CRDS-FY2013-OR-05

Report on the Future Perspective (Asian edition)

Information Science and Technology Field (FY2013)

March. 2014

Center for Research and Development Strategy
Japan Science and Technology Agency

Executive Summary

The surveys were conducted in Asia with the aim of understanding global trends in the information science and technology field, rather than focusing on domestic trends. We visited various sites in Asia and observed first-hand the activities of organizations which work to change society using information technology (IT). We also interviewed experts and identified vital social issues.

The examples that we visited and studied can be divided into two types. One type is the lifestyle innovation taking place in rural areas (referred to as the bottom of the pyramid, or BOP) which utilize IT in new ways. We visited leading social businesses including Drishtee in India and Grameen Communications in Bangladesh, as well as the RTBI (Rural Technology and Business Incubator) which is a business incubation center at a university in India. We also visited Science of Life Studies (SOLS) 24/7 in Malaysia which gives education with the aim of eradicating poverty. Through studying how IT has reinvigorated social activities, we explored new demands for IT.

The other type is advanced IT development and the infrastructural innovation taking place using the developed IT, in countries and communities which have a relatively high average income. As a typical example of a government which successfully exercised strong leadership to quickly disseminate technologies in society, we visited the Government of Singapore. In addition, we also visited NEC Laboratories Singapore which is a research and development (R&D) center recently established in Singapore by a major Japanese IT company NEC Corporation.

The organizations that we visited faced various issues concerning urban areas, rural areas, farmland, resources, the elderly, etc. The common issues raised by interviewees from all the organizations were “inequality,” “sustainability” and “the development of IT infrastructure.”

Inequality

Inequality included inequality between urban areas and rural areas, inequality in skills and education, etc. The problem is that inequality causes society to lose vitality. What is worse, the inequality is increasing.

Sustainability

Problems concerning poverty, education, health, agriculture, etc. cannot be solved using temporary funds such as donations alone. It is essential to construct business ecosystems and ensure independent development.

The Development of IT Infrastructure

IT is the most fundamental infrastructure for solving social problems. Information will accelerate problem solving. It is also essential to integrate IT with social technologies in order to make full use of IT and to make it a useful tool for improving everyday life.

In the surveys, we studied the bottom-up utilization of IT in India and Bangladesh, the provision of IT education which is suitable for the realities in Malaysia, as well as the introduction of IT in society at the initiative of the Singaporean government. Issues raised by experts in various positions put the issues that Japan also faces into a global context. We will utilize the knowledge obtained from the surveys, when defining R&D areas that Japan should work on strategically in the information science and technology field in the future.

Contents

1. Objectives of the Surveys

When formulating a strategy for research and development (R&D) in the field of information science and technologies, which is becoming essential for society, the global trends are the most fundamental and important factors. The overseas surveys were conducted with the aim of understanding new global social and business trends in the information science and technology field, rather than focusing on domestic trends.

New trends can be understood by looking at advanced examples and observing in detail what is happening on the ground. In the surveys, we will focus on advanced examples of social innovation taking place in Asia by utilizing information technology (IT). More specifically, we will study activities conducted in rural areas which encourage social innovation as well as the activities of advanced technology ventures and government agencies in creating new industries.

We will also interview experts (IT experts and IT users in particular) at the sites we visit and analyze new global social and business trends based on the experts' perspectives about the future.

The overseas surveys will be conducted as part of the Panoramic Survey Project VI organized by the Information Science and Technology Unit, the Center for Research and Development Strategy (CRDS), the Japan Science and Technology Agency (JST). The objectives of the Panoramic Survey Project VI are to define R&D areas that Japan should work on strategically in the information science and technology field in the future, and to conduct detailed surveys of the R&D areas in order to create the foundation for formulating future R&D strategies.

