By CHARISSA YONG
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IMAGINE commuter transport synchronised to your personal needs, roads of driverless cars, robot-run restaurants, and even sensors that alert public officers that someone is smoking where they should not.

This could be the scenario of a Singapore running even more efficiently than ever, in a vision for a Smart Nation spelt out on Monday by Prime Minister Lee Hsien Loong. It involves individuals, government and businesses alike working in concert via the nationwide, integrated use of data analytics, sensor networks, information communication and phone apps.

This new goal – with a 10-year target – builds on initiatives to be a smart city, and also an Intelligent Nation 2015. But before jaundiced types wonder if Singapore is not already smart or intelligent enough, the latest drive, if successful, would take things up a notch and the current batch of smart cities of the world (see side story).

Showing how much it matters, the Smart Nation Programme Office has been put under the Prime Minister's Office, with a minister in charge, Dr Vivian Balakrishnan, rather than coming under a statutory board, the Infocomm Development Authority (IDA), as previous smart city efforts were. No wonder. At stake is a potential loss of economic competitiveness, not to mention a missed opportunity to improve Singaporeans' lives, say experts.

"If Singapore does not try new things, it will slip behind other global cities, because innovations will not happen here but elsewhere, like Silicon Valley," said the executive director of the Agency for Science, Technology and Research's (A*Star) Science and Engineering Research Council, Dr Tan Geok Leng.

What stands in the way

TO BECOME a smart nation, Singapore must overcome two problems. The first is to do with analysing big data – the massive volume of data created by every digital process and social media exchange, which can yield groundbreaking insights and solutions to longstanding problems. Are these systems secure, and can citizens maintain their privacy?

Several incidents have called the robustness of Singapore networks' security into question: Some government websites were vandalised last year, while 1,500 SingPass accounts were accessed illegally in July.

PM Lee acknowledged at the Smart Nation launch: "I don't think (our cyber-security functions) are as strong as we would like them to be." Indeed, the IDA just announced that it is rolling out two-factor authentication for SingPass next year.

Then there are the inevitable concerns about privacy.

The public sector is excluded from the Personal Data Protection Act, but as more private companies come on board the smart nation push, more data will be made available to them and citizens, intentionally or not.

For example, the United States-based, non-profit Electronic Frontier Foundation has flagged the possibility of smart meters – which provide real-time readings of household energy use – revealing changes in a person's routine and the types of electronic equipment in the home.

This has implications for personal privacy and home security, but A*Star's Dr Tan, who was instrumental in drawing up Singapore's road map for infocomm development for the next 10 years, thinks such concerns can come at great cost for the country. "The fear of privacy (loss) can't be so strong that you tie yourself up and don't do anything," he tells Insight. "We must protect the rights of the individual, but also use technology to improve the city. If you're constrained, you cannot move."

The second problem is that Singaporeans – especially in business settings – can be overly conservative in adopting new technologies.

It is a daily frustration for Mr Raj Singh, director of cloud-based IT firm Vanpeak, who gripes that many local companies are resistant to cloud-based data-storage solutions, preferring to use paper. This results in unnecessary duplication and costs, he says. "People have to change their mindsets," he says. "Technology isn't just for people in their private lives. Nor does it mean sophisticated robots. Sometimes it's just about better ways of doing business."

At the same time, a smartphone does not a "smart person" make – despite the high penetration of smartphones and broadband access here, there may not be enough people with the right skills.

Consulting firm McKinsey estimates the US alone faces a shortage of 140,000 to 190,000 people with analytical expertise, and another 1.5 million managers who can make decisions based on analysis of big data. Over here, computer science degrees were shunned in the aftermath of the dot.com bust of the early 2000s, according to university enrolment figures.

However, good salaries and a fun work culture have recently pushed up demand – the number of National University of Singapore applicants listing the School of Computing as first or second choice jumped about 50 per cent over the last three years.

With higher demand came higher cut-off scores: Previously, A-level students could enter with three Bs. Now, they need at least two As.

But even as the calibre of such students rises, "in the States, the best programmers have years and years of programming experience under their belt before they move into college", says Mr Wee Yeong Wei, 25, who works at a leading data analytics software firm.

The Government is all too aware: On Monday, PM Lee urged schools to expose students to IT and programming, and added that, in some countries, learning the basics of coding is mandatory.

Living in a smart nation

SOME fear that the less tech-savvy, especially the elderly, will get left behind. This is why building a smart nation "should not be just about adopting new and 'cool' technologies", but about meeting the unique needs of people, says IBM's public-sector business development manager Khoo Peng Han. "Like a good highway, the value of connectivity to a smart nation is not about the speed that can be achieved, but the destinations it serves and the services along its path that benefit its users," he says.

One way to serve seniors, for example, is to make sure information is accessible to them, not just through a smart device, but also electronic signs, says Forrester Research telco analyst Clement Teo.

For example, there could be boards with text that can be updated, or speakers that can play a message in different languages, at void decks.

Citizens can get on board too, such as coming up with creative ways of analysing official data themselves, says tech blogger Alfred Siew.

For example, people can come together to write apps or even launch start-ups, using data shared by the Government. Over 8,000 government datasets are available on the Data.gov.sg website under the Open Data initiative. Since 2011, over 130 apps have been created with such data.

These include The Great Singapore Rat Race, which helps users visualise their starting pay according to university or course of study.

What we have going for us

THE fact that while other cities talk about becoming smart cities (see side story), the Republic is envisioning being a smart nation illustrates Singapore's two key advantages.

First, the smart nation push is a national effort, with the weight of the Government behind it.

