on their hands. Neither is likely to truly represent the interests of the population or to understand why change is needed to adapt to a dynamic global economy. The more broadly planners and elected leaders can engage the people who live in a community, the more successful their work is likely to be. It is the age-old mystery that underlies democracy: a large crowd lacking expert knowledge will typically make better long-term decisions, particularly those affecting their own future, than a small group overloaded with expertise.

It is worth turning to some of the cities and regions already mentioned for examples of this third aspect of the Revolutionary Community. Having pioneered in transforming and enhancing the planning process, it is no surprise that they lead in engagement as well.

How to Engage

In Hsinchu, where Mayor Hsu works to break down the barriers to understanding and engagement that separate the Science Park from the rest of the city, ICT offers one solution. City government has partnered with the leading companies in the Science Park to forge a unique means to encourage volunteerism in Hsinchu.

They created an online platform that allows volunteers to register their availability and interests, which then matches them to programs that need them, from help for single mothers to tutoring for low-income children, acting as docent at cultural sites to environmental projects. Volunteerism is vital to Hsinchu, the Mayor believes, because its working-age people – male and female, affluent or poor – work long hours. They need the help of the community to balance that work ethic with the needs of their families and their own mental and emotional health.



Hsinchu Science Park

More than 12,000 citizens of all ages have registered on the site, which is no small testimony to its ease of use. Companies in the Science Park, led by Taiwan Semiconductor Manufacturing, strongly encourage their employees to participate. In addition to registration and matching, the platform manages time commitments and volunteer staffing, which creates a continuing log of each volunteer's activity. Volunteers receive points based on the number of hours worked, which can be traded for credits or benefits on the Resident Card system, and are also honored through community recognition. By combining efficiency, simplicity and incentives, the volunteer platform demonstrates how to use ICT to get the most citizen engagement for the least cost and effort.

Modernizing “The Arlington Way”

Arlington County in Virginia USA has long been proud of something it calls “The Arlington Way.” This is a tradition of civic engagement that would be the envy of most cities or counties. The formal structure of the “Arlington Way” includes over 40 Citizen Advisory Groups and Commissions, appointed to the association by the County Board and School Board through an open process in which any individual may volunteer. They advise the County Board on everything from planning, transportation, parks and recreation to IT systems, public art, environmental programs and the aging. The County also has 72 different task forces, overseeing a range of issues, most of which relate back to economic development, including “embedding” an Arlington Economic Development person inside an advanced research institute at Virginia Tech.

It was The Arlington Way that made possible the successful lobbying effort that extended the Washington Metro along an existing commercial corridor and created the county's pattern of urban villages surrounded by suburban and open space. But the tradition is under siege, partly as a result of the county's success.

Arlington County has succeeded in attracting great numbers of highly-educated young people to drive its economy. They are, however, a restless demographic group. Arlington has population mobility more than twice the US average and population turn-



over higher than that of any other community in the Washington DC region. A transient population is at odds with the long-term thinking and community cohesion that has powered The Arlington Way.

Arlington's leadership has concluded that the traditional methods of civic engagement – public meetings and hearings – are no longer enough. Fewer people have time and interest enough to attend such meetings, particularly among the young and ambitious population so central to the county's economy. They

are more likely to post an opinion to a blog or social network than share it in a public meeting at 9:00 pm on a Thursday night. So Arlington has developed an E-Government Master Plan to bring The Arlington Way of engagement into the 21st Century.

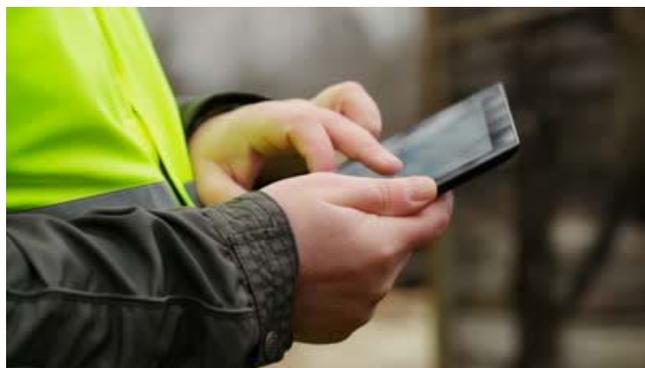
The Strategy seeks to use apps, Web portals and social media to completely redefine the County's interactions with constituents, and to build a new ICT service delivery model based on the needs and convenience of residents rather than government departments. An early example is a project developed with Virginia Tech and IBM. Called Yellow Button, it is an iPhone application that solicits and collects input on public issues anywhere and at any time that users want. By moving community engagement from the physical to the digital, it vastly expands the potential for meaningful connection.

