

BEST FEATURE IN IT JOURNALISM



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Hari Pulakkat won the PoleStar Award for 2011 for his article, 'How smart technologies are drawing city of tomorrow and redrawing cities of today', which appeared in The Economic Times, dated November 2011.

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How smart technologies are drawing city of tomorrow and redrawing cities of today

Hari Pulakkat

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An operating system is the most vital piece of software in a computer. It makes the hardware components work together and, in large systems, ensures that programs running at the same time do not interfere with each other. Operating systems are so useful that they are now being used in devices like mobile phones, tablets, televisions, washing machines and refrigerators. They are now set to migrate to a different kind of device: the city.

Operating systems will soon be used to manage a city in Portugal, near the tourist town of Paredes. Here, a five-year-old Swiss startup, Living PlanIT, is leading the construction of a new city spread over 17 square kilometres. At the heart of this city is the Urban Operating System (UOS) the company has co-developed.

The UOS optimises all the services in a city, just the way a computer optimises all its resources. It constantly receives data inputs from around the city, and makes sure traffic lights, air-conditioners and other appliances are all working optimally. During emergencies like a fire, for example, it guides people to exit routes, and controls traffic signals so that the fire service can reach the area quickly. A city like this could end up being a net energy generator with extremely low carbon dioxide emissions. "It is difficult to estimate the emissions of a city," says Living PlanIT chief technology officer John Stenlake. "But we may find it close to zero if we did."

The city, called PlanIT Valley, is the first of what the company calls its design wins. If it proves the concept and the economics in a few design wins, Living PlanIT — pronounced as Living Planet — could rewrite the \$4.6 trillion global construction industry. Due to its fragmented nature, the construction industry has innovated little over the recent decades, and has lagged behind other industries in productivity gains. It is also enormously wasteful. Studies in the US show that 75% of construction adds no value. The industry wastes 60% of the materials and 30% of the cost of construction. According to the World Business Council for Sustainable Development, buildings use 40% of the world's energy. This can be reduced substantially by making them smart.

PlanIT Valley is one of the many smart cities coming up in the world. Other examples include Songdo in South Korea, Masdar in Abu Dhabi, Dongtan in China and parts of Iskandar in Malaysia. These cities use different concepts, but all aim at the same result: an eco-friendly city that optimises all its resources and services. For example, when complete in 2015, Songdo is supposed to develop into a major carbon-neutral business hub, spread over 6 sq km and with 65,000 inhabitants. PlanIT Valley is being developed as an R&D hub, with companies like Microsoft, Philips, GE, Deutsche Telekom and several others already planning to set up research centres there.

THE NEED FOR NEW CITIES

Building greenfield cities is a new megatrend in the construction industry, springing from the need to accommodate billions of people moving into cities. Three years ago, the world passed through a milestone when the number of people living in cities equalled the number of people living in villages. The United Nations World Urbanisation Report estimated that 70% of the world population would live in cities by 2050. This means thousands of new cities have to be built quickly. The founders of PlanIT estimate this number to be 9,400 by 2050, which translates into one of the biggest business opportunities of this century.

India would need them too as its urban population would increase by 600 million during this period. Management Guru CK Prahalad had said two years ago that India would need to build 500 new cities if the existing ones were not to turn into super-slums. A recent McKinsey report says that India has to add 800 million sq metres of floor space and 400 km of metro-rail every year till 2030. PlanIT is using its design wins to prove its concepts. "Once new cities prove the concept," says Stenlake, "we would go to existing cities that form a bigger market." Major cities have already begun the transformation by retrofitting themselves with smart technologies (See graphic: What Existing Cities Are Doing). Big companies like Cisco and IBM regard developing smart cities as their biggest business opportunity in this decade. Since IT is at the core of all other technologies, also interested in the opportunity are HP, Microsoft, Accenture, Honeywell and several other big IT companies and a large number of start-ups. "We need to see cities as selffulfilling, water-neutral and as close to zero carbon as possible," says Emma Stewart, senior manager of sustainability at Autodesk in San Francisco. "At the same time we need to retain jobs, culture and 'city-life' aspects. I don't think we can achieve those without making cities smarter."

WHY CITIES ARE BECOMING 'SMART'

Cities use different methods to become smart. "Big events provide an opportunity to remake a city," says Steve Hodgkinson, research director for public sector technology at the analyst firm Ovum. London and Rio de Janeiro are using the next Olympics and Football World Cup, respectively, to remake their cities. In the future, big natural disasters could provide similar opportunities too. In Japan, earthquakes are providing a big push — both after the events and in preparation for the next one — for intelligent city technologies. "Disasters create the need to cut through a huge collection of vested interests," says Hodgkinson.

