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## Fujisawa Sustainable Smart Town: Panasonic's Challenge in Building a Sustainable Society

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### Abstract:

Urban utility equipment and electronic goods manufacturers are experiencing profound challenges in this age of rapid technological change. Panasonic, Japan's leading electronics company, has also recognized the limits of its traditional product manufacturing orientation and decided to enter IT-intensive town management in view of these challenges. It has advanced a new strategy for creating sustainable communities to encourage both stakeholders and local residents to get involved. Stressing sustainability, the strategy has adopted a long-term perspective (i.e., a 100-year timeframe). Significantly, it must provide values that foster community-based sustainability and adopt a business model that ensures the economic viability of both constructing the town and managing its ongoing services. As information systems play a big part in the provision of services in the new town, the strategy requires the linking of information with technology and social aspects, quite unlike traditional manufacturing, which is solely based on technology concerns. As part of its new strategy, Panasonic defined five prominent service areas (i.e., energy, security, mobility, wellness, and community). The company thought these areas would expand and generate new value and services throughout the strategy's timeframe.

**Keywords:** Smart City, Service Management, IT Alignment, Community, Sustainability, Value, Business Model.

A teaching note for this case can be obtained from *mihoko.sakurai@uia.no*.

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## 1 Introduction

In November, 2014, Panasonic, a prominent Japanese electronics company, opened the doors to a sustainably designed “smart town”<sup>1</sup> in Fujisawa City, a suburban city approximately 40 kilometers southwest of Tokyo. Planning of the town started some seven years prior to 2014 with completion expected to coincide with the company’s 100th anniversary in 2018. Unrelated to that fact, the company conceived this large-scale suburban development project with a 100-year timeframe in mind, though Panasonic’s company fundamentals leading up to project initiation and those paving the way into the future could not have differed more. Panasonic has led the world in developing, manufacturing, and selling electronics, but it had never engaged in something such as a town-development project that entailed construction and management. However, the product cycle of electronics continues to shorten each year, and electronics companies need to introduce new products regularly every six months or so. Because companies still make business plans according to the product cycle, they usually expect mid-term projects to finish within three years at the longest. For Panasonic, however, the need to plan, execute, and extend its town project 100 years into the future constituted a new frontier. It would need some ten years to get the project up and running. In fact, the town-development project led Panasonic to propose a new business model that relied on the integration of community services and information technology. The company saw information technology as key for the project’s success in terms of giving service providers access to collaborative marketing opportunities and managing specific town services. In the newly developed town, the town’s residents would share the town’s services. The company envisaged the town to promote collective actions based on extensive information sharing (e.g., reducing energy consumption, securing safety of the town, car sharing, etc.) by monitoring residents’ activities and analyzing collected data—in strong contrast to traditional individual solutions toward sustainability goals. As it turned out, this model enabled Panasonic to provide rather finely tailored services to the residents while also reducing the negative environmental impact. Service providers could also benefit by joining the smart town initiative. This model differed from traditional models in that it did not focus on earning profits through mass production and the sale of physical goods. Instead, Panasonic envisioned generating new value by employing information and technology to address the social needs of the residents in a networked, coherent sense.

## 2 New Opportunities to Create a “Sustainable Smart Town”

The notion of sustainability entails a comfortable standard of living in the capacity of nature (Hovorka, Labajo, & Auerbach, 2012; Milne & Gray, 2013). The well-known framework of business management and sustainability, named the triple bottom line (Elkington, 1997), indicates that one should incorporate economic, environmental, and social sustainability into a single structure. In March, 2008, three of the factories of Matsushita Electric Industrial Group (renamed Panasonic that year) located on a 19-hectare (approx. 190,000 m<sup>2</sup>) site in Fujisawa City were closed down after fifty years of operation. Panasonic had built their first factory in that region in 1961 during a time when Japan experienced rapid economic growth though with the downsides of heavy pollution, urban population concentration, and general environmental destruction—issues that we continue to wrestle with today.

Fifty years after the Fujisawa factory began operating, the changed social environment, a stagnating population, and the shift of the company’s manufacturing base overseas made it difficult to maintain the factory as it was. Industry had begun shifting towards a services-based economy apart from the conventional a goods-based economy (Rai & Sambamurthy, 2006). In fact, the market size of electric goods in Japan was shrinking. According to the Ministry of Economy, Trade and Industry, output of electric goods recorded a decrease of about 40 percent over the 15 years from 2000 to 2015 (JEMA, 2016). Shipping of electronic household products also fell 20 percent over the past 25 years. Whereas Panasonic recorded a sales peak of ¥9.1 trillion (approx. US\$800 million) in 2007, the figure had fallen to ¥7.5 trillion (approx. US\$670 million) by 2016 (Panasonic, 2016). It became imperative for the company to create a new business area to achieve economic sustainability. Consequently, along with the deteriorating domestic market environment, the redeployment of former factory sites moved up on the agenda. The founder of Panasonic, Konosuke Matsushita, who believed in the importance of securing employment and shifting citizens to the countryside, had originally proposed “One prefecture, one factory”, which was a

<sup>1</sup> “Smart town” here refers to a novel town development project by Panasonic. The town concept is based on principles of sustainability intended to last well into the future. This entails a new way of doing business along with the integration of new town services and IT. The town delivers safe, sophisticated and environmentally friendly services to its residents.

plan to build one or more factories, such as the Fujisawa factory, in each of Japan's prefectures (Japan contains 47 federal entities akin to states called prefectures). Subsequently, while Panasonic was considering its future business vision, the local government of Fujisawa City intended to use the vacant site for a range of industrial functions including research and development and welfare and education. Although the site was listed with less strict construction regulations and would have allowed large-scale retail malls or multistory apartment buildings, Fujisawa City wanted Panasonic to take the neighboring areas, which could only feature low rise-rise residential development, into account as well. Panasonic set up a project team devoted to redesigning this factory site, and the focus shifted to solving environmental problems that many organizations throughout the world at the time were debating<sup>2</sup>. After thorough consideration, the company chose the old factory site to undergo redevelopment to create a town in which people could live environmentally and socially sustainably with all needed services and facilities at hand.

