The Smart City Cornerstone: Urban Efficiency

by Charbel Aoun

Executive summary

Every city can become smarter. Smart cities start with smart systems that work for the benefit of both residents and the environment. The cities that succeed in making the transition to ‘smart’ will be those that improve their critical systems by combining a bottom-up, systems-centric approach with a top-down, data-centric one. This paper presents a 5-step approach for converting our urban centres into more efficient and sustainable places to live.

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Introduction

In less than 40 years, 70% of the world's population will reside in our cities. This rapid migration will push both current and future urban centres to their seams and expand industrial and residential infrastructures beyond their breaking points.

This eye-opening fact raises important questions that must be considered by cities around the world. Can this growth be done in a sustainable way? Will cities be able to reduce their environmental impact and carbon emissions? Will we be able to meet the sustainability challenges brought on by regulation and the impact of this massive growth? And, will we expand in ways which ensure communities are enjoyable places to live and promote social equality?

We can answer affirmatively to these concerns, and re-design our cities with these thoughts in mind. With the movement towards smart cities, the urban centres we live in can become more efficient, livable, and sustainable in both the short and long term, thanks to involvement from city, citizens, and businesses.

Every city can become smarter. Smart cities start with smart systems, working for the benefit of both residents and the environment. Electric grids, gas distribution systems, water distribution systems, public and private transportation systems, commercial buildings, hospitals, homes — these form the backbone of a city's efficiency, livability, and sustainability. It is the improvement and integration of these critical city systems — done in a step-by-step manner — that become the cornerstones to making a smart city a reality (see **Figure 1**). The cities successfully making the transition to 'smart' will be those who improve their critical systems by combining a bottom-up, systems-centric approach with a top-down, data-centric one.

Figure 1
Cities like Rio de Janeiro, Brazil exchange information between systems and agencies. This enables coordination of traffic management and quick response to traffic incidents.

This paper presents an approach for transitioning to a smart city which involves the following 5 steps:

1. Setting the vision
2. Bringing in the technology

3. Working on the integration
4. Adding innovation
5. Driving collaboration

With this approach to each critical domain of a city, obstacles to a more intelligent infrastructure can be solved, and smart cities can move from a distant dream to an accessible reality.

Some background

Cities are our fundamental building blocks. Throughout history, they have served as centres of innovation, advancement, civilization, and as facilitators of the social interaction necessary for the progress of humankind. It is only fitting that the next evolution of how we live, work, play, and interact is emerging within our cities.

Although they make up just 2% of our world's surface, cities hold half of the global population, consume 75% of our energy resources, and emit 80% of the carbon that is harming our environment. Countries are recognizing that blind resource consumption is no longer a viable option for economic and societal growth. Emissions from buildings and activities of cities have placed them at the top of the priority list for nations aiming to keep their geographies clean, healthy, and livable for generations to come. As an example, the European Union — through the European Smart Cities and Communities Initiative — has targeted emissions reductions in cities as critical to its goal of reducing overall energy use by 20% by 2020, and to the development of a low carbon economy by 2050.

But the challenges to meeting those goals will only grow. By 2050, cities will house an astounding 70% of our population, necessitating expansion and infrastructure (see **Figure 2**). To accommodate this boom, in the next 40 years we must build out the same amount of urban capacity our ancestors took 4,000 years to create.