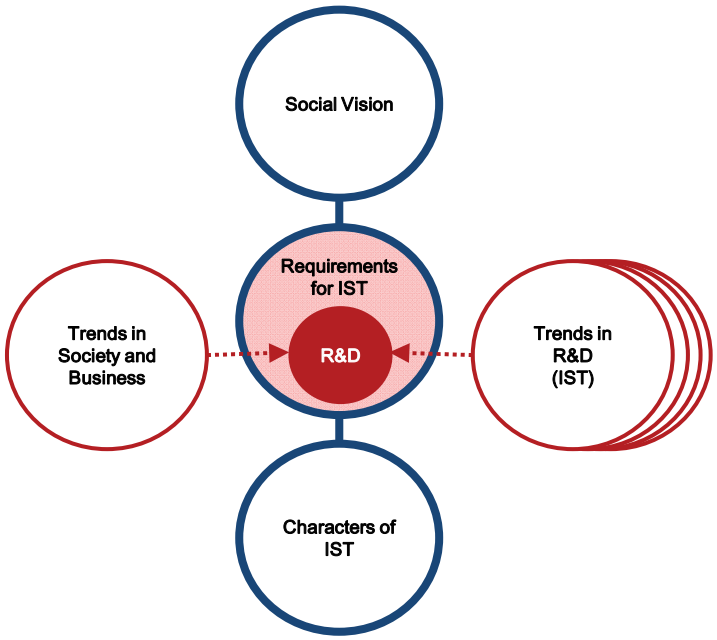

Figure 1 Formulation of R&D Strategies in the Information Science and Technology Field Which Aims to Achieve a Desirable Society and the Factors Which Should Be Taken into Consideration

The general framework for considering R&D strategies is stipulated in documents published by the CRDS in the past. Figure 1 shows the approach of the Panoramic Survey Project VI within the framework, concerning how to design R&D by taking into consideration social and business trends as well as R&D trends in the information science and technology field, so that useful results for achieving a desirable society can be obtained. The project aims to meet the fundamental needs of society by fully utilizing the characteristics of information science and technology in order to achieve a desirable society.

The project is an attempt to encounter R&D areas with the expectations of society. Understanding expectations for information science and technology and designing R&D strategies accordingly is only possible when one takes into account the major changes occurring in society, businesses and academia. The overseas surveys were organized as part of our activities to learn about “social and business trends” included in Figure 1.

(References)

- *The Handbook for the Formulation of Research and Development Strategies*, the Center for Research and Development Strategy, the Japan Science and Technology Agency (April 2009) (in Japanese)
- *Design Methodology for Research and Development Strategy*, the Center for Research and Development Strategy, the Japan Science and Technology Agency (June 2010)

2. Survey Design

We roughly divided advanced examples of IT-related R&D currently taking place into two groups. We then selected major examples from the two groups to be surveyed. Both types of examples create new markets and have major ripple effects, but they mainly target different markets.

One type is the lifestyle innovation taking place in rural areas (referred to as the bottom of the pyramid, or BOP) which utilize IT in new ways. In developing countries including Southeast Asian countries, technologies evolve and are disseminated differently than in developed countries. In developing countries, outcomes from scientific and technological developments are often disseminated in society through social businesses. We will study leading social businesses including Drishtee in India and Grameen Communications in Bangladesh, as well as the RTBI (Rural Technology and Business Incubator) which is a business incubation center at a university in India. Through the surveys, we will explore new demands for IT by studying how IT has reinvigorated social activities. In addition to the above-mentioned examples, we also selected Startup Village in India which conducts Silicon Valley-type business incubation activities, as a comparison. We also selected Science of Life Studies (SOLS) 24/7 in Malaysia which gives both character-building education and IT literacy education, in order to study educational activities to support future IT development.

The other type of example is advanced IT development and the infrastructural innovation taking place using the developed IT, in countries and communities which have a relatively high average income. In some countries with advanced IT, the technologies evolve and are disseminated in a different way than in other developed countries. As a typical example of a government which successfully exercised strong leadership to quickly disseminate technologies in society, we selected the Government of Singapore. Singapore ranked second (first in Asia) in the competitiveness ranking in the Global Competitiveness Report which was published by the World Economic Forum, and it is becoming a technology hub in the Asia-Pacific region. In addition, we will also study NEC Laboratories Singapore which is a R&D center recently established in Singapore by a major Japanese IT company NEC Corporation, in order to understand the standpoint of a user of infrastructure in Singapore.

