THE MISSING PIECE: VOICE OF SMART CITY CITIZENS

FROM PUBLIC-PRIVATE PARTNERSHIPS TO PUBLIC-PRIVATE-CITIZEN PARTNERSHIPS

MARKET ANALYSIS

Alcatel·Lucent

AT THE SPEED OF IDEAS™

ABSTRACT

The smart city concept recognizes information and communication technologies as drivers of economic competitiveness, environmental sustainability and general livability. The challenge for governments, private industry, non-governmental organizations and other stakeholders is to determine collectively how to realize a smart city vision that meets their needs and accords with their local values. The Alcatel-Lucent Market and Consumer Insight team explored this and other key questions, ultimately determining that while partnership is critical, traditional public–private partnerships are not fully equipped to execute smart city initiatives. A third player is essential to the mix: the citizen.

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MAKING CITIES SMARTER

What makes a city 'smart'? While technology is an essential part of the answer, it is only part. The concept of the smart city is really a framework: a way to fulfill a vision of modern urban development that can vary profoundly from place to place.

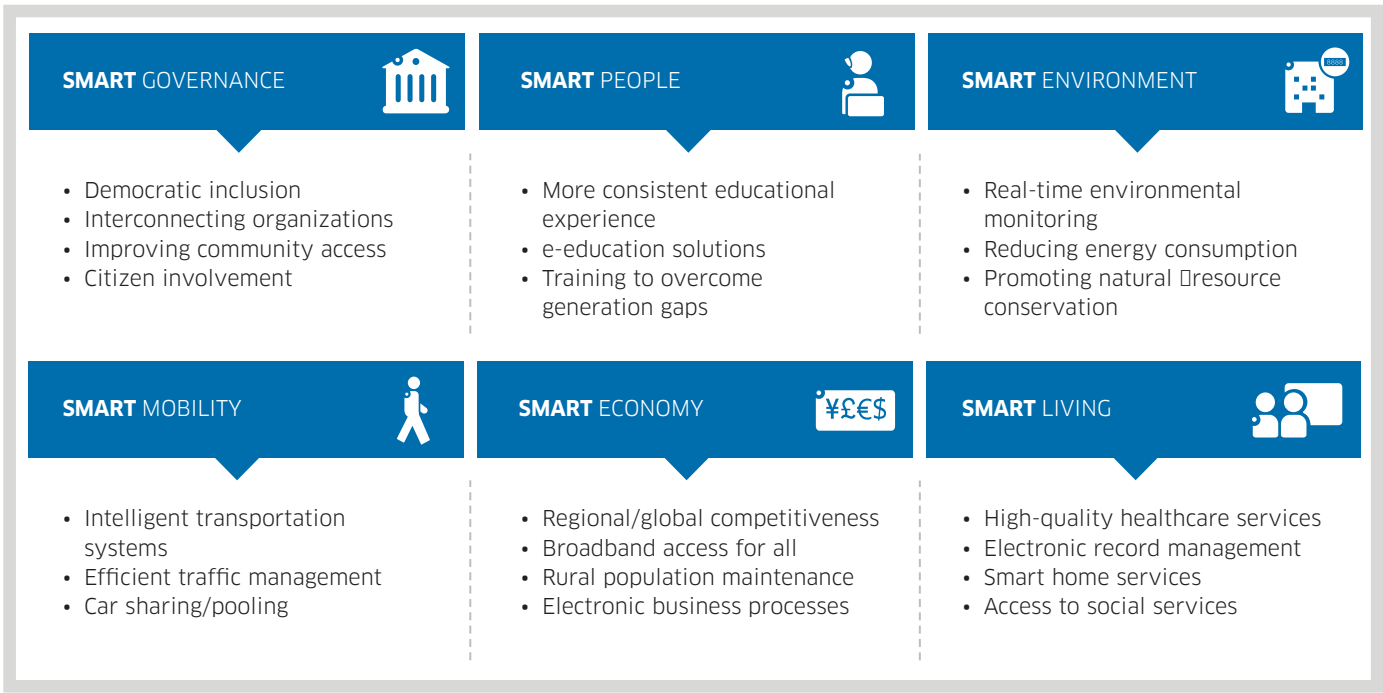
That's why no two smart cities are bound to be exactly the same — just as no two traditional cities are. Culture, economy, geography, history… all of these shape the vision of what 'smart' means in any specific context.