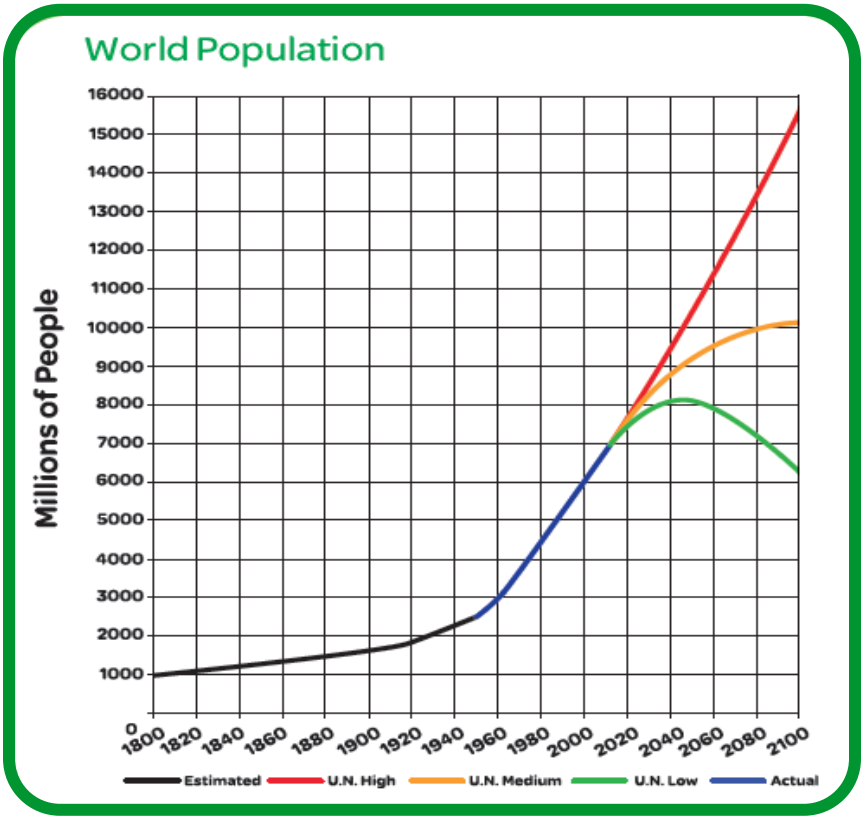

Figure 2
By 2050, cities will be home to an astounding 70% of our population, necessitating more urban infrastructure.

Source: World-Population-1800-2100.svg - Wikipedia, the free encyclopedia

Urban infrastructures will need to better meet the challenges of city environments: energy and water scarcity; pollution and emissions; traffic congestion; crime; waste disposal; and safety risks from ageing infrastructures. The increased mobility of our societies has created intense competition between cities: for investment, for talent, and for jobs. To attract the most promising residents, companies, and organizations, as well as promote a thriving culture, cities must achieve three critical traits: become more efficient, more livable, and more sustainable.

The changes needed to make this happen in our cities can only take place at their core: a city's systems. Spending on these changes should total $108 billion by 2020, according to Pike Research, and will continue to trend upwards, putting massive pressure on city budgets. Just as a house will not stand with a weak foundation, the backbone formed by the traffic, energy, building, and water systems of a metropolis are vital to its longevity and success.

Technologies are available today

Smart cities need not be thought of as cities of the future. They can be the cities of the present. By the end of the current decade, many technologies critical to a smart city, including monitoring and sensor technologies, intelligent traffic systems, and energy management systems for buildings, will be deployed on every continent. And while no single solution defines a smart city, the technologies being put in place today are pieces of the smart city puzzle.

"Via realistic, measurable timetables and financial vehicles, almost any city can achieve a more intelligent infrastructure."

While the challenges are many, the benefits are significant. Going beyond the obvious environmental benefits, the improvement of systems can contribute to social equality through universal access to a city's public services. They save lives by allowing for more immediate access to emergency services. They make cities more resilient in times of crisis, allow cities to prepare for hazards, and help to restore city services from disruption in the wake of one. They create new economic zones that drive growth and prosperity.

Such improvements are not exclusive to modern and wealthy communities. Via realistic, measurable timetables and financial vehicles, almost any city can achieve a more intelligent infrastructure. By honing in on solutions that focus on their most acute pain points and taking a step-by-step, system-based approach, cities can implement strategies that deliver the immediate, visible, and measurable results they need and that their constituents deserve.

What is a smart city?

The most effective definition of a smart city is a community that is efficient, liveable, and sustainable— and these three elements go hand-in-hand.

Traditionally, the water, gas, electricity, transportation, emergency response, buildings, hospitals, and public services systems of a city are separate and operate in silos independent of each other. A truly efficient city requires not only that the performance of each system is optimized, but also that these systems are managed in an integrated way to better prioritize investment and maximize value.

An efficient city also starts a community on the path to become competitive for talent, investment, and jobs by becoming more liveable. A city must work to become a pleasant place to live, work, and play. It must appeal to residents, commuters, and visitors alike. It must be socially inclusive, creating opportunities for all of its residents. It must provide innovative, meaningful services to its constituents. Liveability plays a critical role in building the talent pool, the housing market, and providing cultural events which can bring memorable experiences, international attention, and investment to the community.