The surveys include preliminary document research, the observation of business and R&D activities during site visits as well as interviews with local experts. Interviewees' names are not disclosed in the summaries of the individual comments obtained through interviews. We considered the implications of the survey results and identified the candidate social and business trends which should be focused on.

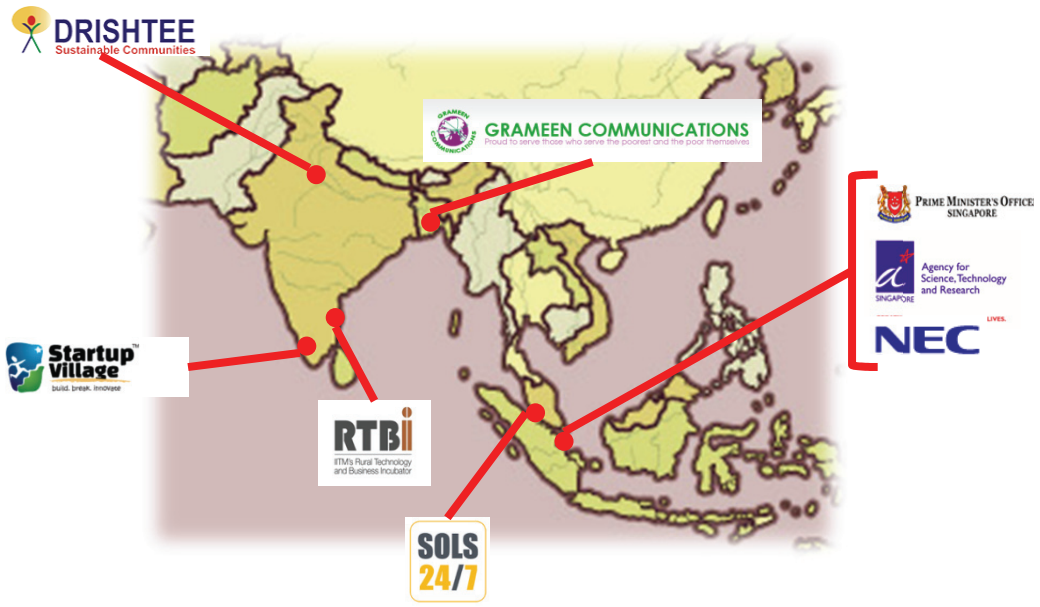

Figure 2 The sites visited

3. Outlines of Organizations Visited and Survey Results

3.1 Drishtee (India)

3.1.1 The Organization's Profile

(1) Description

It is a social business in India. It mainly works with entrepreneurs and micro-businesses in rural areas in India. In order to eradicate poverty, it creates sustainable business models with the aim of developing the rural economy and maintaining farmers' livelihoods.

(2) Establishment

Drishtee was established in 2000. It implemented the IT kiosk project in order to provide e-government services in rural areas of northern India. Later, it utilized the kiosks to develop the project into businesses for selling consumer goods, providing distribution services, etc. Since 2008, it has been training micro entrepreneurs as well as running franchise and distribution businesses. It is mainly active in northern and northeastern India.

(3) The Organization

Drishtee receives support from social investors such as the Acumen Fund and Danone. Communities. It also cooperates with various external companies. It conducts collaborative projects with Microsoft, IGNOU, Nestle, Philips, Honeywell, etc.

(4) Activities

Drishtee networks more than 14,000 entrepreneurs. 60% of its income comes from product sales, 30% comes from education and the rest comes from financial services. It delivers necessary goods and services to rural areas.

Its activities are roughly divided into two types.

1) Supply chain

The main services provided through the supply chain:

- Health: Doctors, clinics, pharmacists and female health-care specialists are organized as franchisees.
- Finance: Drishtee's kiosks serve as rural branches for banks based in cities. They also offer credit.
- Education and vocational training: Drishtee provides education such as English, computers and weaving.
- Supply chain: The supply chain network is the backbone of Drishtee's projects. It is utilized in various ways, for example connecting villages, maintaining relationships between Drishtee and villages, and organizing micro entrepreneurs into a group.