What's common, however, is the notion that 'smartness' enhances virtually every dimension of city life: from democracy, healthcare and education to the economy and environmental sustainability. The challenge for governments, private industry, non-governmental organizations (NGOs) and other stakeholders is to collectively determine how to realize a smart city vision that meets their needs and accords with their local values.

"I would say a smart city is a city that focuses on producing results for the citizens. It puts collaboration first and doesn't worry about who gets the credit."

JED MARSTON, CHATTANOOGA, TENNESSEE

Figure 1. The potential impact of the smart city concept



In 2011, researchers from the Alcatel-Lucent Market and Consumer Insight team set out to better understand the drivers behind smart city projects around the world, and to identify best practices for implementation. That study eventually zeroed in on four cities: Chattanooga, Tennessee; Zurich, Switzerland; Wuxi, China; and King Abdullah Economic City, Saudi Arabia.

A key finding — and the focus of this paper — is the fact that traditional public-private partnerships are not fully equipped to execute smart city initiatives. They are missing one critical element: the voice of the citizen.

A TALE OF FOUR CITIES

It would be difficult to think of four cities less alike than the ones at the center of the Alcatel-Lucent smart cities research project: a former manufacturing stronghold in the American south; a European capital; a Chinese 'megacity' whose history stretches back to the 11th century BC; and an industrial port being built on the edge of the Red Sea.

The differences between the four were, in fact, vital to the exercise. As mentioned previously, being a smart city does not mean being one particular kind of city: it's about applying smart principles in ways that suit the local economic, social and cultural context. For this study, it was important to see just how different the cities' smart visions could be — and to identify, despite those differences, shareable best practices for making the visions real.

The cities in brief

Chattanooga, USA

Once known as the 'Dynamo of Dixie' for its thriving manufacturing sector, decades of heavy industry earned Chattanooga a new nickname by 1969: 'The Dirtiest City in America'. But Chattanooga's civic leaders resolved to reinvent their city, first through a focus on environmental cleanup and, more recently, through strategic investments in high-speed broadband infrastructure. The result? Chattanooga is now known as 'Gig City, USA', boasting the fastest Internet in North America. The process by which it got there — involving public-private partnerships, strong support from NGOs and citizen engagement — has come to be called the 'Chattanooga way'.

Zurich, Switzerland

Zurich is Switzerland's largest city, widely regarded as prosperous and modern. Yet it faces many of the same challenges as other urban centers, including shifting economic conditions, space constraints, limited environmental resources, demographic changes and the technological pressures of the knowledge economy. In 2008, concerns about sustainability led citizens to vote in favor of becoming a '2000-watt society' by 2050. This concept calls for communities to consume only as much energy as global reserves permit, with acceptable impact on the environment.[1] Achieving that goal will require a wide range of smart city features, from green electricity to sustainable buildings and adaptive traffic-management systems.

[1] City of Zurich. (May 2010). *2000-watt society: Together towards a balance.*

Wuxi, China

The birthplace of Chinese light industry, Wuxi has its eyes fixed firmly on the future. Its leaders are determined for Wuxi to become China's 'IOT city'. IOT stands for 'Internet of Things', a concept that describes a kind of hyperconnectivity in which people, devices and systems interact seamlessly. Top IOT and smart city research institutions have established R&D centers in Wuxi, and the city has instituted IOT professional training at both the Chinese Academy of Sciences and Wuxi Jiangnan University. To realize its vision of becoming a smart IOT city, Wuxi now needs to focus on cultivating administrative capacity and public-industrial partnerships, and on enhancing its urban infrastructure to provide a consistently solid foundation for 'smart' applications.

"You can make arrangements for all aspects of your life: wake-up calls, getting to work, activities for weekends. All this needs the communications network."