A sustainable community is one which reduces the environmental consequences of urban life and is often an output of efforts to make the city more efficient and liveable. Cities are the

largest contributors of carbon emissions; the highways, public spaces, and buildings we rely on to live, work, and play emit the bulk of each city's emissions (see **Figure 3**). Implementing efficient, cleaner, and sustainable operations in all of these areas are critical to minimizing a city's environmental footprint. Cities must also look at other methods of achieving sustainability, including resource efficiency, regenerating aging districts, ensuring robustness of systems, and incorporating design and planning in harmony with its natural ecosystem, as opposed to simply living in it.

Figure 3
Highways, public spaces, and buildings emit the bulk of each city's emissions.

Challenges & opportunities

The need for smart cities is evident in emerging and established economies, with each bringing unique challenges and opportunities.

Emerging economies, such as China and Brazil, have immediate needs to develop smarter cities, as their exponentially growing populations have the most pressing short term needs, including flood preparedness, prevention of blackouts, traffic congestion, crowding, and logistical difficulties which accompany fast-paced urbanization — while competing for global attention. In some cases, new cities or districts are literally being built from the ground up, allowing smart city infrastructure to be developed into the first iteration.

Mature economies in Western Europe, the United States, and Japan see similar opportunities, but in many cases different challenges. These regions boast highly engaged citizens, sophisticated and multi-layered government, and deep access to investment and technology innovation. Yet their decades-old systems are aging and deteriorating, rarely sharing information, and often operating under the responsibility of different departments or public jurisdictions. In the face of rapidly industrializing new economies, these older and established bellwethers are finding the need to compete fiercely on the world stage for talent and investments.

While there are clear opportunities in both emerging and established markets, there are also clear challenges. Many communities, especially in today's global financial crisis, find themselves cash-strapped, with little budget for proactive improvements. This makes financing any project a challenge — yet smart city solutions actually reduce costs by eliminating or reducing the need to invest in new infrastructure capacity.

If financing and budgets are approved, project leads often find themselves left with the daunting task of managing a complex value chain, comprised of several departments, as well

as global and local players who have differing sets of understanding and expertise. Navigating this chain effectively For example, a city struggling with traffic congestion might see a need for a massive highway project. But to build public support the city could choose an interim step of deploying traffic management technologies to its existing vehicle infrastructure.

The traditionally traffic-choked city of Mumbai, India is one example. Mumbai deployed real-time, adaptive traffic control systems from Schneider Electric to optimize traffic at 253 crossings. A central traffic management control centre supervises and reacts to traffic disruptions.

The result has been a 12% reduction in average traffic time in the city, along with an 85% reduction in energy usage from the city's traffic lights. Cost savings combined with quality of life improvements made this smart city programme a success for the citizens of Mumbai.

How does a smart city "happen"?

There are several triggers that can set cities on the path to becoming smart. A city may become host to a demonstration project, in which one or a few companies test their most innovative solutions. Examples of this include digital innovation projects being tested in New Songdo City, South Korea; as well as the implementation of smart grid-ready district in Issy-les-Moulineaux, France (see **Figure 4**).

Or, a city could host a major international event, such as the Olympics or the World Cup. When a city is selected as the host for such an event, it often does so with the intent to use the event as a trigger for investment in new infrastructure, to regenerate some of its aging and/or underserved districts, as well as improve its aesthetic appeal and bring the eyes of the world — all at the same time.

Figure 4
Issy-les-Moulineaux, France is an example of a smart grid-ready district

The most available path to a smart city, however, is when a community takes it upon itself to define its sustainability vision and then lays out the roadmap needed to get there. Making sure this vision and path are well thought-out is one of the most critical tasks in the process, and most cities need support to develop their roadmap to becoming smart. Cities have

dramatically varying geographies, populations, natural resources, and individually unique pain points. So a smart city vision must be tailored to the unique needs, challenges, opportunities and resources of each city.

With a vision in place, city officials should start by improving existing operating systems, such as electricity, water, transportation, and gas. A combination of connected hardware, software, and metering facilitates integration and collaboration between systems and networks. This allows a city's infrastructure to create a critical mass of data that allows for continuous improvement of the systems themselves.

Achieving this integration does more than just improve operations. Improving and connecting systems delivers a tremendous volume of information which can be analyzed by intelligent software systems. This data analysis will allow cities to develop actionable information that can be used to deliver better, more effective, and efficient public services.

