INTERACTIVE SESSION   TECHNOLOGY

Singapore as a Smart Nation

Singapore is a small island at the southern tip of the Malay Peninsula with a population of about 5.8 million. Over the second half of the last century, this tiny dot on the map has become well-known for its astonishing economic development—it is now one of the countries with the highest GDP per capita in the world.

The next step in Singapore's evolution is its plan to use information technology to transform itself into a "smart nation." A smart nation or city uses electronic data collection sensors, large scale data centers, and analytic software for initiatives that address a variety of urban challenges. Singapore's Smart Nation initiative aims to make Singapore a sustainable modern city, countering the pressures of increasing urban density and an aging population. Recently, Singapore has also launched a national artificial intelligence strategy, which its government has identified as a key step in the development of its Smart Nation program.

As one of the smallest countries in the world, Singapore does not have much room to expand its transport infrastructure. The Singapore government announces traffic-related indexes, traffic alerts, and traffic snapshots in national and regional views by consolidating data provided by the weather and the transport departments, collected by surveillance cameras on traffic hotspots, sensors on vehicles, commuters' fare cards, and the Electronic Road Pricing System (Singapore's electronic toll collection scheme for alleviating traffic jams). Before travelers hit the road, they now can consult the Realtime Singapore Traffic Watch website or third-party mobile apps for traffic conditions and commute details such as bus arrival timings. Singapore is also testing on-demand driverless vehicles.

Housing planning in Singapore must consider its sunny, hot, and humid climate. Virtual Singapore creates simulations to design a comfortable green living environment that balances the needs of a large population in a limited space. It offers a dynamic 3D city model and data hub, available for the general public, government bureaus, businesses, and research institutes to conduct long-term planning and virtual experiments. Smart Towns are equipped with solar energy panels and smart lights, which light up or dim depending on whether they detect passers-by, thus saving energy. This smart lighting system won first place at the IDC Smart City Asia Pacific Awards 2020 in the category of smart building/smart tech parks. The Automated Meter Reading scheme will allow residents to access water usage data with just a few taps on their smartphones. The Pneumatic Waste Conveyance System aims to deliver household waste to sealed containers through underground vacuum tunnels and use sensors to adjust the service cycle of trash-collection trucks. The authority uses drones to survey mosquito breeding hotspots to prevent outbreaks of dengue fever.

Patients in Singapore can obtain medical advice from healthcare professionals without leaving home through the Smart Health Video Consultation system, which is made possible by the wide coverage of stable, high-speed household Internet connections and the high level of smartphone penetration. Patients in Singapore may perform rehabilitation exercises anytime and anywhere using a TeleRehab kit. It has been designed to be easy to operate—a patient just needs to access the app in the tablet PC provided in the kit, put the limb and neck sensors on correctly, and perform the rehab exercises (by following the video demos on the tablet) using the appropriate exercise bands with different levels of resistance. If necessary, they can consult their therapist in real time during office hours using video-conferencing. To keep its senior citizens healthy and active, Singapore has introduced RoboCoach, a robot fitness trainer that replicates human movements using motion-sensor technology and gives instructions in one of four languages or dialects.

There are other infrastructural projects in progress, such as CODEX (a data exchange platform for internal data-sharing among government agencies), NDI (a digital identification program of citizens and businesses that allows pre-filled form information to be shared with authorized public or private parties), Moments of Life (a one-stop portal for parents to fill out and submit applications for their newborns), and the Smart Nation Sensor Platform (a scheme to collect different types of data, such as air quality, on a territory-wide scale). The private sector, research institutions, and individuals contribute ideas and launch projects.

Singapore was named the Smart City of 2018 at the Smart City Expo World Congress for its outstanding performance and for setting a model for the world by involving its people, the private sector, and government agencies in implementing its blueprints for a smart nation. Its projects have demonstrated the city's willingness to improve the quality of life of its residents, and all signs indicate that its tech strategies will continue to enrich their lives in the future.

However, smart cities and smart nations are not without their issues. Critics point out that in the last ten years smart city and smart nation projects have failed to deliver on many of their objectives, such as reducing urban automobile congestion and pollution despite grand promises with budgets to match. They also take many years to implement the technology, let alone the solutions. The initiatives are often ignored by citizens who fail to see the benefits in their daily lives, especially for poor, elderly, and less tech-savvy citizens, and they pose extraordinary privacy and security issues as well.

Sources: IDC Smart City Asia Pacific Awards, "2020 Winners," www.idc.com, May 20, 2020; Integrated Health Information Systems, Ihis.com.sg, accessed January 8, 2020; Smart Nation Singapore, "Smart Nation Initiatives/Strategic National Projects," Smartnation.sg, accessed January 8, 2020; Eileen Yu, "Singapore Wants Widespread AI Use in Smart Nation Drive," Zdnet.com, November 14, 2019; Tham Yuen-C, "What Is Codex? The Tech Behind Singapore's Smart Nation," Govinsider.asia, April 24, 2019; Kevin McSpadden, "Critics of SG Smart City and All Smart Cities Worldwide—5 Critiques of the Smart City Push," Yahoo News, September 2018; "Finance and Policy AP: Can Investment of $100m in AI Get Singapore's 'Smart Nation' Vision Back on Track?" Smartcitiesworldforums.com, May 8, 2017; Kevin Kwang, "Commentary: Singapore's Smart Nation Vision Blurry Without a Success Story," *Channel News Asia*, August 15, 2017; Maros Krivy, "Towards a Critique of Cybernetic Urbanism: The Smart City and the Society of Control," *Journal of Planning Theory*, April 27, 2016; Boyd Cohen, "The Smartest Cities in the World 2015: Methodology," www.fastcompany.com, November 20, 2014.

CASE STUDY QUESTIONS

1. What are the factors driving the Smart Nation initiative?

2. Describe the smart city initiatives of an urban center in your country or region.

3. What are the possible downsides to the Smart Nation project?

Case contributed by Joyce Chan, City University of Hong Kong

(improving products and the production process), and procurement (purchasing input).

Now you can ask at each stage of the value chain, "How can we use information systems to improve operational efficiency and improve customer and supplier intimacy?" This will force you to critically examine how you perform value-adding activities at each stage and how the business processes might be improved. You can also begin to ask how information systems can be used to improve the relationship with customers and with suppliers who lie outside the firm's value chain but belong to the firm's extended value chain where they are absolutely critical to your success. Here, supply chain management systems that coordinate the flow of resources into your firm and customer relationship management systems that coordinate your sales and support employees with customers are two of the most common system applications that result from a business value chain analysis. We discuss these enterprise applications in detail later in Chapter 9.

Using the business value chain model will also cause you to consider benchmarking your business processes against your competitors or others in related industries and identifying industry best practices. **Benchmarking** involves comparing the efficiency and effectiveness of your business processes against strict standards and then measuring performance against those standards. Industry **best practices** are usually identified by consulting companies, research organizations, government agencies, and industry associations as the most successful solutions or problem-solving methods for consistently and effectively achieving a business objective.

Once you have analyzed the various stages in the value chain at your business, you can come up with candidate applications of information systems. Then, once you have a list of candidate applications, you can decide which to develop first. By making improvements in your own business value chain