The system model of sustainability suggests that considering what is being sustained, how long it is to be sustained, and what state it is being sustained in (e.g., continuation of organizational profitability) are crucial in designing sustainability (Hovorka et al., 2012). No doubt, when Panasonic celebrates its 100th anniversary in 2018, it will do so with a reshaped corporate mission: to become the leading environmentally innovative company in the electronics industry. Reflecting on this mission, contributions to environmental sustainability have become Panasonic's top priority. Panasonic has focused on achieving environmentally friendly living standards by providing residents with ecologically sound technology and, thereby, reducing the familiar strains of resource consumption and global degradation. Panasonic's housing unit, PanaHome, was well positioned in this process because it enabled the company to enter the town-development project with a valuable stock of experience in constructing custom-built detached housing, remodeling homes, and providing asset-management services. In close collaboration with PanaHome, Panasonic's project team proposed to initiate the building of the Fujisawa "Eco-Town" in September, 2007.

Global trends associated with a growing population and demand for better living standards demand that society and companies have sustainable practices (Seidel, Recker, & vom Brocke, 2012). Social aspects of sustainability can also reflect the quality of people's lives (Höjer & Wangel 2015). The UN (2014) has noted that more individuals now live in urban than rural areas and that the discrepancy will only widen in the future (United Nations, Department of Economic and Social Affairs, Population Division, 2014). Hence, increasingly large demands are being made on city development, especially in Asia (see Figure A1 and A2). Given the huge size of the global market (an estimated ¥3,100 trillion (approx. US\$28 trillion) in 2030 (Panasonic et al., 2011)) and the long list of problems that threaten city development such as population growth, resource depletion, and climate change (see Figure A3), solutions to achieve environmental and social sustainable living conditions appear hard to come by. Domestically, too, issues related to increasing urban population and diminished disaster safety in towns and cities (a trendy topic after the Great East Japan Earthquake<sup>3</sup>) continue to constitute major challenges. Overall, energy consumption in Japan—led by homes, offices, and transportation—has increased significantly since the 1970s, while industry has seen some relative efficiency increases over the same period of time (Agency for Natural Resources and Energy, n.d.). Novel ways of implementing and enhancing efficient energy consumption have been sought for some time. Panasonic's original mission was to help produce electric appliances closely related to everyday living. It began by producing incandescent light bulbs. From that point onwards, the 100-year-old business has had a history of consistently introducing improved or altogether new products. In this sense, due to its proximity to households' technical functioning, Panasonic occupies a unique position in proposing new lifestyle options. The company was pivotal in proposing new lifestyles and values that, by way of its knowhow of technologies and products, would not only create an "eco-town" to suit the present times but also help it look to the future, which required both a vision and an on-the-ground functionality well beyond merely constructing such a town. Thus, Panasonic, inspired by the idea of introducing change for a better life and maintaining it, eventually envisaged the project to evolve, in step with the town itself, over the following one hundred years. Initially, however, the project—referred to as the "Fujisawa Sustainable Smart Town" (SST) (Fujisawa SST Council, n.d.)—began with an outline of town-development policies in collaboration with Fujisawa City's local government.

<sup>2</sup> The G8 Hokkaido Toyoko Summit was held in November, 2008, in Japan. The participants discussed central themes such as countermeasures against the main causes of global warming and Japan's efforts to solve environmental problems.

<sup>3</sup> The Great East Japan Earthquake occurred on 11 March, 2011. It was a 9 on the Richter scale and one of the greatest earthquakes mankind has ever faced. It caused a huge tsunami and massive damage to a very wide area. In some area affected by the tsunami, the electricity supply ceased for more than four months.

### 3 Overview of Town Development

It took three years, however, before Panasonic and Fujisawa City formulated the town-development policy in October, 2011—a delay caused by Lehman Brothers' collapse. Lehman Brothers was one of the largest global financial services firms in the US. The firm operated for 158 years until its bankruptcy in 2008. This crisis affected Panasonic as well, which resulted in delays in the company's forming the project structure and preparing for financial backup.

The company formulated the basic "principles" of the new sustainable town to include the reduction of CO<sub>2</sub> emission, energy self-sufficiency, and the efficient use of energy:

- The town would reduce CO<sub>2</sub> emissions to the best of its ability by incorporating energy saving, energy creating, and energy storing technologies.
- The town would use natural renewable energy and promote energy self-sufficiency in co-existence with nature.
- The town would practice effective energy use in residences or other facilities by introducing a "town energy management system".

Following these principles, the Fujisawa SST project team came up with the concept of "bringing energy to life". This concept views energy as the essence of a place where people can live in peace and have secure and healthy lifestyles while gaining vitality through interaction. However, Panasonic needed a reliable energy power source, one that went beyond the usual sense of just "functioning", to make the concept real. Usually, cities function based on their technological infrastructure and, while developers introduce sustainability concepts in city and residential development projects, future residents provide little input. Indeed, technological infrastructure still leads the smart city initiatives around the world, such as in Amsterdam and Barcelona (Nam & Pardo, 2011; Albino, Berardi, & Dangelico, 2015). However, this conventional method focuses too much on technology and disregards Panasonic's principle of thinking from the residents' point of view, which brings into view the social aspect of sustainability.

In accordance with this thinking, Fujisawa SST proposed the following three questions: 1) what kind of lifestyle would be appropriate for residents to actually embrace the "smart life", 2) what kind of space would such a lifestyle require to allow one to call it a "smart space", and 3) what kind of "smart technology" and "smart infrastructure" would Panasonic need to build this space (see Figure A4). The project team suggested nine keywords that all related to the concept of "living": to eat, work, learn, nurture, play, keep healthy, meet, and connect. Team members pictured life in the town in terms of how these themes would develop in their own ways.