Finally, all communities must involve each of their most important stakeholders, including government officials, citizens, and the private sector, in the process — or face tremendously difficult obstacles in making its vision a reality. No single company or organization can build a smart city alone. Each city deserves the best in class players on both a local and global level — from the technologies installed, to the planning and maintenance.

A practical approach to smart cities

Schneider Electric has implemented more than 200 smart city projects around the globe. We have helped cities move toward their long-term sustainability goals by improving their existing infrastructure and driving efficiency throughout a city's operations.

Cities can benefit from up to 30% energy savings and up to a 20% reduction in water losses. Up to 30% reduction in street crime from CCTV security cameras can be delivered. Travel time and traffic delays can be reduced by up to 20%. Other major nonenvironmental benefits include improved safety and higher quality of life, which in turn drives job creation and increases the talent pool, leading to higher tax revenue.

But the benefits go beyond statistics. A recent study in the UK showed that ambulance response times to heart attack victims played a critical role in survival. Reducing the response time from the current standard of 14 minutes to five minutes doubled the chances of survival for the heart attack victim. In most urban environments today, congestion prevents five minute response imes. But smart cities have the potential to make it possible, saving tens of thousands of lives every year.

The Schneider Electric bottom-up, system-oriented approach encompasses five steps to a smart city:

1. Setting the vision and roadmap for an efficient, liveable, and sustainable city
2. Combining best-in-class hardware and software to improve operating systems
3. Bringing in integration for wider city operational and informational efficiency
4. Adding innovation to make a holistic and sustainable future a reality
5. Driving collaboration between the most well-suited global and local players, as well as across the entire smart city value chain

Step 1: Vision and roadmap

The drive for a smart city begins with setting the vision

This vision should highlight the goals of the city for the long-term: where the city wants to be in 5 – 10 years in terms of efficiency, sustainability, and competitiveness.

The next step in building a smart city is to create a pragmatic, step-by-step plan to create value over the long-term. The plan should address the most immediate pain points and opportunities first, building momentum and civic confidence in the overall vision. The plan should implement a series of initiatives over several years, with each initiative building on the others.

In the past, cities typically implemented initiatives in a siloed fashion. Each agency would pursue its own plans, not tapping potential for integration, or holistic management of initiatives. As a result, most deployments have served to improve individual city systems but missed opportunities to create value through more comprehensive, integrated improvements to city infrastructure.

One of the most important elements of setting an effective, achievable plan for a smart city is to make that an inclusive, collaborative process. A smart city can't be created by decree. It requires participation, input, and ideas from a wide range of stakeholders in the city. Public governance is naturally critical, but participation from the private sector and the citizens of the community are equally important. Incorporating the ideas and thinking of citizens helps to identify potential problems while also helping to ensure support and participation in the efficiency initiatives. Where appropriate, involving the local university community brings energy, ideas, and support. And naturally, the city will need partners to help set the vision and ensure that it meets the objectives of efficiency, liveability, and sustainability.

Once a long-term plan is put in place, the city can begin to implement the roadmap step-bystep, leveraging innovative solutions deployed in partnership with business to optimize city infrastructure and become more efficient.

One city with a highly ambitious vision is Masdar City, an intelligent community project in Abu Dhabi within the United Arab Emirates. The city's goal is to create a commercially viable, sustainable community providing the highest quality of life, with the lowest environmental footprint. Its development relies heavily on the ability of the public sector and private companies to work together, ultimately aiming to rely entirely on solar and renewable energy, with a zero-carbon, zero-waste ecology. Upon its completion, timed to fall between 2025 and 2030, Masdar City will serve as home to an international community of 70,000 people.

Schneider Electric, using its systems-oriented approach, has played a significant role in helping Masdar City realize its vision via the improvement of its networks. As a key designer of the Masdar Institute of Science and Technology, the first tenant in the city's clean tech hub, Schneider Electric implemented a fully integrated smart buildings and power anagement systems, which links over 100 sub-systems throughout the facility's six multiuse buildings, spanning 70,000 square metres.

The success of the system led to the expanded role of Schneider Electric in the greater smart city vision of Abu Dhabi. As the key manager of the Demand Side Energy Management project, Schneider Electric is leading the charge to reduce energy and water consumption in a 71 multi-use building district within Abu Dhabi by 30%. In addition to these benefits, the project dovetails into long-term goals by improving residential quality of life, driving behavioural change to promote, take advantage of, and appreciate a more intelligent infrastructure in the long term.