A YOUNG MOTHER-TO-BE, WUXI

King Abdullah Economic City, Saudi Arabia

King Abdullah Economic City (KAEC) is a new smart city being built from the ground up. It includes a seaport, industrial valley, educational zone and central business district as well as resorts and residences. Announced in 2005, the city has been planned to accommodate two million people, and offers the attractions of a smart lifestyle and deliberately sustainable ecosystem. KAEC represents a unique example of a 'greenfield' smart city development: what do citizens want from a smart city when there's the chance to build one from scratch? As a companion to KAEC, the study also looked at King Abdullah University of Science and Technology (KAUST), a campus 20 kilometers to the south that is being endowed with smart features.

"I knew about smart cities from online advertisements and they are really amazing, so I think we should build the best one ever and bring new ideas."

AN ENTREPRENEUR, SAUDI ARABIA

Four kinds of initiatives

From its study of dozens of cities around the world, including the four described above, Alcatel-Lucent determined the desire to 'go smart' is usually motivated by social, environmental or economic aspirations — often in combination.

Chattanooga, for example, wanted most strongly to revitalize its economy, with social and environmental aims secondary. For Zurich, the environment was top of mind, complemented by societal goals.

Separate from what motivates them, Alcatel-Lucent also found that cities take one of four basic approaches to carrying out smart initiatives. Each of these involves some form of public-private partnership (PPP) made up of a complex ecosystem of players: service providers; engineering procurement companies; enterprises in key verticals such as transportation, healthcare and education; city planners; real estate developers; non-governmental organizations and others.

The four categories, or 'boxes', of smart projects are:

1. The IT box

Cities in this category focus on achieving IT excellence, with management and significant funding of smart projects coming from private companies.

2. The dream box

In these cases, cities undertake turnkey smart city projects as part of wide-ranging plans. These are carried out by public-private partnerships with important contributions from and management by the government.

3. The fragmented box

Here, various smart city projects are carried out independently versus being integrated into an overall plan. Chattanooga and Zurich fit into this category.

4. The black box
These types of smart city projects are led and managed by governments within a closed ecosystem; private companies are invited to contribute. Wuxi and KAEC/KAUST fit into this category.

Alcatel-Lucent noted that one essential element was absent from much of the research and discussion on smart city development: the voice of the citizen.

WHY THE CITIZEN'S VOICE MATTERS

The citizen's perspective is important because it is ultimately people who will live and work in a smart city. If the features and amenities of the city don't speak to the ways people want to live their lives, all the 'smart' in the world will be of little practical value.

Analysts, planners, IT companies and other experts tend to define a smart city in terms of its infrastructure: high-speed broadband, wireless and Wi-Fi connectivity, the cloud, sensor networks and the like. All of these are important enablers of a smart city, supporting a range of flexible, intelligent services such as smart metering, enhanced traffic management and emergency response systems.

Yet when citizens were asked as part of the Alcatel-Lucent research project to define a smart city, they tended to talk in terms of a general spirit of innovation and creativity that could be brought to bear on various aspects of their lives. One respondent in Chattanooga put it simply that 'smartness' equals happiness.

Awareness of smart cities

In all four focus cities of the study — Chattanooga, Zurich, Wuxi and KAEC — citizens generally had low awareness of the smart city concept. In Zurich, for example, few had heard the term "smart city", though some had a sense of the ideas behind it because of professional involvement with components such as the '2000-watt society' goal or remote meter-reading technology.

In Wuxi, people had heard the phrase "smart city" occasionally in the media but could not give a clear or complete definition. They did, however, have a few specific impressions about it: one, that a smart city involves applications such as smart homes, intelligent transportation and telemedicine; and two, that intelligence, convenience and security are meant to be part of the smart city user experience.

Of course, citizens should not have to be fully informed experts on the subject of smart cities for their opinions and aspirations to be regarded as valid. After all, few residents of any major center would be qualified to manage the urban transit system, yet public opinion is routinely considered when major changes to such systems are on the table.