"Living" in this comprehensive way required embracing above all the idea of living in a town rather than in a house or a room to address how an entire town might control its energy in relation to that type of lifestyle. That approach, for example, would encourage car sharing and provide places for storing disaster supply kits for all to use. Under the keyword "learn", team members envisioned installing an electric bulletin board where all residents could learn from and teach one another, which would help to create a spontaneous and self-nurturing community. The Fujisawa SST expected such efforts in redefining what it means to live in and share a town to lead to very concrete results. The project team expected CO<sub>2</sub> emission rates to fall by 70 percent (compared to the 1990s) and water usage by 30 percent (compared to 2006). Also, it expected renewable energy use to increase by up to 30 percent and to secure three days' worth of emergency kits. These forecasts became a statistical benchmark for the project, which allowed the team to define three new guidelines: "project design guidelines", "town design guidelines", and "community design guidelines".

Once Fujisawa City and Panasonic came to share a common goal, the project began. The plan specified the construction of approximately 1,000 detached houses and commercial facilities and apartment complexes in the former factory site with a planned population of approximately 3,000 people (see Figure A5). Some of the main features of the plan included:

- Committee center: a facility designed as a place for discussions among residents and for social events that would invigorate the community. It would provide central storage for blankets and other supplies and serve as a shelter in case of a disaster.
- Shonan T-SITE: a composite commercial facility with restaurants, shops, and book stores. Non-Fujisawa SST residents would also be able to use the facility.

- Fujisawa SST square: located adjacent to the Shonan T-Site, the square would constitute the main site of the Fujisawa SST management office. It would support community formation, the management of town development, and business incubation.
- Wellness square: a composite facility that would provide welfare services (special nursing home for the elderly and retirement home), health clinics, and educational services (nursery school and cram school).
- Community solar power-generation system: solar panels would be installed over 400 meters along the prefectural road in the south of the city. Normally, the system would provide electricity for the city, but it could also be used for power in case of an emergency.
- Delivery square: an integrated distribution system. All parcels for different households and by different delivery companies would be centrally held. A single system to integrate and manage information (name, date, place, etc.) and delivery.

## 4 Platform to Generate New Values through Collaboration

A “smart house”—Panasonic’s definition of an energy-efficient house—is not a new concept, and many housing manufacturers have already begun using eco-friendly electronics, solar power systems, and electrical storage devices. However, the Fujisawa SST project marked the first time that Panasonic worked on a town-development project based on a specific concept, but it rapidly began to outgrow its capacity to handle everything by itself. Therefore, in May, 2011, the company had to expand the project by involving nine other companies<sup>4</sup>. In April, 2013, the project team formed a consortium that, as of July, 2017, comprised 20 different organizations. With Panasonic’s acting as the executive secretary, 11 other companies held positions as executive committee members, four held general membership, and five (which includes Fujisawa City Council) played an advisor role. At the beginning, most of the companies were in the business of providing infrastructure; however, as the project moved forward, the focus shifted to business-related services, which continues to apply today. To be a part of this consortium, companies have to adhere to four conditions:

- 1) To follow the town’s concepts and rules
- 2) To create a business based in Fujisawa SST in cooperation with Panasonic
- 3) To work toward adopting a horizontal business network, and
- 4) To act in accordance with individual business guidelines.

The first condition stipulates that the companies must follow the town’s rules and concepts. The second condition stipulates any new business they develop for the project must fit Fujisawa SST’s unique character; however, this development does not include pre-existing services. The third condition emphasizes the importance of promoting business throughout the wider region and expanding into the world unbound by Fujisawa City, which does not necessarily involve cooperation with Panasonic but rather the use of experience and knowhow gained from Fujisawa SST. The third condition focuses on creating an outward-oriented, horizontal business network. Panasonic has not yet decided on the specific rules for adopting a horizontal business network; however, it has begun to investigate business patents and licenses. Panasonic has emphasized this third condition because it does not want Fujisawa SST to end as an inward-looking trial-and-error experiment. In contrast, it wants to encourage people and business to think about expanding their model criteria into other regions. Finally, the fourth condition indicates that the content of service provided to residences can vary between the different companies. For example, real estate firms may focus on the price of land, whereas financial institutions may concentrate on providing new commercial services.

Panasonic selected participating companies in terms of the above conditions. To join, companies presented various services based on the individual “living” concepts developed for the town. For instance, a transportation company proposed an idea whereby packages should be delivered from the distribution center to each home with electric vehicles, which would cut down on the use of fuel and reduce energy use in the town, an idea eventually realized in the delivery square. From the perspective of urban security and safety, Panasonic found a need to develop a trusted delivery service that followed the town’s rules.

<sup>4</sup> Panasonic Corporation, PanaHome Corporation, Mitsui Fudosan Co., Ltd., Mitsui Fudosan Residential Co., Ltd., Accenture, NIHON SEKKEI, INC., Tokyo Gas Co., Ltd., Sumitomo Mitsui Trust Bank, Limited, ORIX Corporation. As an advisor company: Tokyo Electric Power Company, Incorporated (TEPCO).



During the initial design phase, Panasonic had no actual plan for building a distribution center; that need, and others, arose only as the town progressed. The business ecosystem framework implies generating shared visions, forming alliances, negotiating deals, and managing complex relationships (Moore, 1996). As coevolution proceeds, the whole system becomes much stronger and more likely to succeed. Generally, Panasonic coordinated the town's development well, and the increase in the number of participating companies resulted in the expansion of various services.

## 5 Design of Services for a Sustainable Community

In September, 2013, Fujisawa SST started constructing 200 detached homes, and the first occupants could start moving into their homes by the following year in March, 2014. A grand opening took place on 27 November in the same year. Panasonic expected to complete the town by 2018 when the remaining households would be ready for occupation.

Occupants occupied all of the first 200 detached homes by July, 2015, and three years later, by 2018, when this project is expected to finish, the town will have 400 detached homes and 400 apartments ready for sale. Commercial facilities will include a café, restaurants, and a bookstore. Construction for health, welfare, and education facilities began during 2015; in fact, 30 percent of the entire project had finished by that time.