Step 2: Bringing in the right technology

When developing a smart city roadmap, the sheer number of technologies and solutions available today can be overwhelming. This makes honing in on the most acute pain points vital, and cities will often find that solving one pain point opens up opportunities for improvements in other areas of the city's infrastructure.

If a city faces water availability or disruption issues, implementing Supervisory Control And Data Acquisition (SCADA) systems to manage water flow can bring 30% savings on the energy used to manage the water systems, 20% reduction in water loss, and 20% reduction in water outage. A recent project to bring energy effi ciency to four water treatment plants in Beijing, China delivered a remarkable 52% reduction in energy usage, allowing the project to pay for itself in less than 18 months, and create long-term cost savings that can be applied to other smart city initiatives. Another programme at Europe's largest water treatment plant in Budapest, Hungary allowed for the effective treatment of 95% of wastewater — up from 54% before the project. The results of these smart city initiatives save money, but just as important, they help to ensure the availability of water for years to come.

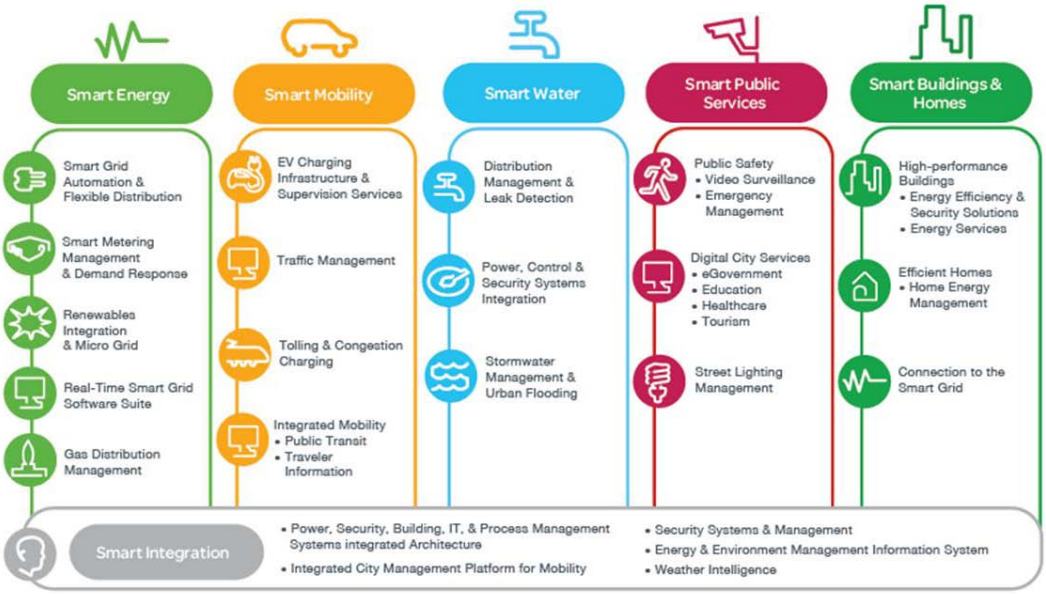

Figure 5
Smart City services and solutions cover a broad range and can be deployed in a modular fashion

Another example comes in traffic management— one of the largest obstacles for most cities. Congestion is an issue in almost every major metropolitan area. Solutions exist today to improve and optimize flow, manage traffic to cut down on clogged and bottle-necked highways, and boost usage of electric vehicles to reduce pollution. These solutions, working in cities like Mumbai and Rio de Janeiro, exchange information between systems and agencies to coordinate traffic management and quickly respond to incidents.

Whether for water, traffic, or other domains —because these solutions also include a suite of analytics, business intelligence, and decision support capabilities — cities are able to capture actionable intelligence that identifies potential issues before they occur and make more informed decisions.

The ability to identify these pain points within cities, deploy integrated and scalable solutions with immediate results, and then leverage those results into other smart city initiatives, requires strong technical and process expertise. This acumen, which relies on a deep understanding of each system and experience in its underlying processes, is necessary to design solutions effective in both short-term goals and in long-term vision (see **Figure 5**).

Step 3: Integration

The use of information integration to create a smart city follows an evolutionary process as a city becomes more advanced in using technology to manage infrastructure.

The key first step in the process is deployment of sensors throughout city infrastructure to collect raw data, which is then transmitted through communications networks, either wireline or wireless. Once the data is collected and available, real-time systems can use the data to automate management of city infrastructure, resulting in significant performance and cost advantages.