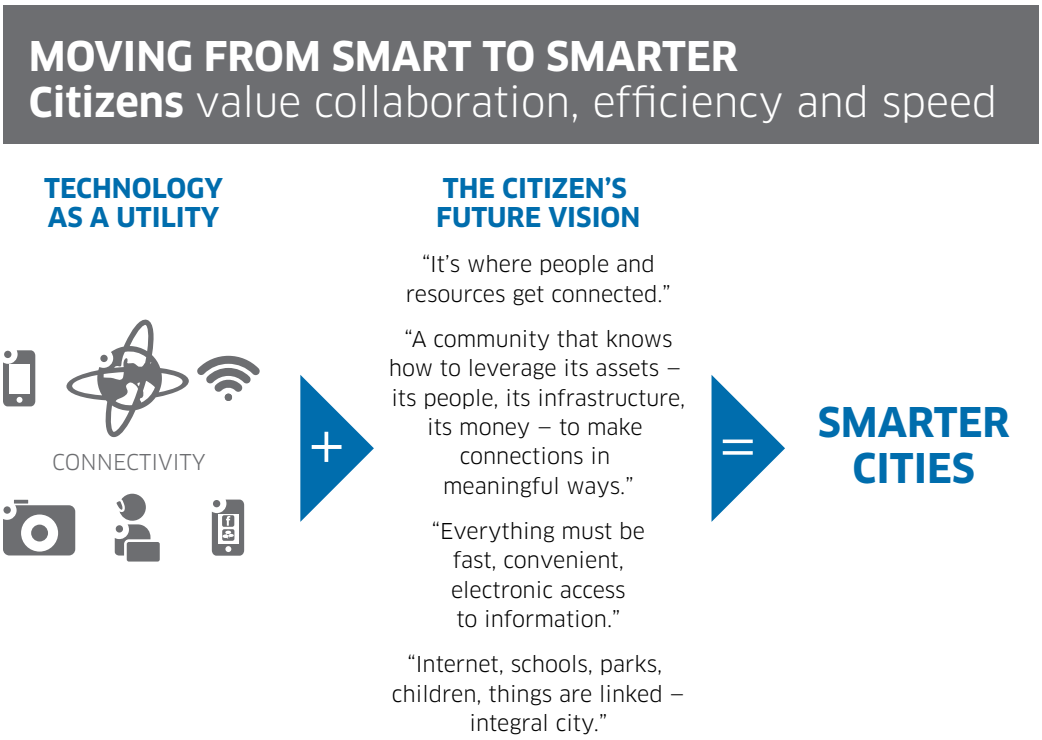
Including the citizen's voice in smart city initiatives gives project authorities an understanding of the community values that have to be reflected. In Chattanooga, citizens repeatedly talked about innovation and creativity, collaboration and technology as being key to a smart city. They recognized economic development opportunities and greater quality of life as potential benefits of 'smartness' as well.

BROADENING EXPOSURE TO SMART LIVING

Awareness of their city as a "gig city" is high among citizens of Chattanooga – in part thanks to the establishment of open community forums for people to participate in and contribute to. Yet several citizens Alcatel-Lucent spoke to were aware that more needs to be done to include and engage the a wider swath of their fellow citizens. Some noted that residents of the city's housing projects have very basic needs for safety, security and food that smart living could help meet – and that the kinds of smart initiatives required to benefit them deserve special consideration.

Citizens generally tend to view information and communication technologies (ICTs) as drivers of these kinds of benefits. Technology, in the smart city context, is a utility, and includes full array of networked devices and infrastructure the world has come to depend on. ICTs have the power to increase economic and political efficiency, enrich societies and cultures, and improve citizens' quality of life.

Figure 2. Technology as a commodity



Beyond the material characteristics of a smart city (connectivity, efficiency, etc.), study participants identified some less tangible qualities as well. Some Chattanoogans, for instance, said a smart city is one capable of compromise and of learning from its mistakes. (This would certainly be a relief to city leaders under pressure to justify spending on projects that are not necessarily producing desired results.) Citizens also put a high value on practicality versus 'intellectual' exercises that could not be implemented in businesses or homes. In other words, citizens wanted to be able to validate and experience the benefits of a smart city themselves.