To meet the numeric target values and realize the concept of "bringing energy to life", Fujisawa SST has focused on five services in these fields: energy, security, mobility, wellness, and community.

### 5.1 Energy

Panasonic had set an overall reduction in CO<sub>2</sub> levels by 70 percent as an official goal back in 1990. To accomplish this goal, Panasonic adopted the idea of detached homes that would emit zero CO<sub>2</sub> as a whole, create energy, store energy, and save energy. During the design phase for the detached homes in the new town, Panasonic simulated the houses' environmental performance in order to calculate how much sunlight they would need for their CO<sub>2</sub> levels to reach zero. The houses included solar power systems and rechargeable lithium-ion batteries as part of a system that created and stored energy, which realized the ideas of energy creation and energy storage for a self-sufficient system. Rather than transferring energy from power plants, which often results in a loss of energy from exhausted heat, Panasonic designed the system to reduce energy loss and, thus, to lead to increased efficiency. Panasonic also installed residential fuel cells that generate electricity and a hot-water supply from city gas. In addition, it installed household electric appliances with high levels of energy use, such as air conditioners, refrigerators, and lighting, with energy-saving functions. A smart home energy management system (HEMS) allowed Panasonic to inspect residents' energy use. After moving into their houses, residents registered their intended lifestyle and family structure to create individual records with reference to the energy data that the HEMS collected.

After the Great East Japan Earthquake of 2011, all electric supply in regions close to the epicenter of the disaster stopped for an extended period. The subsequent restoration work had a great influence on the Fujisawa SST project, and Fujisawa SST has since aimed to secure disaster supply kits, which enable residents to have emergency lifeline supplies for three days in their homes. By using the energy-creation and storage system, an accumulator stored energy that the solar power system generated during the daytime, which residents could use as a three-day backup source of electricity during emergencies (such as for television, lighting, gate lights, communication devices, and refrigeration). Thanks to this system, residents have a reduced risk of not having any light in the town, even during a power cut. Moreover, households can access a hot-water supply that uses water stored in their hot-water tanks during power cuts.

Panasonic installed community solar panels inside the 400 meter-long sewage system site located in the southern area of the town that generates 100,000 kilowatts per hour. Generally, Panasonic aimed to cover 30 percent or more of the total area that the town required with renewable energy and for that renewable energy to use the town's power plant and the solar power system. During emergencies and disasters, residents in the surrounding regions could also use emergency electrical outlets to use the town's emergency power supply (assuming that people would use electricity to charge mobile phones and lanterns).

Furthermore, Panasonic introduced water-conservation measures for toilets, baths, and dishwashing machines to reduce water usage by 30 percent (compared to 2006).

## 5.2 Security

Throughout the world, physical gates have provided entry into cities. Fujisawa SST emphasizes the importance of creating an open environment while also maintaining strong security. For that reason, Panasonic considered four viewpoints when planning security: open space, the town as such, homes, and people. From the viewpoint of “open space”, one can enter the town only in six locations. As for the “town” itself, Panasonic has installed 50 security cameras and LED street lamps, especially on the town’s entryways, public buildings, parks, and main roadways. Considering security from the perspective of “homes” meant the installation of home security devices such as intrusion detectors, fire detectors, and emergency alarms. Finally, from the “people” standpoint, Panasonic adopted a (human) security concierge. An innovative effort to merge the installation of security cameras and street lamps was successful. Panasonic first thought this effort impossible because of the different technologies used to control cameras and lighting. Under provincial regulations, Fujisawa City would have ownership of street lamps, while security cameras would belong to a residents’ association, which would make it difficult for the two to merge. The successful technical solution now in place was a sensor that connects the control technology of the camera with lighting technology. At night, the street lamps dim down when no one is around. When the motion sensors in the lamps detect people, the lamp lights up fully and the camera adjusts its angle of view based on the identified motion. The system comprises a device installed on top of the lamp lights two to three steps ahead of where people walk. To overcome the administrative problems in merging lighting and security, Panasonic held negotiations with Fujisawa City. After negotiation, the two parties established joint supervision of the property by the private and public sectors<sup>5</sup>.

Residents can access photos taken by security cameras installed in parks using a tablet computer at home to ensure the security and safety of their children while they play in them. This new security service, which ensures security by creating an invisible gate, is called the “virtually gated town”.

## 5.3 Mobility

Fujisawa SST also has a service that allows people to share electric cars and bicycles. From July, 2015, the Fujisawa SST project team placed one electric next to the Committee Center and another two electric cars in a garden space, a former parking lot, near the residences. The project team seeks to increase the number of cars so that it can meet its target by the time it completes the town. Additionally, as it stands, residents may have cars allocated near their homes using a rental car-delivery service. The project team also allocated ten electric bicycles around the Committee Center, but their number may increase depending on the number of new residents.

Residents must pay a monthly town-management fee to the residents’ association. This fee includes the basic charge for the availability of shared services of electric cars and bicycles. Those who want to actually use this service need to pay an additional hourly fee.

Mobility in this town does not refer only to people but also to a delivery service. The town has a delivery square from where one of the project member companies runs an integrated delivery service to residents. Every package enters into this square and is tagged. The company is developing an application to allow residents to track packages in the town. With it, residents will be able to visualize the location of packages through Viera TV, which every household has. Using Viera TV, residents will also be able to arrange a time when they want to receive their packages. While we would normally expect several independent companies to deliver packages around the nation, eight companies agreed in November, 2016, to cooperate for a one-stop delivery service in the town, which made this distribution system a novel one. Further, the consortium plans to generate new services based on this system in the future.

## 5.4 Wellness

To complete the town’s development, Panasonic built two towers as part of the “wellness square” that will include, on request from Fujisawa City, a special nursing home for the elderly, retirement housing with

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<sup>5</sup> After Panasonic makes land adjustments, it will transfer the supervision of public facilities (not only limited to lighting) including the sewage system and road system to Fujisawa City.



supportive services, and a nursery school. The buildings will also contain a tutoring school, a clinic with a pharmacy, and additional space for resident interaction.