Integration of isolated systems and sharing of data yields further performance benefits through coordinated actions and holistic management of the city as a system-of-systems (see **Figure 6**). Once all of these factors are in place, cities can further leverage them to create value by applying advanced analytics tools to support optimization, as well as provide data back to city residents through public services which improve their daily lives in the city.

By measuring performance of city infrastructure systems, the government can identify problem areas and track the effectiveness of solutions in achieving the city's long-term goals. Recent advances in technology have greatly improved the ability to gather tremendous amounts of data about city infrastructure:

- Pervasive sensors enable cities to collect measurement data about energy, water, transportation, and buildings systems in real-time.
- Low-cost communications and new communications protocols greatly simplify and reduce the cost of gathering data collected by sensors. Protocols such as Zigbee® and Bluetooth®, growth in Machine-to-Machine (M2M) networks, as well as continued improvement in wireless and wire line communications technologies, enable cities to affordably collect data from widely distributed networks of sensors.
- Real-time management systems automate the control of infrastructure systems, improving the efficiency of infrastructure by optimizing performance.
- Advanced analytics make use of the large amount of raw data collected and translate it into actionable intelligence, which a city can use to improve the performance of infrastructure.

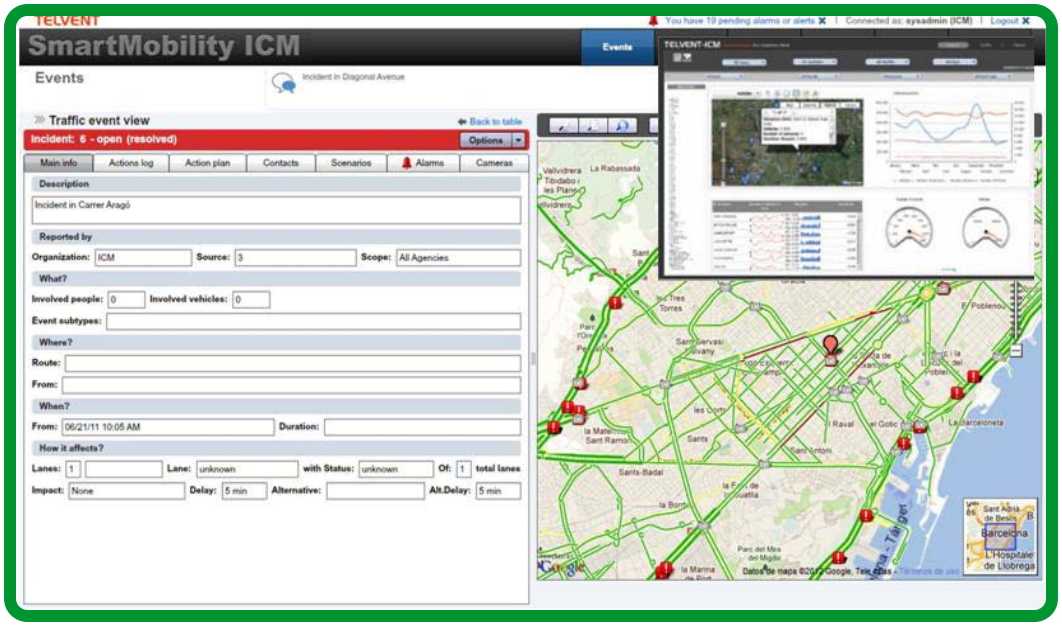

Figure 6
An Integrated City Management (ICM) platform integrates multi-modal transportation systems, shares information between agencies, and facilitates management decision support.

The city of Rio de Janeiro is a classic case study in the impact of data and system integration to push toward a smart city vision. Eleven different control centres manage the city's critical

infrastructure: electricity, water, oil, gas, public transportation, and urban traffic, air quality, and airports.

Focusing on pain points within these functions, the city implemented a SCADA system to improve the efficiency of its water distribution; a management system to better optimize its electric grid; a CCTV surveillance system to improve community safety; and a traffic management system. Alone, these deployments delivered significant benefits to each of their respective systems. But Rio de Janeiro's longer-term vision was to realize the benefits of system integration. The city's Intelligent Operations Centre (IOC) forms an advanced level of intelligence, allowing a holistic view of all city systems and the opportunity for continuous improvement based on data analysis. Today, over 50% of the IOC's total city data is provided by Schneider Electric systems.