Putting Planning Online

City Council in Coffs Harbour, Australia, is piloting two programs that aim to streamline the often-complex planning process in the same way automated teller machines streamlined banking for the average customer.

The Electronic Housing Code program was introduced by the state of New South Wales to improve the handling of environmental compliance certificates for new property developments. Users reach the EHC platform through the City Council Web site, select the Coffs Harbour region and find tools that help them determine whether their proposed development qualifies as an "exempt or complying" project. Using funding from the state government, Coffs Harbour purchased tablets that allow its building assessment officers to access maps, management records, property records and email while making field inspections.

The Digital Local Government Program is a national project that the Council has taken live in Coffs Harbour. Working with a software consultant, the city developed customized modules that interface with data in the national system and provide online application tracking and customer service by email and videoconference. The resulting platform handles every aspect of approvals for property development, from pre-application to application, tracking to assessment. There is even an electronic approval stamp for applications and plans. Users can track the progress of applications, view documentation such as master development plans and submit inquiries about the regulations that may apply to their projects.



For Coffs Harbour, these programs are the first steps in creating a comprehensive ePlanning system that aims to reduce the delays, friction and frustration of the approvals process for development while improving compliance with Council policies. By choosing to share information rather than bury it in file drawers, and by empowering developers to self-serve, ePlanning reduces the barriers to engagement without adding to the risks of “regulatory capture” – that unsavory state when the regulated grow too close to and exert too much influence over regulators. And in simple, practical terms, ePlanning reduces trips to city offices, time spent waiting in line, time spent serving the people waiting in line, copying and filing documents and fielding inquiry calls to the planning office. Both citizens and government come out ahead. ■

The Revolutionary Community

This white paper has argued that Intelligent Communities are taking a revolutionary approach to planning their futures, so that they can respond flexibly and fast to the continuing disruptions to be expected of the 21st Century. Like most revolutions, it is driven by necessity and the understanding that there is no choice but to change. Planning among Intelligent Communities is not a new formula, something to take the place of the New Urbanism or Smart Growth, but a rising tide of individual actions that are producing changes that make life better, even as the direction of the future economy remains unclear.

Truly revolutionary communities use the tools and capabilities of ICT to develop strategies in collaboration with citizens and institutions, and to implement and manage the opportunities that result. These include crafting an environment that attracts talent and creativity, creating memorable and inspiring places, reducing the friction of daily life and offering services of a quality found nowhere else. They exploit to the fullest extent the core power of ICT: to eliminate distance as a barrier, minimize physical constraints and overlay the broadband economy, with its rich data and instant transactions, on the physical economy. Since so much of traditional planning concerns distance, physical constraints and the physical economy, tied to decades of legacy behavior, it is no wonder that ICT demands of the profession a new outlook and expanded toolkit.

Intelligent Communities have become the best places to experiment with social change and solve the biggest problems, from the erosion of the middle class to environmental issues. If achieved within the context of a community-spirited transformation, this can be exciting for its culture, heritage and traditions. This is what the Intelligent Community Forum stands for – and it is what good urban and rural planning are all about. ■

The Authors



Robert Bell is co-founder of the Intelligent Community Forum, where he heads its research, analysis and content development activities. He directs the multi-stage analysis of communities for the annual Intelligent Community Awards program and is the lead author of ICF's research. Robert developed and leads the Intelligent Community Master Class and Community Accelerator programs, as well as ICF's advisory services for communities, and is a frequent speaker at municipal and telecom events.



ICF co-founder John G. Jung originated the Intelligent Community concept and continues to serve as the Forum's leading visionary. Formerly President and CEO of the Greater Toronto Marketing Alliance and Calgary Economic Development Authority, he is a registered professional planner, urban designer and economic developer. He leads regular international business missions to US, European, Asian, Indian and Australian cities, and originated the ICF Immersion Lab program. John is a regular speaker at universities and conferences and serves as an advisor to regional and national leaders on Intelligent Community development.



Louis Zacharilla helped found the Intelligent Community movement. The developer of the Intelligent Community of the Year Awards program, Louis helps the New York-based think tank communicate the importance of developing viable and innovative communities to audiences worldwide, and oversees the new Institutes for the Study of the Intelligent Community Forum. He is a frequent keynote speaker and a moderator at conferences and events. He appears regularly in the media to discuss the impact of broadband and access technologies on the rebirth of the world's communities and has written hundreds of articles and blogs on the subject.

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NOTES

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