To build this wellness square, people from different age groups met to plan its design and create a space that would encourage easy interaction between people. In the future, Panasonic plans to establish an integrated community care system that uses information and communication technology. Using this system, residents would be able to share their health information and various services, such as medical and nursing care, with the pharmacy. Not only will medical and nursery care be provided, but programs for both children and adults will also be available to encourage lifelong learning. In addition, a wide space will allow people from outside the town to interact with its residents.

## 5.5 Community

The most important aspect of the Fujisawa SST project is its 100-year vision. As opposed to traditional businesses who have ultimately sought to build and complete a city at a fixed date, Panasonic recognizes the importance of continually nurturing and growing the town. To do so, its residents need to form a community. Project team members asserted that the first 10 years are the most important for residents to form a community, and they have incorporated many mechanisms to encourage residents to communicate and resident. Further, Panasonic set up a residents' association, the Fujisawa SST committee, up to include residents and business operators from the town.

Panasonic has used information and communication technology (ICT) to help form the community; however, making technologies effective in developing a sustainable community requires a great deal of work (Coe, Paquet, & Roy, 2001). Nevertheless, technology helps empower people and gets them involved in conversations about how they live and how their lifestyles affect sustainability (Hollands, 2008). No doubt, the formation of a community using ICT presented Panasonic with a great challenge as it made efforts to effect social and environmental sustainability. Doing so connected key players inside the town and created the "town portal" (through the electronic notice board) to give residents information on how to gain access to services in the town (Panasonic ran the portal as a prototype system). Since July, 2015, residents who could teach classes and provide information through the town portal have even started yoga and hula dance clubs. Other interested residents have joined up. The town portal also supports a social network function for people to interact with one another and encourages residents to communicate. In addition, residents can also receive information about aspects of the town itself through the town portal, such as the energy-use levels in their homes, monthly eco-life recommendation reports, and reservations for car-sharing services and electric bicycles.

Panasonic also expects the community to form a sense of solidarity during emergencies. After the Great East Japan Earthquake, safety and security have been topics of widespread concern. At Fujisawa SST, Panasonic has incorporated the business continuity plan (BCP) and community continuity plan (CCP) into the town's development. The company created a disaster-assistance group for every 10-20 households that would, in an emergency, help support adversely affected residents to find their way back into their everyday lives. In addition, many mechanisms throughout residents' daily lives, such as the annual disaster-awareness event, help to raise disaster awareness.

To encourage neighboring residents to interact, Panasonic also set up a social network service called "SOY LINK". To support the exchange of information between residents of Fujisawa SST and its surrounding neighbors, Fujisawa SST's management company and stakeholder companies started a three-year trial system of SOY LINK in January, 2015. This service allows individuals and groups residing in Fujisawa City and in locales around it (aged 18 and over) and businesses in the wider region to register their shops and services. People can share and gain information by using the smartphone SOY LINK application. The application provides four services: lending and borrowing items (resource request), sharing security and crime information, receiving sales and discount information from registered stores (the city shops), and receiving information from various groups such as NPO groups of five or more members and neighborhood associations (city groups). Moreover, the Fujisawa SST committee organizes events every season to create special opportunities for residents from the town and its neighborhood to interact.

## 6 Town Management<sup>6</sup> Information Systems

Household electric appliances, smart houses, town development, and facility replacement have all contributed to continuously increasing sales at Panasonic. For reference, Japan had about 28 million detached homes in 2013 (Ministry of Internal Affairs and Communications, 2015). In 2014, the country had about six million apartments (Ministry of Land, Infrastructure, Transport and Tourism, 2015a). By 2024, almost half of the apartments will be thirty years old, which means that the market share of apartment management has steadily grown to ¥500 billion (approx. US\$4.7 billion) in 2006 and ¥700 billion (approx. US\$6.6 billion) in 2015 (Yano Research Institute, 2014). The average apartment management expense in Japan comes to ¥12,710 per month (approx. US\$120) (Ministry of Land, Infrastructure, Transport and Tourism, 2005). Apartment repair cycles vary, depending on repair parts needed, from between 13 and 20 years (see Table A1). Table A2 shows management charge estimates for two types of apartments.

In the past, many companies including Panasonic believed that they had finished their job after selling a product. They focused on selling a great number of goods to make a profit. However, given Japan's decreasing and ageing population, this approach will no longer allow companies to stay in business. Therefore, instead of selling only ready-made products, an approach in which one provides continuous services will be more profitable. Companies need to think about what types of services consumers will need while also leveraging their accumulated technology knowhow. One solution that has become apparent is to offer residents services as part and parcel of a new town's development. With this mission in mind, Panasonic established Fujisawa SST Management Company in March, 2013, to act as a gateway between residents and as a provider of a range of services of scale. To do so, Panasonic had to focus their attention on helping the town's community to form. For example, when new residents moved in, residents who lived near the new residents would organize a common gathering (a tea party) to welcome them into the community. By having the town-management company create this first contact of interaction, residents would be naturally encouraged to become part of the community.