Engaging citizens in the smart city process along with municipal leaders, developers, investors, NGOs, tourism bureaus, chambers of commerce and other stakeholders helps strengthen buy-in. Citizens feel some ownership of the vision: they see that it's relevant and want to enable its success. In Chattanooga, the local utility company, EPB, won customers away from well-known national service providers by demonstrating its involvement in, and commitment to, the smart city vision.

THE ENGINE OF THE SMART CITY

Fundamentally, a smart city depends on ubiquitous connectivity. Individuals, companies, governmental and non-governmental organizations, educational institutions, healthcare and public safety providers, utilities, and even municipal assets such as buildings, sensors and devices must all be able to interact seamlessly, in real time, to share data and content.

The local broadband network becomes, in a very real sense, the 'brain' of the smart city. It houses a range of network capabilities that can be accessed by organizations in support of various public and commercial functions such as content delivery (e.g., movies, TV, music, games), social services (e.g., e-health, educational services) and transportation (e.g., traffic management, train signaling, parking systems). And it fosters an ecosystem in which developers can create new, more innovative services and applications that will provide even greater benefits to ordinary citizens and the business community alike.

Today's urban centers, both those that are fully developed and those that are emerging, have lattices of networks at their disposal: fixed and mobile broadband access systems; optical transport and metro networks; and private business, educational and governmental networks. These networks can be made smarter by outfitting them with advanced instrumentation and employing more finely tuned management and control capabilities.

They can also be more efficient and less costly to operate (and less power-hungry), if they are retooled to ensure that every service or application receives the bandwidth it uniquely needs at the absolute lowest cost per bit. The infusion of greater intelligence not only makes networks easier to manage but also allows them to support the rapid creation and delivery of new services.

Finally, if they are to enable the delivery of city services, these smart city networks have to provide all the stability, resilience and security of standalone telecommunications networks.

FROM PPP TO PPCP: HOW TO ENGAGE CITIZENS

What citizens really want — and what benefits smart city stakeholders most — is true involvement, not perfunctory consultation. True involvement means the communication loop is closed: citizens receive feedback that they've been heard. It also brings the opportunity to take part in activities that help prove out smart innovations. Citizens want to experience the practical application of 'smartness' to their daily lives.

These desires suggest citizens should be integrally involved in smart city initiatives. Yet typically those initiatives are led by public-private partnerships that don't naturally offer a role for citizens. Instead, as contractual agreements between public agencies or public-sector authorities and the private sector, PPPs concentrate on inviting greater private participation in the delivery of public services. The partners share risk, reward and responsibility — and reap the returns on a shared investment.[2]

[2] Akkawi, A. (November 2010). *PPPs as policy instruments*. Presentation to INSEAD.

For citizens to be included, the model has to change — from PPP to PPCP. One fundamental question is how to get citizens engaged, especially when they don't fully grasp the smart city concept to begin with.

Traditional engagement mechanisms include votes and referenda, city planning and visioning consultations, field trials and other government-led initiatives. These were all familiar in both Chattanooga and Zurich, two cities that have long, rich histories of citizen involvement. Wuxi and KAEC have deployed e-government portals to more actively engage their citizens.

Alcatel-Lucent research found that traditional engagement models are being upgraded, made smarter in keeping with the smart city ethos. Citizens in KAEC and Wuxi were especially supportive of adding channels such as face-to-face meetings, instant messaging options and city hotspots that enable 'anywhere, anytime' engagement.

Engagement strategies in action

Chattanooga

In the mid-1980s, city leaders in Chattanooga realized something had to change — urgently — if the city was to reverse the decline that had been gripping it over the past decades. Strategic investments in public-private partnerships, citizen engagement, strategic planning and visioning projects all helped turn the tide. Chattanooga in fact became one of the first U.S. cities to effectively use citizen visioning to set specific long-range goals. These activities, combined, came to be known as "the Chattanooga way".

Leaders continued to to build on this citizen involvement as they worked with the city-owned utility EPB to upgrade to smart grid and high speed broadband.

As part of its smart city endeavors, Chattanooga established several informal citizen-participation channels, including bi-weekly "intentional conversations" between citizens, real estate developers and representatives of the local energy utility and Internet provider, EPB. This collective would gather to share views on what makes Chattanooga smart.