Step 4: Tapping innovation

In the wake of collapsing financial markets and uncertain revenue streams, it is no surprise that many cities today find themselves short of cash. The revenue they do have must first be allocated to essential operations and staff, and there is often little left over for upgrades, retrofits, and other improvement measures.

But a large up-front investment is not a requisite for a smarter city. The most progressive smart city players are tapping innovative financial and business models to make efficient infrastructure a reality despite limited capital.

One of the most effective strategies is the use of energy saving performance contracts (ESPCs), which in many countries make possible the funding of smart city projects from the cost savings those projects generate.

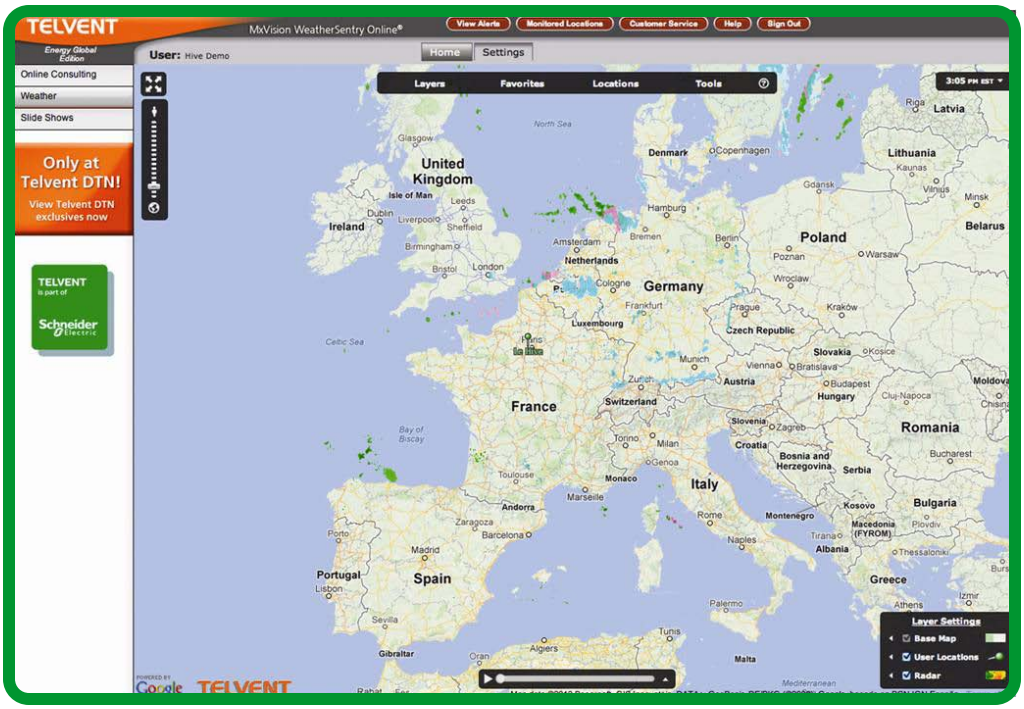

Figure 7
Weather Intelligence Services cam provide data that helps improve the efficiency of a city's electricity distribution, transportation, and public safety.

ESPCs tap into the financial flexibility of the private sector to pay for energy, saving capital upgrades in government and private commercial buildings with the energy savings realized after project implementation. The initial capital investment is provided by the financial community and the actual services are delivered by companies such as Schneider Electric, or

Energy Services Companies (ESCOs). The financier is paid back out of the accrued energy savings, with the ESCO guaranteeing a certain level of savings or performance. If the performance standards are not met, the ESCO is responsible for paying back the loan — not the taxpayer. Most importantly, the city and its residents receive the benefits of having highly efficient, modern systems that fulfil elements of a smart cities vision.

This simple and effective strategy has been successful in many regions, such as in the City of Houston. There, Schneider Electric leveraged an ESPC to perform energy efficiency retrofits on 40 municipal buildings — infrastructure upgrades that not only decreased the city's emissions and boosted its sustainability rating, but also saved the city $3 million annually in energy and water costs.

At the University of North Texas in Denton, Texas, Schneider Electric leveraged this financial model again to spur the creation of smart, sustainable buildings on the school's campus, saving the university over $14.6 million and reducing its energy consumption by 14%.