2) Livelihood

Drishtee focuses on agriculture, the construction industry, the garment industry, information technology, the supply chain and distribution.

3.1.2 Report on Site Visits

(Dates of the visits)

The whole day of February 18 (Tue.) (a site visit in Mathura)

9:00-12:00, February 19 (Wed.) (an interview in Noida)

(Sites visited)

DRISHTEE (HQ), Knowledge Boulevard, Tower B, 8th Floor, Plot No. A- 8A, Sector 62, NOIDA (in Delhi NCR) U. P. - 201301, INDIA

DRISHTEE (Mathura), Bhagwati Bhawan, Dampier Nagar, Mathura, INDIA

(Interviewees)

Nitin Gachhayat, Co-Founder and President, Functions

Swapna Mishra, Assistant Vice President, Marketing & Communication

Prabhat Kumer Tiwari, Division Commander

Sachin Pal Singh, Controller, Operations

■ Outline of the Sites Visited

On February 18, we visited an office in Mathura. Mathura is located about 150 km away from Noida. An area of about a 40-km radius is divided into 10 blocks and about 400,000 people live in the area. Most of the residents are engaged in agriculture. 38 staff members work at the center in Mathura. Their main work is distribution, education and finance. During the site visit, we visited places where distribution activities, education activities and BPO (Business Process Outsourcing) activities were taking place. BPO was recently started at the center as a new business.

Drishtee Mathura office

■ Distribution

For the transportation of goods to villages, each block is divided into six routes. Drishtee covers one route per day so that all routes in one block can be covered in a week.

Large streets are paved, but vehicles have difficulty passing on the small roads between fields. We visited a kiosk in a village called Naugaon which has a population of about 1,500. Although it is only about 20 minutes' drive from Mathura city center, we were able to see a considerable economic gap

The entrance of a kiosk (retailer).
It looks like a village grocery shop.

between the two areas. The kiosk is run by the owner who signed a franchising contract with Drishtee and invested his/her own money. Average size wholesalers do not come to small villages such as Naugaon. The kiosk sells sundries such as cheap sweets for children, hygiene products and detergents. Although it is a franchisee, the owner has discretion about what to sell, and the kiosk sells vegetables and processed food purchased in the neighborhood. Drishtee conducts social business activities with the aim of facilitating local communities to become independent as can be seen in this example. Until Drishtee established kiosks, this type of shop did not exist and the residents found it difficult to purchase daily necessities. There are 700 kiosks like this in the area served by Drishtee's Mathura center, which delivers products to the kiosks.

■ Education

Drishtee offers education on a variety of topics including computers, agriculture, livestock husbandry, sewing and carpentry. It seems to focus on vocational education.

At the lecture, the teacher shows the students how to use a PC. After the lecture, the students practice by themselves using PCs in the training room next to the lecture room.

It offers computer education at 15 sites. The courses include basic computer education, accounting software, desktop publishing (DTP) software and Microsoft Office. When the students complete the courses, they are given certificates. The certificates are recognized as official qualifications, and this gives the graduates an advantage when job-hunting. The three-month basic courses cost 1,200 rupees (if this cost was equated to the typical factory worker's wage in Japan, it would amount to about 30,000 yen.*). Advanced courses cost 500-600 rupees per month (which can be equated to 10,000-15,000 yen in Japan). People aged between 14 and 25 take the courses. One hour of desk work and one hour of practical training are conducted every day, six days a week.

At the site we visited, multiple courses are given in response to requests. Currently there are about 100 students. So far, there are about 800 graduates. This school has received awards many times as a superior school due to the large number of graduates and the high quality of the graduates (based on their performance in certification examinations). The school principal is enthusiastic about education and wants to improve the student's lives by helping them to obtain IT skills.

At another site we visited, there were just five students because it was only established in 2013. We were told that it would soon be the end of the academic year and the number of students was expected to increase at the beginning of the next academic year. The facility is also an Internet cafe because using the facility only as a school is not profitable.

