

## Smart cities – a future urban landscape?

*Ciaran Molloy examines the technology and ideas behind the “smart city”. As the global urban population steadily rises, more people will have to live close together in a sustainable way. Is this a vision of the future?*

Since 2007, the majority of the world’s population have lived in cities and it is predicted that by 2050, three quarters of the world’s people will do so. Urban centres are not just the hard infrastructure of our town landscapes but the web of social, economic and environmental dependencies which shape our societies. It is no exaggeration to say that the way in which we choose to organize our mega-cities, our towns and villages in a world of finite resources, is the main challenge of the 21<sup>st</sup> century.

### The smart city

One of the ideas which has emerged over the last decade or so is the concept of the “smart city” but what does this label mean? The term “Smart City” is a relatively loose one that can be applied to a blend of characteristics which involve:

- transport and ICT infrastructure;
- people - especially in terms of an educated, flexible and creative workforce;
- environment – viewed in terms of sustainability, safety, energy efficiency and quality of life; and
- governance in the widest sense encompassing participation, transparency and a long term vision.

Drew Hemment a leading commentator on innovation has said that, in essence, the smart city is about connectivity: connectivity of systems, devices, data, people and organisations. “This is connectivity between all kinds of things, on all kinds of levels”.

Undoubtedly the image of the smart city can best be visualized in terms of [advances in technology](#) . For instance in relation to growing field of telematics – the “internet of things” by which physical objects are connected to the web – systems are being developed through which cars can communicate with each other, thereby avoiding traffic jams. It is also easy to see today’s “sat nav” systems being replaced by a connection to the cloud using voice control to get directions. We are not only talking about smart cars, smart roads are also being developed, with parking spaces which indicate when they are vacant by means of a [phone app](#).

On a wider scale, systems such as [Urban OS](#) operate rather like a PC operating system, keeping buildings, traffic and services running smoothly. The software takes in data from sensors dotted around the city, keeping an eye on developments. In the

event of a fire, Urban OS can manage traffic lights so that fire engines can reach the area swiftly. [Greenwich](#) is currently testing an Urban OS system.

The concept of the smart city is much more wide-ranging than just technology. In an urban planning context, imposing a minimum time period in which to walk from new homes to a transport connection is a simple example of “common sense smart”. Similarly, one could view the Velib bicycle hire system in Paris and its popular London equivalent as examples of “low tech smart”, which facilitate the flexibility of cheap travel while also promoting health.

### **The driving factors**

A central back-drop to the smart city initiative is the growing realisation that globally the medium to long term trend in energy prices is upward. Housing our populations in urban centres, particularly in high density apartments is in itself energy efficient but this efficiency can be enhanced by [smart buildings](#) with energy using appliances which automatically regulate themselves. None of this is new. We are simply developing Le Corbusier’s idea of the house as a “machine for living in”. The “smart city” enhances this concept by measuring urban performance as a totality of the physical, social and communication infrastructure, combined in a way that advances economic growth in a socially inclusive and sustainable way.

Another major driver behind the idea of the smart community is the notion of sustainability. The sustainability message is about trying to use scarce resources efficiently so that in the long run not only buildings but our towns and cities can be constructed and operated cost effectively throughout their life cycle. It is about thinking in the long term and promoting quality of life.

The prevailing demographic transformation in much of the developed world is a rapidly aging society. Our smart cities have to be designed with this in mind. On a purely technical level, innovations such as [mobility sensors in carpets](#) can aid independent living but we also need to push forward initiatives to train older people in new technologies to achieve maximum benefits. Teaching grannies and grandpas to use the internet can promote on-line shopping and allow the elderly to stay in their homes for longer. This is a win-win situation for everyone as that is what most of them want and it also minimises expensive social care. Life long learning is as much a part of the smart city of the future as any developments in technology.

Undoubtedly the economy is the most important driving factor behind the “smart city” idea. With much of the western world in post industrial, service-based economies, business led urban development is the holy grail of local and national politicians throughout the world. In attempting to promote cluster-based “intelligent” city strategies, the aim is to attract creative, flexible, skilled workforces in the knowledge intensive industries that trade in a very global economy. Particularly in the economic sphere, the essential ingredients of the smart city are most evident: networked infrastructure; good education facilities producing a skilled workforce; forward thinking local governance; good transport connections and an attractive sustainable environment.