Smart city solution providers can also help cities to develop and implement other innovative business models to generate needed improvement capital. This could include creating additional streams of revenue realized as a fringe benefit of improving and collaborating disparate public systems.

Advances in data analysis have enabled the mountains of data emerging from connecting city systems to be turned into actionable information — and ultimately, revenue for cash strapped cities. For example, a smart city would implement traffic management and monitoring systems that provide real-time traffic data — for automotive, public transportation, and even pedestrian traffic. The data these systems capture could then be sold to private businesses who seek to understand traffic patterns to make decisions around new business development, appropriate staffing levels for their businesses, and a host of other uses. The smart city puts its data to work, for the benefit of the city, private businesses, and the local economy as a whole.

Step 5: Driving collaboration

Just as a city is the sum of its parts, the effective development and execution of a smart city roadmap requires collaboration from all stakeholders. Each unique smart city plan and roadmap requires collaboration with companies like Schneider Electric, global technology providers, and local organizations best suited for the specific system improvements needed. The smart cities emerging strongest will be those whose solution partners cast aside industry competitiveness and political differences to bring the most comprehensive and best solutions together.

This means sharing information across city departments, to break down silos; and involving global leaders, with world-class capabilities, as well as local providers and stakeholders, who know their cities the best. Success will come from combining public governance, people ownership and business collaboration, driving communication between these groups by giving each of them a true stake in the smart city built out of their community.

Multi-sector, multi-company business collaboration can bring innovative ideas to smart city projects. The participation of Schneider Electric with other major global players in the World Business Council for Sustainable Development's Urban Infrastructure Initiative is one such example. Bringing together 15 global industry leaders from all sectors*, this program offers their combined expertise to cities around the world, including: Turku, Finland; Tilburg, Netherlands; three cities in Gujarat, India; Guadalajara, Mexico; Kobe, Japan; and Yixing, China.

The continuing digitization of our world, and its consequential need for a large and energy intensive IT infrastructure, has brought the convergence of the energy and technology

industries. Schneider Electric works with technology leaders such as Cisco®, Accenture, IBM®, and Microsoft®, combining the strengths of both industries to deliver unprecedented efficiencies.

"The continuing digitization of our world, and its consequential need for a large and energy intensive IT infrastructure, has brought the convergence of the energy and technology industries."

For example, in the UK, Schneider Electric worked with Cisco to integrate the company's EnergyWISE™ solution, which monitors energy usage within IT facilities, with the Schneider Electric Building Management System (BMS) at a large university. Because the BMS was extended to the IT domain, the facilities enjoyed incremental energy savings, as well as helped the campus achieve its carbon and energy reduction targets.

Schneider Electric and Cisco have also teamed up to offer joint solutions enabling smarter and more energy efficient buildings within communities, such as the Schneider Electric Torana Gateway for Cisco EnergyWISE solution. Providing two-way control within the BMS, the collaborative system extracts data — for measurement, monitoring, reporting, and device control — and allows managers the freedom of multiple functions, such as powering down IP phones. These solutions use fewer raw materials, consume less energy, and offer a future-proofed infrastructure; setting the stage for more intelligent buildings and exemplifying the astounding levels of integration and efficiency propelled by technology collaboration.

Conclusion

Cities are facing urban challenges of unprecedented scale, and will continue to do so into the foreseeable future. As growing populations intensify pollution, resource scarcity, crime, traffic, emissions, and more, communities must pre-emptively respond and preserve the integrity, attractiveness, and competitiveness of their cities by becoming smarter.

Setting a smart city vision and effectively moving towards it with a bottom-up, systems-based approach is critical to ensuring resource efficiency and security, as well as maintaining socially inclusive growth. Many cities have already started. By the end of 2020, analysts from Pike Research anticipate that annual spending on smart city infrastructure will reach $16 billion.

The time to act is now. Our urban populations are growing rapidly. The pressure on infrastructure will only increase. The need to reduce the impact of cities on our environment will become more urgent.

About the author

Charbel Aoun is Senior Vice President of Schneider Electric's Smart Cities, Strategy and Innovation, and has extensive experience in technology development, start-up company formation, innovation-based economic development, and planning. Prior to joining Schneider Electric, Mr. Aoun performed various roles within the Cisco Corporation related to Smart City networking.

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To learn more about our approach and solutions, visit *www.schneider-electric.com/smartcities*

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