There are more than 50 sites where vocational training is given for subjects other than computers. We visited a sewing class. About 20 women were sitting in a circle and learning how to sew clothes on a hand-cranked sewing machine. It is a two-month (60-day) course. The graduates will buy sewing machines and do sewing at home. A sewing machine costs 10,000 rupees (which equates to about 200,000 yen in Japan*). In this area, it is difficult for women to work outside the home because by custom women are not supposed to have

friendly conversations with men other than their husbands. In particular, they are not supposed to serve customers even in normal shops. On the other hand, women cannot earn an income unless they work. Therefore, women's work has been a major issue. For these reasons, Drishtee intends to help women obtain sewing skills so that they can work at home. Students from a relatively wide age range come to the class. The students were sewing children's clothes only 18 days after enrollment, even though they were using hand-cranked sewing machines rather than electric sewing machines.

A sewing class.
Classes are given outdoors in the dry season.

These schools are franchisees and Drishtee supports them. Drishtee helps with the startup of the schools, their daily business management as well as giving job-search services to graduates.

■ BPO (Business Process Outsourcing)

The Mathura office launched a new business called BPO (Business Process Outsourcing). Currently, it is conducting user surveys on behalf of TVS, which is India's leading motorcycle manufacturer. It is an outbound call center service where workers phone users, collect comments about products and give feedback to manufacturers. There were 10 seats, of which two seats were working for TVS. The remaining eight were providing support for Drishtee's IT kiosks (the computer education sites mentioned above). iDEA (a cellular operator) and ACC (a cement company) are listed as potential customers, among others. It specializes in local languages and provides information to domestic manufacturers rather than providing global call center services.

The outbound call center.
The man at the front is working for TVS. He makes 30-40 calls a day.

* The wage comparison is based on a document published by the Bank of Tokyo-Mitsubishi UFJ http://www.bk.mufg.jp/report/aseantopics/ARS291.pdf

3.2 Startup Village (India)

3.2.1 The Organization's Profile

(1) Description

Startup Village is a non-profit technology business incubator in India. It focuses on business incubation activities which help university students with business startups and accelerating the businesses. It aims to launch 1,000 technology startups over the next 10 years and start the search for the next billion-dollar Indian company. It was modeled on technology incubators in Silicon Valley in the US.

(2) Establishment

Startup Village was established in April 2012. The Government of Kerala and MobME Wireless (which is a local student venture) jointly planned the project and established the organization through a public-private partnership.

The Government of Kerala and MobME Wireless played central roles in establishing Startup Village. Its activities are jointly supported by the Government of India, the National Science and Technology Entrepreneurship Development Board (NSTEDB), the Department of Science and Technology (DST), the Government of Kerala, Technopark-TBI, KINFRA and MobME Wireless.

(3) The Organization

There are currently 18 employees. Mr. Kris Gopalakrishnan from Kerala, who is a co-founder of Infosys (a global IT company based in India), serves as the Chief Mentor.

(4) Activities

Startup Village provides business incubation services. Its main services include the provision of physical infrastructure, technology & service infrastructure, and mentor capital & people network. It provides various types of support including a three-year tax exemption, angel funds, consulting, intellectual property strategies and accounting support. Its major services also include the planning and provision of various opportunities, for example: SV Square where young entrepreneurs are selected and sent to Silicon Valley; a Community Gathering which is held on the third Saturday of every month as a show case for the latest products made by startup companies (where investors, famous entrepreneurs and founders of the startups incubated at Startup Village participate); and Dev1000p which is a campaign to train 1000 developers and nurture them into professional developers. Startups have to pay a Virtual Incubation Fee of 2,000 rupees to be incubated at Startup Village (if this fee was equated to the typical worker's salary in Japan, it would amount to about 50,000 yen, although it is 3,300 yen when simply converting 2,000 rupees to yen). In order to use the Startup Village building, the users have to pay an additional 1,000 rupees (which equates to about 20,000 yen, although it is 1,150 yen when simply converting 1,000 rupees to yen).