PM Lee emphasised the importance of a cohesive effort, saying: "Today, the government departments are all doing their own things: LTA (Land Transport Authority), URA (Urban Redevelopment Authority), MOM (Ministry of Manpower) and so on. Our research institutes are doing their own things. We need to bring them together. And we can go much further if we can put it together, deploy them effectively to benefit the whole nation."

In this way, Singapore overcomes the problem of different groups hoarding their own data for reasons like sensitivity, says A*Star's Dr Tan. "The more you're able to aggregate the data, the more you're able to see what's going on. By setting up this smart nation platform under the auspices of the Prime Minister's Office, we can make sure we can collate the data. That gives us an advantage over other people, who may not have the vehicle to bring about this sharing."

Others also point to the speed at which the Government makes and implements decisions. "Some nations or cities may argue forever about privacy concerns that come with the use of big data. Singapore tends to be less bogged down by such things," says Professor Bernard Tan of the National University of Singapore's Information Systems Department.

Second, Singapore's small size means that infrastructure can be quickly deployed, say experts like Professor Lim Ee Peng, director of the Singapore Management University's Living Analytics Research Centre.

In fact, the World Economic Forum's annual Global IT Report consistently ranks Singapore as the second most ready country in the world to make use of its big data and infocomm infrastructure. It has held its rank since 2010, beaten to the top spot only by Sweden or Finland.

The report looks at a country's mobile network coverage, international Internet bandwidth, secure Internet servers, and electricity production, among others.

But while "Singapore offers a fine, well-defined environment to test and experiment, we also encounter a disadvantage compared to larger countries with multiple cities", says Mr Shrinivas Kowligi, who leads IBM's Smarter Cities initiative for Asean.

With a smaller consumer base, it is harder to attract the investment needed to adopt technology in a big way, he says.

Still, A*Star's Dr Tan says this is not a problem, as other countries and firms partner research institutes here on projects for technology solutions that can also be applied elsewhere.

The future is also on Singapore's side if it learns to

Despite the high penetration of smartphones here, there may not be enough people with the right skills in turning Singapore into a "smart nation", but there are calls to expose students to IT and programming early. ST FILE PHOTO

Sensors galore and an eye in the sky

SENSORS IN JURONG LAKE DISTRICT
■ More than 1,000 sensors that measure levels of humidity, light, noise, sulphur dioxide, haze particles in the air and temperature will be installed in the town. They will be used to monitor and control traffic lights or detect illegal smoking, among other things.

NEW ERP SYSTEM
■ A new satellite-based electronic road pricing system (ERP2) in the works could charge a motorist based on how far he travels on congested roads, and can track the precise position of each car. The data will be anonymous, however, and aggregated with that of many others who move in a similar pattern.

SENSORS FOR HDB FLATS
■ Future homes can come equipped with energy sensors that monitor how much energy each appliance consumes. This information can make it easier for residents to reduce their overall energy usage.
■ Motion sensors can track the movements of senior citizens at home, and alert caregivers if the seniors exhibit irregular movements, for instance, if they fall or faint.

"fail fast and learn quickly", as PM Lee said on Monday.

"We will encourage experimentation. When we fail, we will learn quickly and try again," echoes Mr Tan Kok Yam, head of the Smart Nation Programme Office in a statement to Insight.

Dr Andrew Hudson-Smith, who heads University College London's smart cities and urban analytics course, tells Insight that "smart cities will grow naturally over time via new apps, personal devices and data from citizens". "So even if the first early trials fail, the next 50 years will see the rise of the smart city as a truly automated, networked system".

All in all, Singapore has much of the makings of a smart nation, argue those optimistic about its prospects – the runway is there. What remains is the take-off.

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What other smart cities are doing

A central database, fed by 12,000 sensors on lamp posts, in gardens and cellphones, coordinates municipal services in Santander. PHOTO: GETTY IMAGES

The apartments and office and retail space in Songdo will be linked to each other virtually, through its information systems. ST PHOTO: NEO XIAO BIN

A visual map of New York City is available, thanks to a data-sharing platform from 20 agencies and external organisations. PHOTO: GETTY IMAGES

SANTANDER
RUNNING on an 8.67-million-euro (S$14 million) budget and backed by the EU, this northern Spanish city is the first comprehensive "smart city" in Europe.

A central database – fed by more than 12,000 sensors on lamp posts, in gardens and cellphones – is responsible for coordinating municipal services.

For example, sensors in bins measure how much rubbish they contain, and notify waste management services for collection when almost full.

The city has also opened up about 75 data sets to citizens and businesses, so that they can develop apps and new services.

Santander is also looking at introducing technologies to enable the city to be even more efficient in the delivery of services, to "do the same things with less budget", and to involve businesses in the process.

SONGDO
THIS South Korean city, 56km from Seoul, was built from scratch: on 607ha of reclaimed land sits the largest private real estate development in the world.

By its completion next year, its 80,000 apartments, 4.6 million sq m of office space and 930,000 sq m of retail space will be linked to each other virtually, through its information systems.

Every home in this S$47 billion project will have a telepresence system, allowing users to control heating and locks remotely, as well as use video-conferencing to deliver and receive education and health care.

NEW YORK CITY
THE Big Apple uses a city-wide, data-sharing platform from 20 agencies and external organisations, which can be then translated into a visual map for city managers to study.

For example, the Mayor's Office of Data Analytics worked with tech firm IBM on an algorithm, which directs the city's fire department to inspect over 300,000 buildings in the city and identifying those with similar characteristics of having had serious fires historically.

This "risk map" means that the fire department is able to cut its response time to inspecting the worst conditions by nearly two-thirds.

The city also makes available to entrepreneurs a "business atlas", allowing them to create business plans based on data like economic activity, demographics, and foot traffic.

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