TOWARDS A SMART NATION

Building a smarter Singapore

On this small island, smart city technology can make a great difference to key areas such as water and energy efficiency

About 50 kilometres north-east of Tokyo, a city of the future is developing. It is not the kind of futuristic city you might find in science fiction movies: no flying cars or humanoid robots or holograms. Instead, the Kashiwa-no-ha Smart City Project uses technology for something far more important.

Kashiwa-no-ha is a "smart city" – a city that coordinates its information and communications technology to improve its urban services and increase its sustainability, while making the lives of individual citizens more convenient and comfortable. For example, it utilises an Area Energy Management System (AEMS) to gather and analyse information about the energy supply and demand across the region, and regulate the power grid accordingly.

Singapore is a long way from Kashiwa-no-ha, but that distance is only geographical. The smart city concept is even more applicable to Singapore's context: on this small island, smart city technology can make a great difference to key areas such as water and energy efficiency, healthcare, transport, and security. And the first steps are already being taken in that direction.

The Smart Nation initiative, which aims to implement smart city technology across the island, was launched last November. Prime Minister Lee Hsien Loong said at the time that in order to be outstanding, Singapore must "use technology extensively and systematically, particularly IT . . . This will make our economy more productive, our lives better, and our society more responsive to our people's needs and aspirations."

Making daily living more sustainable

Sustainability is an evergreen issue for urban areas. As the smart city concept takes hold in Singapore, sustainability will become even more important, simply because the more technology a city employs, the greater its power consumption becomes.

To more efficiently manage energy use, cities are beginning to utilise smart grid technology – an electricity system that independently uses information technology to gauge the power demand, and adjusts the supply accordingly. Such energy management systems minimise their impact on the environment by only generating as much power as the city needs. They can even be integrated with waste collection systems to burn biomass as fuel, reducing the city's reliance on fossil fuels and putting some of the waste it generates to good use.

A number of smart cities around Asia, including Dalian BEST City in China and Kashiwa-no-ha Smart City in Japan, have already implemented smart grid technology to increase their energy sustainability and reduce their carbon footprint.

"We believe that a smart city must have three ideals: it is an environmentally symbiotic city, a city of health and longevity, and a city of new industry creation," says Mr Ichiro Iino, Chief Executive for Asia-Pacific, Hitachi, Ltd. and Chairman, Hitachi Asia Ltd. "In a nutshell, Hitachi designs smart cities by seeking optimal balance among people, places, prosperity and planets."

The Kashiwa-no-ha AEMS was created by Hitachi, as was the Community Energy Management System in Dalian BEST City.
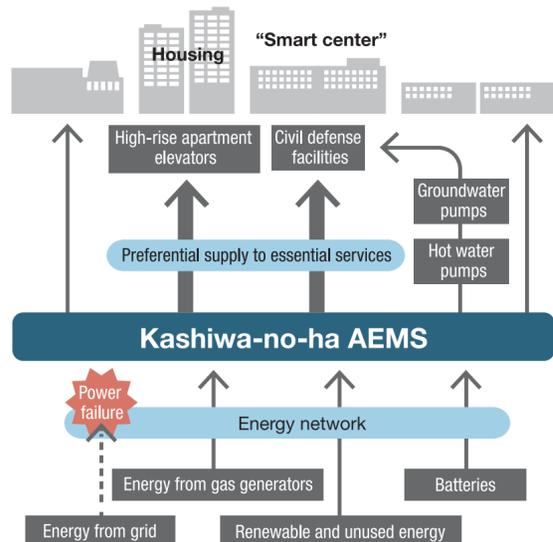
Providing for our elderly

Besides using technology to improve their sustainability, smart cities also utilise it to take better care of their citizens, especially the elderly. Many countries today, Singapore included, have ageing populations with specialised healthcare needs. Smart city technology can be used to meet those needs in new and better ways.