Since its inception on 15th April 2012, Startup Village has received over 2521 applications and is currently extending incubation support to over 612 technology product startups, which includes 215 campus startups.

3.2.2 Report on Site Visits

(Dates of the visits)

13:30-17:30, February 20 (Thu.)

(Sites visited)

Startup Village, Kinfra Hi-Tech Park, Kalamassery, Ernakulam, Kerala, India

(Interviewees)

Gokul K S, Director, Strategic Alliances

Tanish Thakker, Head, Partner Relations

■ Outline of the Sites Visited

Startup Village built its own five-story building in Kinfra Hi-Tech Park (which is being developed by the Government of Kerala) and uses it as their office. Young entrepreneurs have open access office space in the Startup Village facility. Students also gather in this building in order to prepare their business startups.

Students who came after their classes finished to work on their business startups

Startup Village originally rented an office in a biotechnology research center building when it was established. It then moved to the current building. The current building is becoming too small for Startup Village and they plan to construct a larger facility. FabLabs is in Initiative by MIT which enables students/ startups to manufacture prototypes of the product in this facility. Such a FabLab is being established at Startup Village by partnering with MIT.

An entrepreneur enthusiastically explaining his technology

On the day we visited their office, there was a pitching event targeting investors at a hotel in the city and many student entrepreneurs seemed to have gone to the event. However, there were still a considerable number of people in the office, working on R&D (mainly software development).

We met various young entrepreneurs who have moved in to the Startup Village building (including students and graduates) and had conversations with them separately. Their technologies are perhaps not astonishing in terms of their novelty. However, IT does not function with just a single technology. They seem to focus on finding needs and adjusting various combinations of technologies to meet the needs. We were impressed with the enthusiasm of the students who were trying to turn functioning services into businesses through trial and error.

■ The Need for Business Incubation

We were told that India has a smaller number of business incubation centers than the US and China. So far, a total of 136 startups and 4,500 jobs have been created at the high-tech park.

In Kerala, both the literacy rate and teledensity are 100%. There are 150 engineering colleges. Therefore, Kerala provides a suitable environment for IT startup ventures. Four pillars are needed in order to support business startups: policy change, an incubator, an accelerator and an angel fund.

■ Business Ventures Interviewed

- A company which is developing a plug-in that enables users to clip as many different parts of websites as they want to a clipboard, including videos, texts and images
- A company which is developing a system that enables the operation of a computer by wearing a motion sensor ring on the thumb
- A company which intends to put into practical use infrared sensor technology that enables the operation of a quadcopter using only gestures
- A company which intends to put into practical use technology that integrates personal information published on the Web so that it is easier to see
- A company which intends to develop e-commerce services for women's clothes and accessories
- A company which provides a service for the creation of animations that clearly explain specific services
- A company which works on the remote control of robots (they mentioned Professor Hiroshi Ishiguro when we asked the question, "Do you know any famous Japanese researchers?")

A ring device developed by the entrepreneur. It enables the operation of a terminal without a keyboard.

3.3 IITM's Rural Technology and Business Incubator (RTBI) (India)

3.3.1 The Organization's Profile

(1) Description

The RTBI is one of the non-profit business incubators located in the Indian Institute of Technology Madras (IITM). It supports more than 30 startup businesses which aim to provide products and services whose markets are expected to expand, in response to demand from across all segments (Agriculture, Healthcare, Education, Livelihood etc) in rural communities. These companies disseminate world-class technologies in order to resolve the most difficult challenges facing rural India.

(2) Establishment

The RTBI was established in Chennai (Madras), Tamil Nadu, in October 2006. It was established with the support of the World Bank's InfoDev Project and Government of India's Department of Science and Technology (DST). It emerged out of the Telecommunication and Networking Group which was established in IITM in 1996, with the aim of strengthening the information communication industry in India. The RTBI focuses on tapping into Information and Communication Technologies (ICT).

(3) The Organization

The RTBI team is made up of experts including 9 Governing Board members and four Management Council members. Currently the RTBI has 17 employees.