EPB also trained employees to go into the community to discuss smart grid plans and triple-play Internet services (i.e., combined voice, data and video), soliciting citizens' views on whether or not the city should pursue its high-speed Internet project. (The answer was a fairly resounding 'yes'.)

One particularly interesting method of citizen engagement was the launch of the 'Gig Prize', a contest that aimed to stimulate innovative ideas about how to use the technology the city had deployed. App developers, entrepreneurs, students and others brought forward proposals that were then put to the community to decide which had the most merit.

Zurich

Citizens may not always appreciate the importance of their role in the development of their smart city. This is the case in Zurich, where the populace tends to see the city government, utilities and NGOs as the crucial stakeholders. While they are open to participating in smart city ventures by testing products and services, they are protective of their time and family commitments and ultimately place unconditional trust in their government to define and execute smart projects.

HOW MUCH 'SMART' DO PEOPLE WANT?

For citizens, services are the key to experiencing the value of a smart city. They see infrastructure as necessary but not as the differentiator, value driver or revenue generator. As Alcatel-Lucent's research in Chattanooga and Wuxi revealed, when the potential services resonate with citizens – aligning with their needs, values and vision of what their city should be – many said they would be willing to pay for them: in Wuxi, as much as 30 percent of their incomes.

"Knowing how to leverage your assets is the key – whether it's people, money, infrastructure or technology."

AN ENTREPRENEUR, CHATTANOOGA

The government and other stakeholders, however, recognize that citizens should be involved in smart city development — and, importantly, be encouraged to bring 'out of the box' thinking to the initiative.

To promote such involvement, Zurich introduced outreach activities such as Environment Day, Cycle Zurich 2025 and Zurich Multimobile, which provided forums for communicating about initiatives and prompting participation. Cycle Zurich 2025, for example, hosts conversations between researchers, scientists and citizens. The most important aspects of smart city development were, not surprisingly, those that had the deepest impact on people's personal lives. Despite the general reluctance to get involved, citizens in Zurich did express interest in going beyond testing smart grid services to be involved in idea generation.

"Citizens have to be motivated – and they're motivated when they get something from the process."

AN ENGINEER, ZURICH

Wuxi

To date, government has more or less driven Wuxi's smart initiatives. Public engagement is still something that needs cultivation. Analysts have suggested a model for that engagement — one that might work equally in other jurisdictions as well.

As a starting point, it has been proposed that neutral research organizations, media, civil organizations, traditional communities and cultural organizations should be allowed and encouraged to help study, advocate and design modes of public participation and collaborative governance in Wuxi. Together, these groups can participate in a dialogue about how to apply Wuxi's IOT ambitions to matters of daily life in the city.

"The ordinary people shall respond to the government's call and get actively involved."

A STORE MANAGER, WUXI

Knowledge organizations could work out a framework for cooperation based on what researchers call the 'cultural diffusion model', leveraging the customs of the local community to stimulate active engagement. Civil, volunteer, non-governmental and semi-official organizations could then work within such a framework to determine the smart city applications best suited to different regions and citizen needs. Academic research on communities, residents, information technology, environmental protection and urbanization could then be carried out and fed back to enterprises and government, with the media and other knowledge institutions having the task of disseminating information to citizens.

Such a process would reveal opportunities for cooperation and engagement across all segments of society, including the general public. The interest is definitely there: helping elderly or handicapped residents was top of mind for Wuxi citizens, for example. The task before Wuxi today is to turn this process into an operational reality.

"Easy access to information, a more efficient way of doing things and mobile for a better lifestyle – this will depend on what technology can provide."

AN ENTREPRENEUR, SAUDI ARABIA

KAEC/KAUST

Saudi Arabia's exploration of the smart city concept began in 2005 with purely private investment. Each city has a developer and a landowner (such as the group EMAAR in King Abdullah Economic City). After the recession of 2008, the private sector could no longer continue the smart city project alone; the Saudi Arabian government has therefore embraced the PPP model. (That being said, one stakeholder calls it "a reverse PPP, where the government is pulled into private-sector projects.") Given this, the citizen's role in creating Saudi smart cities — especially the greenfield cities of KAEC and KAUST — has been mostly reactive, with online portals giving residents the ability to interact with city developers. Citizens hunger for more involvement in strategic visioning and long-term planning.

