The battle for urban intelligence

What makes cities "smart"? Buildings and lampposts impregnated with sensors, or more mundane things, like sewerage and electrical companies agreeing to dig up roads at the same time? **David Smith** explores a concept hotly contested by competing philosophies and business interests

The idea of "smart cities" plays to deep-rooted hopes and fears: our unease with global warming, resource scarcity and uncontrolled population growth, our hope that human ingenuity can solve it all, and our frustration at the dysfunctional aspects of urban life. It's like pressing the restart button for humanity, laying the foundations for a new mode of living that puts us in harmony with nature, in harmony with each other, and where there's plenty of parking.

So it's no wonder that the notion of "smart cities" is such an effective draw for everything from conferences and white papers to product launches and real estate developments. But what does it mean?

According to the big ICT and consulting firms who currently hold the floor in the smart city conversation, the "smart" bit is ICT. They say smart cities can tackle the great problems facing humanity by organising our use of resources. Cities will house almost five billion people in 2020, we're told. A 2008 report by The Climate Group, called SMART 2020, claimed that use of ICT could cut 7.8 gigatonnes from greenhouse gas emissions by 2020, a figure larger than China's total emissions in 2010.

The Climate Group is an international non-profit organisation of governments and corporations. The SMART 2020 report was sponsored by 19 of the world's top ICT firms, including BT, Cisco, and Microsoft, all of whom stand to benefit from governments around the world trying to get "smart" by investing heavily in ICT.

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Under its Smarter Cities Challenge programme, IBM is giving free advice to cities around the world on getting smart. It advised authorities in Accra, Ghana on how to set up a system for making sure residents paid, by mobile phone, taxes and fees for services like garbage collection and parking.

We're told that the next big things are the Internet of Things and 'machine-to-machine' (M2M) communications, where appliances, vehicles, air conditioning units, factory machinery, phones, lawnmowers, drainpipes, traffic lights, anything, can "talk" to each other, wirelessly sharing data about their performance and environment harvested by embedded sensors. Falling costs of sensors and instrumentation, say the ICT visionaries, means 'big data', and better mining of the data will be possible, meaning better, more rational control of the flow of everything – water, money, data, energy, waste, traffic, people and goods.

It sounds impressive. It even sounds possible. But is it what we want?

To understand more about this vision I spoke to Simon Giles at Accenture. His title is Senior Principal, Intelligent Cities, Accenture Global. I thought he'd be an ICT whizz and so was surprised to learn that he studied modern French philosophy at university. He said it was a perfect grounding: "I'm a structural problem solver," he said. "I take concepts in the smart city world and deconstruct them into their constituent parts. I try to understand cause and effect and then reconstruct the concepts in new ways that are helpful."

Accenture's Simon Giles: "I take concepts in the smart city world and deconstruct them into their constituent parts"

He leads a London-based team developing concepts that put digital technology at the core of cities, old and new. He works with city governments and developers in Asia, Europe, the Middle East and the Americas, as well as advising the World Economic Forum on smart grids and green growth strategies. His team contains an evolutionary biologist, an engineer and a mathematician.

"We act as intermediaries between the analytics providers and digital designers of the hardcore ICT world, and the physical architects and urban planners," he said. "Architects tend to come from a very analogue world. Their mentality is very static and physical and we try to supplement that with an understanding of virtual worlds. People have always lived in physical spaces, but more and more they are also living in virtual realities," he said.

"I get my clients to think about the roles of cities in the 21st century. Cities are no longer simply market places where people bring physical goods, as they were in the 19th century, or places to set up manufacturing centres as in the 20th century. In the 21st century's service and information economy, we ask urban planners if they are designing spaces just where people can interact with each other, or are they also designing cities as information market places which enable new information transactions," he said.

Deeper data

For Giles, there are two critical components of a smart city: one is the ability to extract data from sensors and the other is the ability to integrate data from different sources to create deeper understandings.

"Sensors can be static, such as ones on lampposts feeding information about pollution, or dynamic, such as mobile phones which move around the city. Their data is fed back to a central unit, where someone centrally, or automatically, controls the devices. It's about resource efficiency and sustainability," he said. But the sensors alone don't make 'smart'.

"It's not sufficient to create 'islands of smartness', such as automated meter readings, or GPS navigation. We've had this kind of technology for 30 years. 'Smart' is about pooling data to enable new insights into a city's infrastructure layers. For example, it's about getting the water and the waste departments of a city to share information, which traditionally they have never done. When we get a better understanding of interrelationships we can start to make interventions. Integration of different data sources is the Holy Grail for technology companies, such as Accenture and IBM, who are working on smart city concepts," he said.

Giles says no city in the world is smart enough for him yet. Copenhagen, Amsterdam and Singapore are on the right track, but none have dug smart technology into the whole city's infrastructure. Giles' favourite example of partial smartness is the use of data from several sources in Singapore to help people find taxis during daily thunderstorms.