A key issue in healthcare for the elderly is allowing them to "age in place" – letting them spend their final years in their own homes, rather than in hospitals or care centres. This is often impractical because elderly citizens, especially those with medical conditions, need constant monitoring to ensure that they are receiving the care they need. However, healthcare IT services can provide a solution to this need. For example, elderly patients at home can wear miniaturised monitors that keep track of their vital signs and notify medical personnel if something happens to them.

In addition to medical monitoring, smart city technology can be applied to patient information. Elderly patients are more likely to have multiple medical conditions and require the care of several different doctors, each of whom will need access to the patient's medical information. IT platforms can be used to quickly and effectively share this information. In fact, a number of hospitals in Singapore have already begun using IT to integrate their different healthcare services.

Convenience and security

At the core of each smart city is one fundamental concept: that systems should be able to pre-empt people's needs and help them carry out basic tasks, or provide them with the information to do the task themselves in the most efficient way.

In Singapore, smart city technology has already begun to improve daily living in small ways. For example, the Land Transport Authority launched the MyTransport app for smartphones in 2012. One of this app's features is "smart mobility", the ability to access real time transport information and plan a commute more efficiently. To do this, the app draws on existing bus and traffic monitoring systems to estimate when a given bus will arrive at a particular bus stop, and how much room there will be on the bus.

However, like many other forms of technology, smart cities are not perfect. They have their own dangers, most notably cyber-security issues. A city's vital systems, such as its power grid or water supply, may become a target for hackers. Homes are also potential targets: in the US, for example, security experts have been able to break into home systems and take over remotely controlled appliances.

Smart cities, with their reliance on infocomms technology, may also be uniquely vulnerable to physical disruptions. In past years, undersea fibre optic cables have been damaged by a wide range of incidents ranging from natural disasters, to ship anchors, to trawler nets, and even shark bites. The same thing can easily happen to power or data cables in a busy urban environment. And in Singapore, there is the added danger of lightning strikes: due to the density of the power grid here, Singapore has the highest incidence of lightning strikes in the entire South-east Asian region. Disaster management and response systems therefore take a high priority in smart city technology.

Achieving the smart city vision

The development of a smart city is a collaboration between all the parties involved, from the government to businesses to the citizens themselves. Kashiwa-no-ha Smart City in Japan, for example is a collaboration between a wide range of stakeholders including government agencies, universities, research institutions, and large corporations such as Mitsui Fudosan Co., Ltd and Hitachi, Ltd.

Within such collaborations, public-private partnerships are often fundamental to developing and implementing the necessary technologies: in Singapore, government agencies such as the Housing & Development Board, the Public Utilities Board and the Building and Construction Authority are already working with various corporations to test-bed a wide range of integrated systems solutions. The PUB, for example, is collaborating with Hitachi on sewage water leakage prevention and auto-management systems – infrastructure that is often hidden behind the scenes, but is incredibly important to daily life. Other areas being explored are energy efficiency, green buildings, and traffic flow management.

At the end of the day, a smart city is smart not just because it integrates its services and infrastructure through technology. It can also potentially integrate its residents and stakeholders: government, business, academia, professions, and individual citizens themselves, for a more comfortable and balanced way of living.

(Left) Concept of a smart city. (Below) Proton Beam Therapy System

Diagram: "Smart center" / Housing / High-rise apartment elevators / Civil defense facilities / Groundwater pumps / Hot water pumps / Preferential supply to essential services / **Kashiwa-no-ha AEMS** / Power failure / Energy network / Energy from grid / Energy from gas generators / Renewable and unused energy / Batteries

Connecting people, places and events

USED correctly, technology can bring us closer together, and that ideal is at the heart of a smart city. From mobile systems infrastructure to public communications systems, from wireless networks to broadcasting systems, these and many other applications are the foundations of today's urban living. In Singapore, a number of companies are already laying these foundations. They include Hitachi Kokusai Electric, a wireless communications specialist which established a subsidiary here in April 2015. Like its counterparts in the industry, Hitachi Kokusai develops systems that enable critical information flows and support the connectivity that is increasingly important to modern cities.

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