Information systems play a significant role in designing environmentally sustainable organizational practices (Watson, Boudreau, & Chen, 2010). Information systems can collect, process, and disseminate information from and in business processes (Seidel et al., 2012). Under Fujisawa SST, Panasonic developed a technology platform to connect residents to the services in the town. From the start, Fujisawa SST aimed to change people's lifestyle by getting them to use the services the town put in place, which Panasonic expected to create a residence-oriented sustainable community (the social aspect of sustainability) and to gradually change residents' behavior towards environmental sustainability. The company planned to introduce various information systems; as of July, 2017, it has already implemented some of them (see Table A3 and Figure A6). Effective IS strategy alignment with company's goals can increase the potential impact of information technologies (Lederer & Sethi, 1988). For instance, in the energy service area, each house has HEMS installed, which controls energy consumption and storage. To achieve the goal of zero CO<sub>2</sub> emission rates, the town-management company created a monthly advisory report (eco-life recommendation report) that residents received over a two-year period after moving in. Regarding security, the company employed security cameras with a sensor to detect people. Viera TV in each household shows disaster-related information such as warnings from the government. The town portal is a gateway for residents to access services that Viera TV also shows. The portal displays residents' monthly advisory reports and pictures from the security cameras. The town-management company operates the portal. Both they and residents can post on the portal. Residents who post information can observe how others react to their posts. Moreover, the company plans to integrate residents' health information into a single information platform so they can share it with a local hospital and pharmacy. The company expects to use Viera TV to confirm residents' whereabouts in both ordinary times and in times of an emergency. A transportation company in the consortium will develop a package-tracking application and a delivery-reservation system that connect to Viera TV. For partner businesses, the infrastructure supports various business opportunities. For example, data on individual household energy consumption helps them to meet collective demand efficiently. Further, on-demand information, such as the supply and location of mobility tools, can help business build services for residents to share. While these companies can benefit from the town's integrated service model, a suitable technology platform should be flexible in view of a strategy that has become a more moving target (Sauer & Willcocks, 2002) in order to accommodate the town's grand vision. So far, as a shared IT process,

<sup>6</sup> Town management in this project refers to the process of design and implementation town services and making profit from them. Panasonic developed the collaborative platform with partner companies (consortium) and a technology platform to manage various town services.

Fujisawa SST Management Company has drawn up an information ownership policy. Residents have ownership of data collected from various households, and, if other companies ask for the data, the town-management company must ask residents for their approval. Only then can the town-management company act as a gateway between residents and organizations inside/outside the community. Separate companies that are all members of the Fujisawa SST consortium provide residents with services separate companies all of which are members of the Fujisawa SST consortium. These companies are responsible for introducing and managing information systems. In the future, Panasonic will need to further align IT with the town's grand vision in cooperation with the town's various stakeholders.

One reason for why Panasonic established a company to manage the town was to find a way to administer the collection of service fees and to play a gateway role in using the data that each household generated. As for apartments and multiple dwelling houses, Panasonic could easily collect fees for maintaining the town's shared spaces by charging a recurring maintenance fee. However, for detached homes, Panasonic had no system to collect household service fees, and the concept of town service as applied to this type of dwelling did not exist. Therefore, Panasonic established the Fujisawa SST committee (residents and business operators of Fujisawa SST) as a residents' association to collect the town-management fee. Eventually, this association passed on the job of collecting the fee to the town-management company<sup>7</sup>. Having it act as a gateway between residents and service providers allowed the two to link up closely and create an operational structure that managed the town.

The monthly town-management fee includes a fee for operating the residents' association, the maintenance of shared facilities, and a basic fee for services that the town provides. In reality, a target number of 1,000 households for personal services is rather small when calculating the profitability of these services. In order to actually accrue a profit, the town would need to have 5,000 to 10,000 households. However, even with only 1,000 households, profitability will not be an issue as long as the households are effectively united and a range of services are efficiently combined to balance the town's budget. Fujisawa SST reduces the cost of attracting and maintaining customers by incorporating the concept of a single "platform" into its new business model, which constitutes one of the project's strengths. Further, this single platform also affects other business operators. The cooperating organizations in Fujisawa SST that deliver services to residents also charge a special discounted fee to its residents (i.e., a fee that is smaller than that for the general public).

## 7 Epilogue

The Fujisawa SST case shows the way toward creating new services that consider economic, environmental, and social sustainability. The town requires collaboration among residents, the local government, and businesses. Fujisawa SST has just opened its curtain toward the future, and, with it, Panasonic hopes to contribute to the history of sustainable living for the next 100 years. As the community grows and changes, it will need new services. Information systems will need to integrate increasing service functionality, and the management of complex information systems will constitute a new challenge for Panasonic. As Davenport (1994) says, effective information management must begin by thinking about how people use information, not with how people use machines. Fujisawa SST also shows the design process of a sustainable town from a residence-oriented perspective and how technologies support the town's goals. From this perspective, IT strategy could provide novel and different ways of doing business (Luftman, Bullen, Liao, Nash, & Neumann, 2004, p. 33). Effectively designing and using information systems enables all members of the community to access integrated services and strengthen their bond, which is what eventually makes the town sustainable.

The Fujisawa SST project is a suburban-type development project, and 80 to 90 percent of the first homebuyers for such projects are typically between 30 and 40 years old. However, in Fujisawa SST, over 30 percent of the residents were over 50 years old by the time 200 homes had sold in July, 2015. Also, compared with other suburban-type development projects, a wider variety of people seemed to buy smart homes in Fujisawa SST. Moreover, while usually 70 percent of such a project's new residents usually come from the same city, half of the residents who moved into new homes in Fujisawa City came from other cities. Each residence had around 130 square meters of land total and 110 square meters of floor area). Each property has an approximate value of ¥60 million<sup>8</sup> (approx. US\$564,000)—a relatively high selling price. However, residents have said they bought a property in the town because it has a clean and

<sup>7</sup> Residents must join the association when moving in.

<sup>8</sup> By August, 2015.

safe environment for raising young children and that the elderly have access to several services, such as nursing care, high-quality security systems, and so on. One of the biggest appeals for buying a house in Fujisawa SST was not just the actual home but rather the town's conceptual design and the range of services readily available in it<sup>9</sup>.

Thinking about the future of the town in ten-year periods means that Panasonic has to adjust its relationships with external companies in novel ways. In the long term, managerial roles will change, too. While the scale of this project is significantly larger than that of ordinary time-limited projects, the skills expected from each individual in charge also vastly differ. For many decades to come, the challenges for the Fujisawa SST and Panasonic will continue.