This mixes rainfall data from the meteorological office, cellphone data, which shows how many phones are logged in to the network via a particular phone mast, and GPS data from taxis. "So they know where all the taxis are, where all the people are, and where the localised rainstorms will strike," he said. "They create complex algorithms and are able to schedule the taxis for where the rain is likely to hit. It provides an improved service for a known problem with the use of multiple sources of data which would otherwise not be integrated," Giles said.

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Data + people

No one doubts that the digital explosion will be at the heart of our cities in the 21st century, but not everyone agrees that this is what will make them smart. There is a fundamental difference of opinion, for instance, between Accenture's Simon Giles, for whom a smart city begins and ends with technology, and Heidy van Beurden, communications specialist and author of "Smart City Dynamics", who believes that clever, joined-up planning is the key.

"I always find it disturbing when people set out to claim the term 'smart'. Obviously, technology companies like Cisco and Accenture want technology to be the basis of smart cities and from a business point of view, I understand. But people want to hijack the term and define it in ways that match their own objectives. In reality, we are all still looking for what a smart city is and every city, and their citizens, has a piece of the puzzle.

"For me, technology is a very important aspect but should never be the main focus. A smart city approach is about doing things in a more efficient, more integrated way. Smart technology has a role to play, but the main aim is smart planning," she said.

Van Beurden agrees with Giles that integration is at the heart of the smart city idea. But she says human interaction is as vital as technology. In Amsterdam for example various bodies responsible for infrastructure have finally started working together to the benefit of all. "When the sewerage, lighting, telecom, water, transport and energy groups share what was once regarded as company-sensitive information, they all benefit. Then they can agree together to dig up the streets once every five years, rather than doing it individually so it happens once a year. This is a Smart approach which involves discussion around a table.

"What I hear from business, universities, and governments is that the main challenge for smart cities is creating synergies between sectors. But I also hear how big egos get in the way. People want to push their products and services and forget the bigger picture."

Van Beurden agrees with Giles that no city can yet be deemed truly smart, but one of her favourite path-finders is Bristol, England, home to a collaborative programme between the public sector, business and the community. Its priorities are smart energy, transport and data: Bristol wants to use its Smart City Programme to reduce CO2 emissions by 40% by 2020.

"There is a lot of technology involved in the Bristol Smart City Programme but what I really like is the way they are working together with the citizens, for example in terms of putting smart meters in homes. A Smart approach is not just about infrastructure, but also about engaging with citizens who live in a city," she said.

One example of Bristol's approach is the 3e-Houses project, where ICT in homes is used to save energy and shift consumption from peak to off-peak hours. Another project sees the council's Energy Management Unit working with software company SystemsLink to monitor daily electricity and gas meter readings from 500 buildings to check for waste.

Van Beurden also likes solutions that involve open data initiatives such as 'apps competitions', or 'hackathons'. Citizens get together with technology developers to build new mobile and web applications using public data. The resulting apps solve problems that don't interest the market. The winner of the first New York City "BigApps" contest, MyCityWay, is now a venture capitalist-funded startup, offering a digital guide to the city.

Meanwhile, the Greater London Authority (GLA) has provided access to a number of its public data sets in the London Datastore, which has led to the creation of new, private sector app development companies. It's a new, interesting take on the public-private partnership, relevant because the public sector can't develop good digital assets all by itself.

Bold claims

The award for the boldest commercial territory grab in the smart city craze goes to tech company Living PlanIT, brainchild of its CEO, the former Microsoft executive Steve Lewis. He says they've developed an "Urban Operating System" to orchestrate intelligent devices embedded in buildings and infrastructure, allowing them to manage energy, water and waste, and even services such as transportation, education and healthcare.

Lewis has proposed building a whole new city, called PlanIT Valley, on a 1,700-hectare site in the Municipality of Paredes,

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in northern Portugal. It was meant to be an R&D test-bed for Living PlanIT's vision, and home eventually to 220,000 people, mostly researchers and other staff employed by the Living PlanIT's "ecosystem" of high-tech partner companies and their families.

According to Lewis, the buildings would not be buildings primarily but computing devices allowing property developers to get more money out of them by skimming off the digital services ("place apps") sold to occupants by third parties. He said this would be a compelling new value proposition for developers.

Lewis further claimed that Living PlanIT would revolutionise the entire construction process, bypassing BIM with a more powerful virtual design model connected electronically to a global supply chain of component manufacturers, so that construction would be as streamlined as car manufacturing. "When we throw up the buildings in PlanIT Valley in less than nine months, and they run at 80% less cost and they cost 30% less to deliver and we've proven it and proven it and proven it, how are you going to go build?" he challenged us last year.