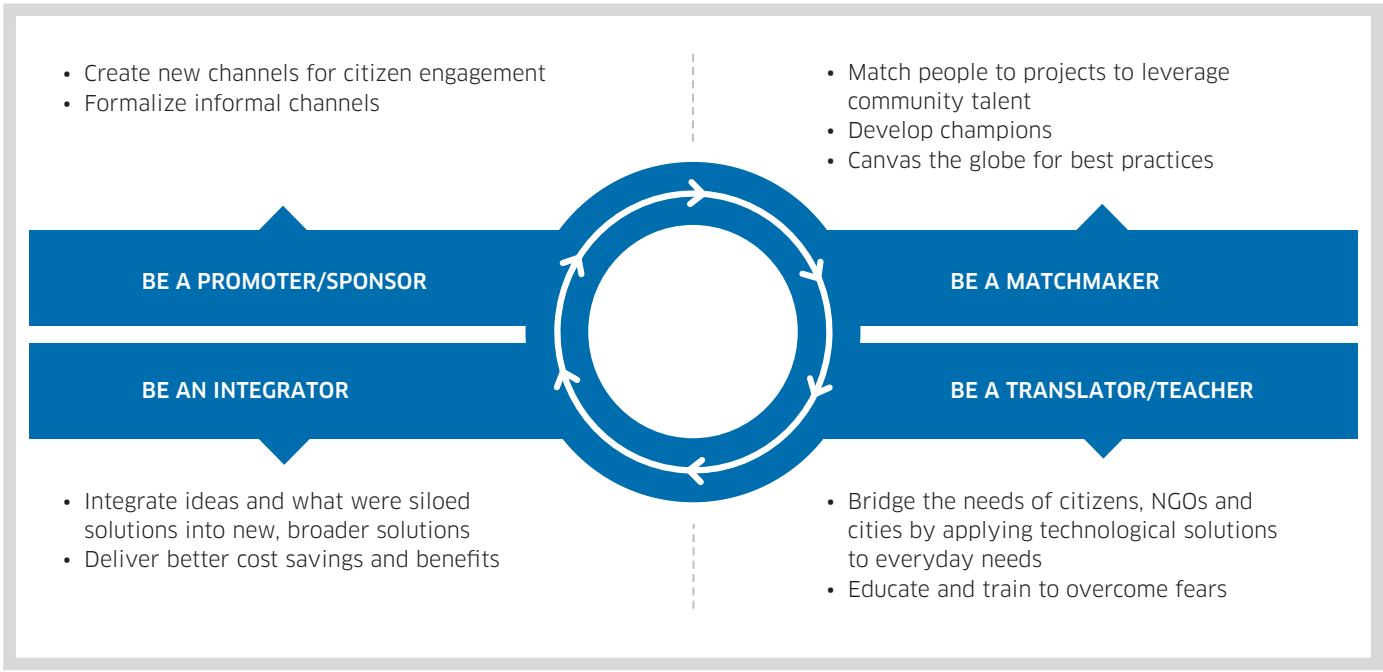
New models, new roles

Creating a variety of informal channels suited to the specific needs and preferences of the community seems to be an effective way of sparking interest in smart city projects. Once informal channels become well used and familiar, they can be formalized to facilitate greater, ongoing involvement. An example of this comes from Chattanooga, where the utility provider EPB trained employees to gather ideas from the community, then formalized those channels as part of its overall customer experience approach.

People in all four cities said they would welcome 'smarter' engagement models that would give them a voice in local smart initiatives. They also looked to NGOs to promote smart city projects and engagement channels — a role that could be shared with industry players such as IT service providers.

This notion of roles is important. Implied in the need to move from PPP to the PPCP model is a change not only of outreach method but also of the roles stakeholders have to play. Government agencies, NGOs, service providers, engineering procurement companies and other businesses can all facilitate the cycle of engagement by taking a more active role, serving as promoters, matchmakers, teachers and integrators to varying capacities and degrees, as their expertise allows.