## 8 Questions

1. What business model and business process changes has Panasonic implemented to promote environmental, economic, and social sustainability in Fujisawa SST? What would you do differently to achieve those goals?
2. How did information systems in the town align with the goals of Fujisawa SST? How did Panasonic reorganize the business processes through the IS implementation?
3. Identify core technologies and business practices that enabled the systems in Table A3 and Figure A6. Consider both technical, non-technical components, and stakeholders involved.
4. What technological requirements does Panasonic need to support the town's grand vision and guide the town's information systems projects?
5. What qualitative benefits does each information systems project bring? How could these systems support new value creation in Fujisawa SST?

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<sup>9</sup> Residents can expect an income of approximately ¥5,000 to ¥10,000 (US\$45 to \$90) per month (depending on households) from selling electric power and will be able to reduce their water bills through using water-saving systems installed inside their homes.

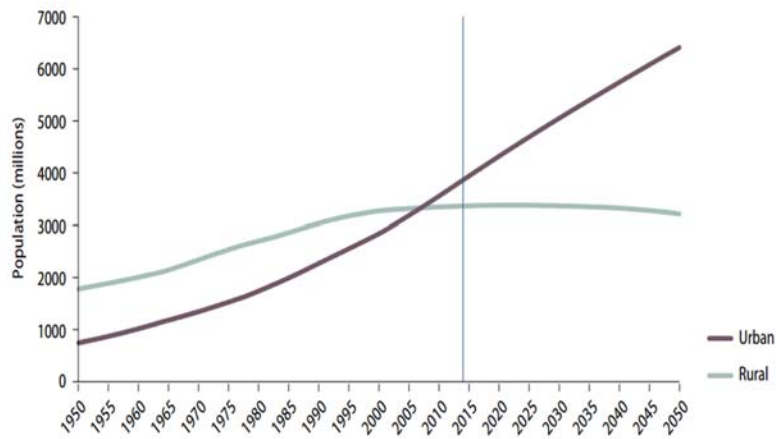
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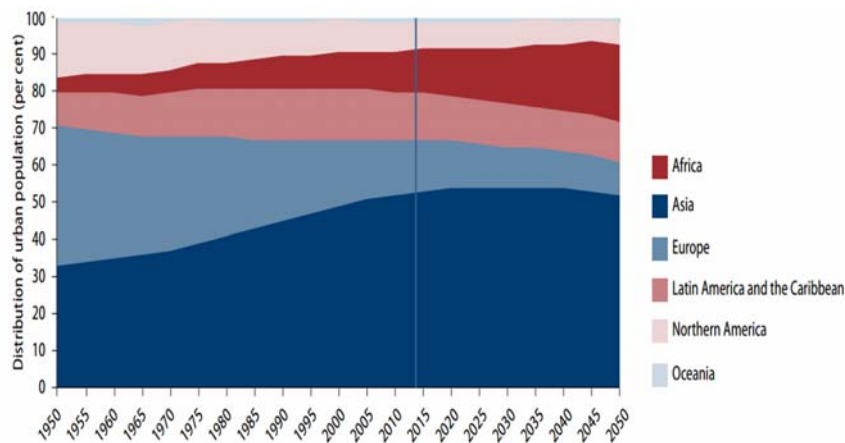
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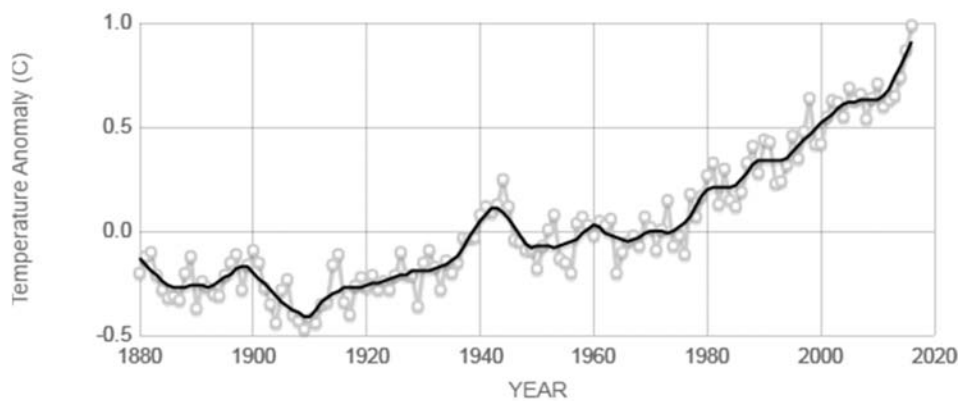
## Appendix



**Figure A1. Population Change in Urban and Rural Areas (United Nations, Department of Economic and Social Affairs, Population Division, 2014)**



**Figure A2. World's Urban Population Ratio by Region (United Nations, Department of Economic and Social Affairs, Population Division, 2014)**



**Figure A3. Global Surface Temperature Change Relative to 1951-1980 Average Temperatures (Gray: Annual Mean, Black: Five-year Mean) (NASA, n.d.)**

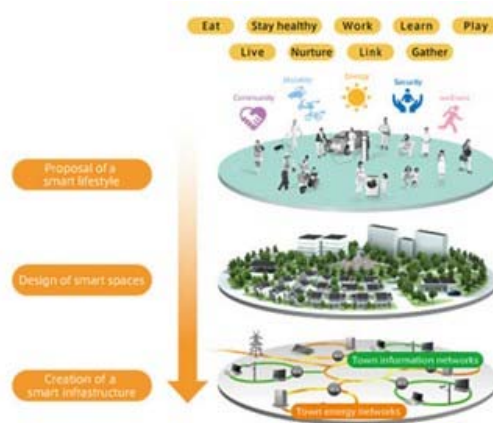


Figure A4. FSST Design Model (Fujisawa SST Council, n.d.)



Figure A5. SST Development Overview (Fujisawa SST Council, n.d.)