Cities are adopting smart technologies for different reasons: Amsterdam to reduce its carbon emissions, Tokyo to become

more competitive, and China to tackle its resource scarcity. Elsewhere, South Korea is using cities like living labs to help domestic companies drive growth in other markets, specifically in India and China. In every case, the smart city is the beginning of initiatives that will drive big changes on the earth over several decades. "The city is a relatively manageable entity when compared to the earth," says Ynse de Boer, who leads smart city projects for Accenture in Asia-Pacific. Accenture is helping several cities to build intelligence into their infrastructure. In Amsterdam, it is strategising a large project to reduce carbon dioxide emissions in the city. The city officials' goal is to use 20% renewable energy by 2025 and reduce emissions by 40%, when compared to the levels of 1990. In Fujisawa, about 55 km from Tokyo, Accenture, Panasonic and several other companies are building a smart city within the city. It will support 1,000 families and will be ready for occupation in 2014. The city is building infrastructure for charging electric vehicles, energy generation and storage for public buildings, video-based security systems, smart appliances in all homes, and several other facilities. The city administrators believe that the \$742-million project can reduce carbon dioxide emissions of the city by 70%.

WHAT EXISTING CITIES ARE DOING

As these smart cities develop, many existing cities around the world are remaking themselves bit by bit. In Toronto, the waterfront area is creating an ultrahigh-speed broadband network, with speeds of 100 Mbps for residences and 10 Gbps for commercial establishments. This network is supposed to help deploy a large number of new services like telemedicine, distance education, virtual tourism, and several business applications. This will help Toronto to compete with major cities worldwide for attracting investment. Wembley Stadium in the UK went through a major overhaul, integrating all building safety systems with data, video and voice communications, and then using an intelligent control solution. It has made Wembley the most technically advanced sports stadium in the world. The Toronto Waterfront project was managed by Cisco and the Wembley project by Honeywell. IT companies are involved in thousands of similar projects around the world. Just one company, IBM, has more than 2,000 projects focused on making cities smart.

Even in India, there are departments that are beginning to employ smart technologies. Bangalore's traffic police have 180 cameras around the city managed from a control room. "Bangalore has the most advanced traffic management system in the country," says V Ravichandrar of Feedback Consulting, an urban development consultant in Bangalore. In Mumbai, the recent terrorist attacks have prompted the development of a city-wide security system. Many large private developments have begun to incorporate smart technologies. IT companies now consider the Delhi-Mumbai Industrial Corridor to be a great opportunity to build several smart cities in the next two decades.

WHAT COMPANIES ARE DOING

The idea of a smart city has received international attention only in the last few years. IBM has been one of the prime movers of the idea, especially of the word 'smart'. In 2007, IBM asked 4,000 employees and their families about the big problems that they

face. IBM then ran its analytics engine on the responses it received. "All the responses were focused on the physical world," says Guruduth Banavar, chief technology officer of IBM public sector. This exercise led IBM to its smart planet initiative, of which building smart cities was an important part.

Other large companies — Cisco and Accenture, to mention two obvious examples — had similar ideas, but made different approaches to the problem. "Cisco follows a top-down approach," says Hodgkinson, "while IBM follows a bottom-up approach." Cisco convinced the South Korean government to build Songdo near the city of Incheon. Being a networking company, Cisco is creating an intelligent network for the new city, through which it delivers a number of services. For example, Songdo residents will be able to control lighting, air conditioning and heating systems, gas, curtains and all other home devices using touch-screen wall pads, mobile remote controllers, smart phones, computers or tablets. The Cisco tele-presence unit will connect homes, schools, banks and the government. "If children fall ill and miss school," says Janesh Moorjani, Cisco India president of enterprises and public sector. "they can attend classes through tele-presence."

For IBM, with its business focus on analytics, management of data is at the heart of its smart city initiatives. The amount of data captured by the government has gone up exponentially over the last few years. Deep analysis of this data can provide insights as well as predictive power. It can tell governments why problems occur, and also give pointers on when it could happen again and what to do. In a smart city, analytics is as important for avoiding disasters as it is for the smooth running of the city. A large number of city corporations around the world are now beginning to use data analytics for transitioning into the smart era. The city of New York is an obvious example. Till recent years, it was known to be one of the world-centres for crime. Early last decade, the city mayor kicked off a major initiative to crack down on crime. Now, the city police combine surveillance with information from databases, which gives them the ability to investigate crime very quickly. The analytics software also gives alerts, which give the police the ability to predict the next crime and take preventive action. Says Banavar: "Predictive power is the hallmark of a smart system."

The Brazilian city of Rio is also turning out to be a user of analytics. Rio is preparing for the Football World Cup in 2014 and the Olympics in 2016, but is struggling with crime and natural disasters like flooding. It has developed information systems that also analyse what happens during floods to buildings, public transport and energy systems. Weather prediction systems combine with mathematical models of water flow in the city to provide enough information to avoid major disasters. In the future, such warning systems will become common-place in all cities. Later this decade, as enough new buildings are built with sensors that can gather realtime data, cities will begin to integrate their departments like never before. "The sharing of information is already happening at a micro-level in buildings," says Greg Turner, vice-president of global offerings at Honeywell Building Solutions. "But the real transformative power will come only when it all comes together." In other words, cities would need to develop a brain.