Heidy van Beurden believes that clever, joined-up planning is the key

Lewis has said the money to be made is vast, not from real estate but from technology licensing. He wants his Urban Operating System to be the framework governments or developers use to integrate the many different systems, hardware and software, provided by Living PlanIT's partners.

He told CRI last year: "If this is a guy in the hardware engineering world, the networking world, we're making a 25% margin off of all the intellectual property being sold by that company. So in one of our partner's cases, over the next four years they'll make 14 billion euros in the deployment of our technology in world markets. We're making about three billion in cash off of that. So our end in this is really not about the real estate. It's about the monetisation of intellectual property on a world wide basis. It just so happens we have a very high level of hygiene in the real estate play as a result of having a captive market in PlanIT Valley."

Living PlanIT's Steve Lewis: bold claims, but hit by delays

Proof that this will work has been slow in coming. When CRI first reported Living PlanIT's plans in December 2010 Lewis said the first phase of building in Portugal for a projected influx of 7,000 residents would start in early 2011 and be done within a year. That didn't happen, and Lewis told CRI in September 2011 that it was because of the political turmoil in Portugal caused by the eurozone crisis. He said work on site would start in the fourth quarter of 2011.

That didn't happen either. Most recently, in July 2012, Lewis told CRI that Living PlanIT had changed its funding model for PlanIT Valley and hoped to use equity provided by unnamed Chinese investors instead of taking on debt. He said more announcements would be made in September 2012.

Smart real estate

The Songdo International Business District (IBD) in South Korea is a more recognisable style of property development and is actually happening. The district is being built on 1,500 acres of reclaimed land along Incheon's waterfront at a cost of US$40 billion. Work began in 2000 and should be completed in 2016, by which time it will have 80,000 apartments.

Developers have made great claims about Songdo IBD's use of smart technology to enhance citizens' lives. Cisco has wired the city with fibre optic broadband and TelePresence screens have

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been installed in homes, offices, hospitals and shopping centres. Sensors have been embedded in streets and buildings and street lights can be switched off in deserted streets, or brightened in busy ones. RFID (radio frequency identification) tags on cars send location data to a central hub identifying heavy traffic and tweaking signals to ease congestion.

The US real estate developer Gale International has the majority stake of 61 percent and some critics have dismissed the project as merely a hardcore real estate play with techy bells and whistles. But Tom Murcott, the company's executive vice president of global foreign investment, denies this. "Of course it's a business district so we are aiming to attract corporations, their employees and families. But for Gale, smart cities are a quality of life issue. We've embedded technology in the urban environment to enhance the lives of people living and working there. It's not technology per se that's Smart, it's how it affects lives."

Murcott says Songdo has very good urban infrastructure. Planners copied the best bits from the world's great cities: it has versions of New York's Central Park, London's concentration of green spaces and Venice's canals. He says already there are vibrant neighbourhoods.

Our French philosopher Simon Giles respects Songdo but says there are more interesting and egalitarian developments, such as in Guadalajara, Mexico, which he says "runs counter to profit-driven real estate models". The plan there is to create, with Accenture's help, a digital city within a city that is environmentally, economically and socially sustainable. Its governance model puts development in the hands of communities, Giles said. The Mexican government gave money to a foundation trust to buy the real estate and the trust deals with developers and retains the lion's share of the profits.

"The foundation trust is not-for-profit," Giles said, "so all profits are reinvested in social enterprise, or environmental enterprise activities around the development. Technology will play a big part in making it an attractive, vibrant place to work, but it is differentiated by the social conscience behind it. The developers, too, can make money from being hired to build the infrastructure. It's enterprise with a social and environmental purpose, as well as a profit-making motive.

"The project is in its early days, but this governance model is right on the cutting edge of how to do sustainable development. We want places to be socially and economically sustainable, so we cannot create massive inequalities," he said.

Financial backing

For Giles the trouble is selling smart city concepts to financiers. The smart city "industry", he says, has to find better ways of articulating value. "Smart cities are often cynically seen as marketing wrappers by CEOs and mayors," he said, adding that technology vendors need help from the creative industries to articulate what smart cities can be.

The smart city industry also needs to find different sources of money, from the public and private sectors. The large banks will only come on board if there is clear value for shareholders. Giles says the key will be attracting people. "How can I give them services they need to demonstrate that … life is better in Milan than Amsterdam? If I do that, then the capital will flow," he told one conference on smart cities.

For Heidy van Beurden, it's not necessarily a bad thing if the smart city concept is driven by business. "After all, businesses are in general more innovative than governmental bodies. The real issue is how local authorities and business can work together in such a way that all parties benefit," she said.

Overall I'm surprised at the level of agreement over what constitutes the basis of the smart city concept: the unprecedented integration of data from many new sources to create efficiencies not previously possible. Whether it leads to new, sustainable social structures or is just a clever way of selling ICT to the world's municipalities remains to be seen. ❑

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