Figure 3. Stakeholder roles in smart city engagement



TAKING THE SMART CITY CONCEPT FORWARD

Smart cities may hold the key to the prosperous, sustainable future of the world's urban centers. Using technology as a platform to develop and deliver services that increase public safety, expedite governance and enable economic opportunities, smart cities promise to bring wide-ranging improvements to citizens' quality of life.

Citizens appreciate the potential benefits, even if they don't possess a technical definition of what exactly a smart city is. In all four of the cities surveyed by Alcatel-Lucent, people voiced their expectation that 'going smart' would give their government leaders the tools to break down silos between departments and deliver new services.

Examples of such services abound. In Saudi Arabia, citizens said they appreciated the ways e-government is changing their daily lives by enabling online applications and approvals for tasks that used to consume hours of time in queues. And the people of Chattanooga are reaping the collective benefits of a smart lighting system that doubles as rain gauge to control flooding, and also acts as a sniffer for chemical spills or other disasters.

Citizens have to play a central role in the PPP process if the other smart city stakeholders want to confidently identify opportunities, secure buy-in for new initiatives, effectively pilot solutions, and ensure uptake that will deliver a meaningful return on their cities' smart investments. This citizen involvement effectively produces a new partnership model: the PPCP.

When communications service providers take an active role in such partnerships, they not only stand to contribute to the realization of the smart city vision but also to reap the benefits of obtaining new enterprise and consumer customers. The time is now to step up proactive involvement in smart cities rather than wait for cities to upgrade their aging infrastructures.

As well, service providers can use the technologies at their disposal to help foster citizen engagement — enabling online dialogue and impromptu contribution.

Cities adopting smart solutions are already realizing billion in economic growth — and shaping new identities to attract residents and tourists. Municipalities, utilities, public service providers, communication service providers and citizens all stand to benefit from greater collaboration and the enhancements smart living can bring.

METHODOLOGY AND ADDITIONAL RESOURCES

In 2011, the Alcatel-Lucent Market and Consumer Insight team reviewed studies undertaken by key stakeholders in smart cities, and looked at 18 smart city projects to better understand the players, the processes and the focus of vendors and service providers.

Next, students from the EDHEC Business School in Nice, France, helped conduct a deeper dive into seven smart city projects. Alcatel-Lucent then substantiated the smart city types and the initial motivations behind smart city projects by applying them to 52 projects. Students from the Presidio Graduate School in San Francisco, USA, joined for this phase.

Finally, Alcatel-Lucent, in partnership with Erin Henry of Harvard University in Cambridge, USA, designed a qualitative study and conducted in-depth interviews with citizens and select stakeholders across the globe. This included the four focus cities of Chattanooga, Zurich, Wuxi and King Abdullah Economic City (the latter via a partnership with the ENPC Graduate School of Business in Paris, France). Discussions centered on several key aspects, including citizen awareness of the smart city concept, involvement, service and service provider preferences, and challenges and concerns. Given the nascent nature of the research, Alcatel-Lucent tested no single hypothesis but rather probed to paint a picture of smart cities from the citizen perspective.

HOW ALCATEL-LUCENT SUPPORTS SERVICE PROVIDERS

ICT companies are critical contributors to smart city projects. Through its research, product portfolio and large-scale project expertise, Alcatel-Lucent has the capabilities to support service providers in the many roles they have to play as PPCP participants: as promoters, matchmakers, teachers and integrators.

Specifically, we provide:

- **Knowledge:** through research insights, modeling and design, end-to-end project management and solutions-focused R&D
- **Technologies and services:** including the Alcatel-Lucent High Leverage Network™ and CloudBand solutions as well as applications for customer experience management, urban traffic management, public safety solutions, smart grid technologies and train-to-ground communications
- **Experience:** with partnerships and 'ecosystem development' (e.g., the GreenTouch™ consortium, ngConnect), network deployment, strategic industries and the public sector, global service provider operations, standards bodies and end-to-end holistic project integration

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