

## **SMART Cities must be Intelligently Developed**

Cities have exponentially grown since 1800 when 2% of humanity lived in urban areas to 2017 at 60% and heading for 75% of people living in cities by 2050. In parallel, the human population has risen from about 1 billion in 1804 to 7.6 billion today, and is predicted to increase by another 3 billion by 2050. Hence, in the last 213 years, city inhabitants have risen from 20 million to about 4.6 billion.

This huge expansion has seen cities responding in numerous different ways, from the growth of 'shanty towns' to rich luxurious city centres such as the relatively new high-tech Shanghai in China and the continuance of the historically central trading centre of the world as is London. As a result, the expansion of our cities brings many challenges from poverty to richness, from lack of drainage and water to an abundance of shops and commercial centres supplying all kinds of products that are consumed in vast quantities every hour. This has seen the continual drive for more technology and efficient ways of distributing and producing the resources humanity is consuming.

However, technology is also now developing into accessible ways to bring resources to the poorer sectors of city communities. Solutions such as a plug and play solar panel with built in battery, an LED light and a mobile phone charger can be provided as an autonomous technology to individual dwellings; this would avoid the need for new power infrastructure. Furthermore, emerging technologies for rural farmers to control their crop production and distribution more efficiently are becoming more common; cities cannot survive without adequate food supplies.

However, the cities we have today are a response to the huge demands of a growing population. SMART cities are much more about the needs of the future; they have to be in order to cope with challenges of human density, global warming and the degradation of the Earth's natural resources. Fundamentally, it is about balancing global financial wealth with the environment for the benefit of society, where progress involves moving away from past social constraints. By focusing our efforts to achieve sustainable change, the Earth can then replenish its natural resources. The balance is about green initiatives being implemented within a sustainable economic structure. The definition of SMART cities is not a fixed parameter; in fact it never will be, especially as people are consuming more and technology is advancing,

Data capture and analytics will continue to grow enabling better community based decisions; technology solutions will allow more and more data to be harvested. An example of this being emerging intelligent streetlights, whereby the lamp post becomes an intelligent multi-purpose solution to monitor street pollution, provide street security surveillance, points for electric vehicles, and even lighting for pedestrians - all generated by integral high efficiency solar panels. The technical products are rapidly reducing in cost and increasing in efficiency, but fundamentally, by being linked to the city communications network, the data is becoming available to manage traffic flows better, help to reduce crime and reduce energy consumption.

The thoughts transpiring from research and learning groups focused on cities, such as the CIBSE Resilient Cities Group which SPIE supports, are realising increasingly that our cities will drive the emergence of sustainable solutions for humanity. Cities will develop into places to be, with stronger emphasis on green infrastructure, which will make for liveable spaces, assist in the reduction of pollution, the diminishing of crime (yes, research even shows that) and progress the new concept of city farms; farms that can be developed from waste ground, unused tunnels and derelict tower blocks. Subsequently, new technology is evolving and being used for these solutions to become very efficient, such as new full-spectrum lamps, providing a balance of cool and warm light replicating natural solar spectrum.

Moreover, technologies are changing and improving in most areas of city dwelling. The SMART bus with high-density battery packs that can be rapidly re-charged at a bus stop is already being trialled for use. Imagine the removal of the combustion engine from our cities to reduce pollution, which is now a matter of legislation, especially as the European objective of 2050 is to ban all combustion engines - the UK and France's target is 2040. Even some of the big car producers have announced plans to convert to fully electric in the coming years. This change will bring about enormous opportunities for more integrated transport policies and the technologies to support them

The growth in data collection and the devices and networks that facilitate this, has already been significant; but the future holds even greater opportunity. Overall, the goal is to develop intelligent cities; the SMART, the technology and the social, the wellbeing and healthy and sustainable communities which must embrace our existing cities and buildings.

Cities are without doubt at the forefront of humanities future development. The challenge however is not just about growth. It is also about the importance of health, ecology, environment, people and greater global fairness. The SMART systems and technologies being developed will have a big role to play in all of this.