## Barriers to smart city development

Urban development is a complex process and there are significant institutional barriers which can hold back the creation of smart communities. The concept is being developed within the context of budgets, geographical boundaries and organisational structures which belong to a different era. Even if they have the vision, many urban authorities do not have the power or the resources to carry out smart city initiatives.

Some commentators in the field (e.g. the market analysts at Ovum) have called for the creation of a new [digital governance framework](#) which would allow “digital urban planners to find a balance between treating each initiative that uses new ICT as a separate project and implementing an inflexible master plan”. Certainly everyone is agreed on the need to break down thinking in “silos”. Co-ordination is needed over a range of administrative disciplines.

Re-thinking the current mindset does not just apply to technology but also to basic concepts of land use development. In the USA in particular, a lot of thought is being given to re-examining zoning laws to shift the emphasis from sizable single family suburban homes which need the use of a car towards walkable neighbourhoods characterised by the rising number of [single person households](#) which are a growing feature of urban populations world wide. Promoting “mixed use” developments which incorporate work/live usage is another way of incentivising a more knowledge based economic structure.

## Financial constraints

Raising the [finance](#) to build, or more likely, retrofit smart cities is a challenge. Investors traditionally put their money in projects rather than cities and there is a lack of evidence by which to judge what works and what does not. Given the multi-dimensional aspects of the public infrastructure investment needed, vision is needed to push the smart city idea forward. As noted by Mazars and the Urban Land Institute “smarter projects involve a move towards a different type of project from the current norm, which implies city leadership to incentivise and encourage new project development through clear strategies and policies”. In this respect, an active mayor can be a big asset but currently there are only [16](#) directly elected mayors in the UK.

Particularly at a time of public spending constraints, it will be vital to encourage private investment, thereby enabling private/ public partnerships which can bring in private money to fund the physical infrastructure needed. Concepts such as [tax incremental financing](#) are a recent American import which can create the fiscal framework to incentivize the sort of large scale development which can create smart communities. The redevelopment of the [Battersea power station](#) site is an example of this new approach.

Along with new [enterprise zones](#) announced last year, the idea of the smart city can be taken forward on a district basis, with some urban communities which are ripe for regeneration acting as exemplars. European funding through [Jessica](#) can also be accessed to promote smart regeneration. In the context of limited resources, one of

the tensions within the smart development debate is between balancing investment city wide or doing it on a project by project approach.

Faced with the challenges of inefficient transport services, outdated water and waste networks, rising pollution levels, an increased demand for energy and the need for economic rejuvenation, there is always the tendency to think that only large scale intervention and considerable amounts of money will make any difference but one should never underestimate the effectiveness of a small scale incremental approach. As the development of smart cities will generally involve retrofitting our existing urban centres, then the cities of the future will need to reflect the different requirements of their populations by small improvements such as the [Parking Tag](#) system in Dublin which allows a registered user to park and pay by mobile phone.

### **Taking the concept forward**

To promote the “smart city” certain basic elements are necessary. These include:

- promoting constructive partnerships both within local authorities and between the public and private sectors;
- removing barriers between roles and responsibilities within the public sector;
- ensuring that there are agreed standards developed so for example traffic lights can “speak” to cars; and
- ensure that there is sufficient investment in connectivity, bandwidth and education.

Smart cities are being discussed on a global basis. Globalization, competition and technological change are constantly pushing the frontiers for everyone. While it is easy to think that technological advancement will inevitably be the preserve of the developed world, one needs to note how technological changes such as the spread of mobile phones in [Africa](#) can serve to accelerate economic growth in less developed countries. Nonetheless, the rapid advance of smart communities will have considerable social effect. The speed of change is such that the benefits of more localised services and employment for those best able to negotiate this digitized, on-line world must also be balanced against the [10 million](#) people in the UK without internet access.

Cities are in essence collections of communities. Some smart cities such as [Masdar City](#) are being developed from scratch but in most cases they will be developed incrementally. What is needed most of all is a sense of vision so that communities and cities can develop in ways which promote social cohesion and a sense of moving forward together.