Table A1. Effective Dates for First Large-scale Repair Work (Ministry of Land, Infrastructure, Transport and Tourism, 2015b)

Repairing parts	Repair cycle
Roof waterproofing	14.4 years after occupation
Outer walls coating	13.5 years after occupation
Water supply equipment	20.1 years after occupation
Drainage equipment	20.8 years after occupation

**Table A2. Maintenance Charge Estimate Model (Ministry of Land, Infrastructure, Transport and Tourism, 2015b)**

Years since construction	Model A* (70 apartments in nine-story building)	Model B (30 apartments in -fourstory building)
	¥ a month per room	¥ a month per room
0-4 years	13,585 (approx. US\$127)	11,257 (approx. US\$106)
5-9 years	16,445 (approx. US\$15)	14,888 (approx. US\$140)
10-19 years	17,515 (approx. US\$165)	14,338 (approx. US\$135)
20 years+	17,446 (approx. US\$164)	14,467 (approx. US\$136)

\* Model A has an elevator.

**Table A3. IS Projects and Town Goals**

	Information systems in the town	Corresponding town goals
Social sustainability	The town portal	Community building, connecting people, engagement of residents, communication with all stakeholders in the town Delivery of integrated town services (gateway to each service)
	50 integrated security cameras and LED street lamps. Photos from security cameras can be shown in tablet and other mobile devices/home computers.	Security and safety
	Emergency warning in Viera TV	Security and safety
	SNS: SOY LINK	Community building, connecting people, engagement of residents, communication with all stakeholders in the town Note: this system is a trial
Environmental sustainability	Home Energy Management System (HEMS) Energy consumption report and eco-life recommendation report as output from HEMS	Monitor energy use in each household for creation, storage, and saving energy to fulfill the following numeral target: <ul style="list-style-type: none"> <li>• CO<sub>2</sub> reduction by 70% (compared to the 1990)</li> <li>• Detached homes to emit zero CO<sub>2</sub></li> <li>• Renewable energy use of up to 30%</li> </ul>
Environmental / social sustainability	(Future plan) Package-tracking application, delivery reservation system through Viera TV	Create a novel distribution system Achieve energy efficiency
Social sustainability	(Future plan) Integrated community care system	Keeping healthy Record individual health information and share with related institutions

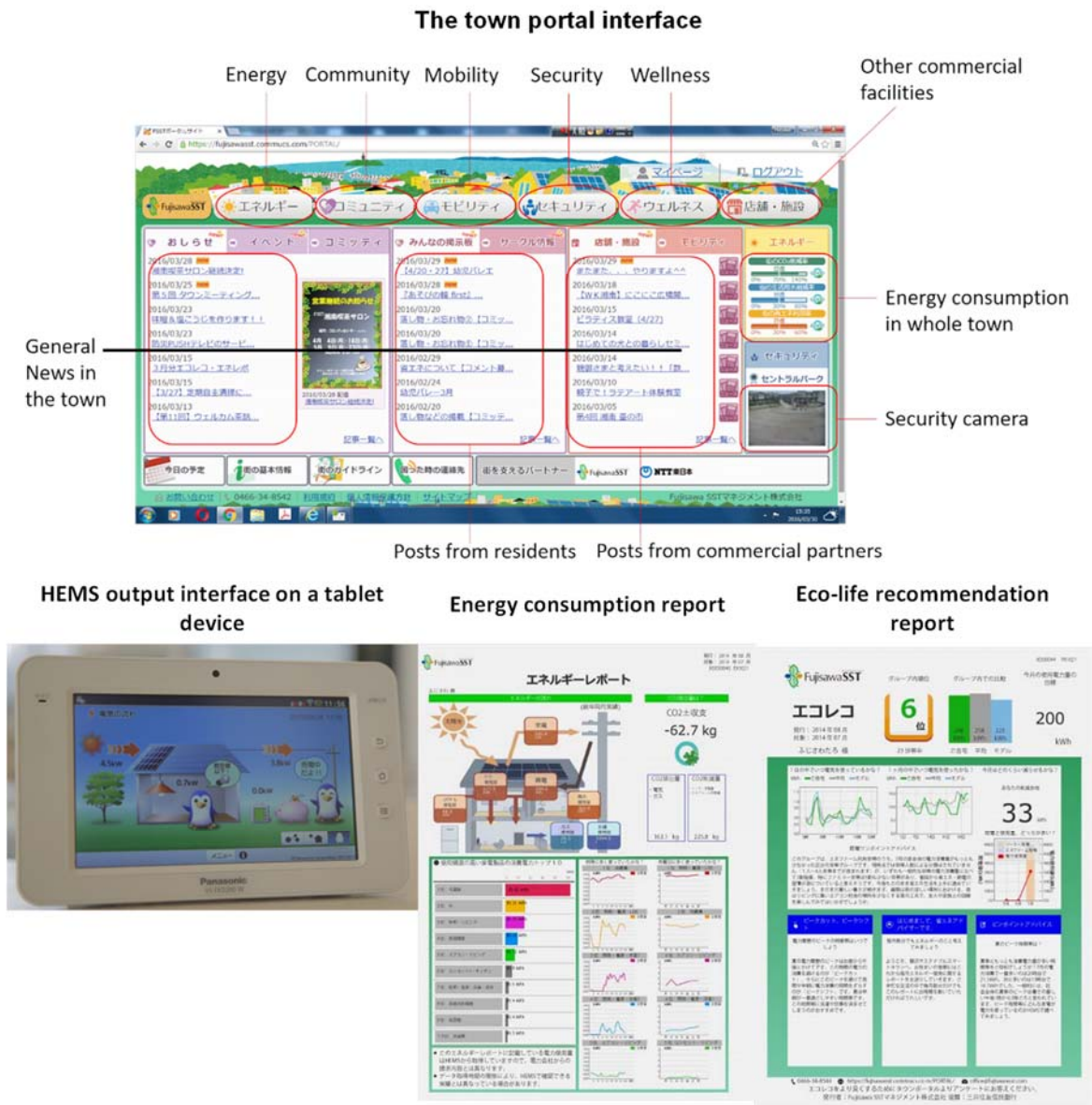


Figure A6. Interfaces for the Town Portal, HEMS Output and Eco-life Recommendation Report<sup>10</sup>

<sup>10</sup> the Fujisawa SST project team in Panasonic provided these pictures.

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