How to build a smart city

The internet of things has huge potential. However, collective intelligence is generated by the participation of all inhabitants in shaping the new cities.

by Marco Fosci *

Consider the navigator on your mobile phone. You send data to a service company using its GPS. In exchange, you are warned about traffic jams and provided with alternative routes. This is an example of one of the potential benefits provided by the internet of things (IoT). Objects that are connected to the Web and a network of sensors generate a large amount of data which, via social networks and artificial intelligence algorithms, opens up possibilities that were inconceivable until a few years ago.

Now let's change scale, and take a look at a city like Seoul, South Korea, with its ten million inhabitants. From a single integrated control centre called the Transport Operation and Information Service, or TOPIS, a team of operators monitors street traffic, the timeliness of underground and public transport, taxi availability, parking lot occupancy, the weather conditions and any critical situations arising from accidents or operations by the fire brigade or the police. In contrast to our navigator, TOPIS doesn't just provide citizens with an update on traffic and public transport. It anticipates problems, drawing on data from social networks and sensors. TOPIS can relieve congestion in public transport by getting more buses on the roads, verify the status of the infrastructure and schedule maintenance operations and warn the traffic police where they might be needed most to avoid traffic jams. It essentially guarantees smooth travel for millions of people.

By applying the same principles, projects are now being devised that aim to reduce the environmental impact of cities, improve energy efficiency of entire neighbourhoods, and help with traffic and services. The basic idea is that current technologies can enable material infrastructure and human capital to communicate, generating a sort of collective intelligence. Major urban centres thus become smart cities, places where citizens are called on in some way to actively participate in a process that structurally improves the quality of life within the society.

"The advent of IoT in our lives enables new solutions to be found for old problems", said Carlo Ratti, head of the Massachusetts Institute of Technology's Senseable City Lab. "One of the most important aspects is linked to the dynamics behind changing behaviours, or how the citizens themselves, having acquired a greater awareness of the city's problems, can promote change". In Santander, Spain, a network of over 6,000 IoT devices (sensors, RFiDs and NFC tags) checks rubbish bins and skips, monitors the routes travelled by a fleet of street sweepers and collects information on the quality of the air and pollution. Via APIs, the data is made available to private citizens and companies that want to develop applications to make waste disposal more efficient or even improve the awareness of citizens and tourists on the importance of separate collection.

"The smart city", Ratti added, "aims at inclusion and cohesion between all strata of the population. It's a city shaped from below and therefore by the inhabitants themselves. For this reason, it can adapt to suit everyone's needs". This is an interesting concept that we should probably be implementing, considering that World Bank figures indicate that almost 54% of the world's population lives in cities, use two-thirds of the energy produced, create 80% of GDP and generate 70% of all greenhouse gases.

But there is no shortage of critical aspects, starting with technological risks. The vulnerability of Intel, AMD and ARM processors revealed at the start of 2018 has clearly pointed to the fact that an entirely connected society will also need reactive anti-bodies. Plus, one has to consider the dangers of asymmetrical information resulting from companies or public institutions having access to large quantities of data on citizens, a problem that is being discussed in a number of different venues and can only be solved by the introduction of clear and transparent regulations for the exploitation of big data.

Conversely, instances of leapfrogging are also taking place that can help redress the imbalance between advanced and underdeveloped economies. One example is the use of mobile phones: "Most African countries", Ratti explained, "have moved directly towards wireless connections without first installing cable ones. As a result, mobile phones are often being used in new, ingenious and more sophisticated ways than is happening in Europe or the United States".

In Kenya, a few young Nairobi businessmen have developed an application called Usalama that provides an immediate and direct link to the police, road assistance and ambulances. By shaking the mobile phone, you send a help request. With the camera and GPS, users can then send information to the various emergency units. In a few months, this grassroots platform hopes to become a reference point for emergency services, much like the 112 or 911 phone numbers, which took decades to develop in the EU and the US respectively.

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