(4) Activities

The RTBI is engaged in incubation and investigative research, with the technical support and mentorship from IITM . In the incubation activities, it strengthens the foundation of startups which provide innovative and low-cost products and services, by jointly creating business models. It also conducts investigative research activities by organizing an in-house domain research team in order to deepen understanding on the different domains and see if newer ventures can come about or add value to an existing venture. It has five main research areas including agriculture, education, financial inclusion, healthcare and livelihood. Some if the focus area includes:

- Agriculture: The RTBI conducts the IITM's RTBI Agriculture Initiative, which is led by a team comprised of six members and is partnered with the national government and foreign organizations. The Initiative leverages ICT to connect farmers and experts (scientists). It gives farmers advice at a juncture when needed on the best crops to grow, when to grow, how to grow, how to handle crop diseases, when to harvest and, when and where to sell.
- Education: The RTBI works on ICT intervention in education and improving the quality of teaching, through working with academia, industry and the government.
- Financial Inclusion: The RTBI conducts research into the provision of financial services by non-banking financial companies and real-time financial service technologies which use mobile terminals.
- Healthcare: The provision of proper healthcare to patients in rural areas by leveraging ICT to understand and manage health conditions.
- Livelihood: How can products made by rural artisans be enhanced and directly be

linked to buying from urban sectors, how can ICT be leveraged in this process?

- Others: Rural Engineering Technology Clubs (which aim to enable students to identify problems in villages and to provide solutions using ICT); Namma Ooru (which aims to disseminate village specific information including history, location, panchayat announcements, village resources on maps, etc. and to create a collaborative platform), etc.

3.3.2 Report on Site Visits

(Dates of the visits)

15:00-16:30, February 21 (Thu.)

(Sites visited)

IITM's Rural Technology and Business Incubation (RTBI), I Floor IITM Research Park, Chennai - 600 113, India

(Interviewees)

Ashok Jhunjhunwala, Professor, Indian Institute of Technology Madras

Suma Prashant, Director of RTBI

Jayalakshmi Umadikar, RTBI

Janani Rangarajan, RTBI

* Due to time constraints, we only conducted interviews on vital social issues.

■ Methods for the Horizontal Dissemination of RTBI's Research Results

The RTBI disseminates its research results by incubating businesses. In this sense, entrepreneurs are important.

Prof. Jhunjhunwala said that India is experiencing the aging of the population, which is a problem that Japan also faces.

If one recognizes problems and understands technologies, the technologies can be utilized in other fields. By "understanding technologies" I mean not only having knowledge of existing products and services but also understanding the technological context. This will enable the connection of engineers and to any end beneficiaries, farmers including.

For business incubation, investment is needed in addition to entrepreneurs. At RTBI, we utilize the funding support schemes enabled by the government for Incubators to leverage, Industry, CSR (corporate social responsibility) activities or alumni funding from IIT Madras. We then give guidance to our incubatees to seek external investments at an appropriate juncture. On the research, for an example, while one is working to tackle problems concerning water and agriculture, specific examples of important technologies include temperature and humidity sensors, communications, and control technologies for watering crops. Costs are also an important issue to keep in mind throughout the solution designing aspect; cost of manufacturing, cost of delivery and cost to beneficiary.

3.4 The Global Communication Center, Grameen Communications (Bangladesh)

3.4.1 The Organization's Profile

(1) Description

Grameen Communications is a non-profit information technology company with a portfolio that includes software services, hardware services, internet services, IT education, etc. It utilizes cellphones to conduct various social businesses in rural communities, including the e-commerce of vegetables from rural communities, telemedicine, financial services and the dissemination of information. It is part of the multi-faceted group of ventures which grew out of Grameen Bank, which was established by the Nobel Prize winner Dr. Muhammad Yunus.

The Global Communication Center (GCC) is the R&D wing of Grameen Communications. Associate Professor Ashir Ahmed at Kyushu University serves as the director of the center. The center takes action based on the idea "Use ICT to improve the lives of rural people."

(2) Establishment

Grameen Communications was established in 1997, although it began in 1994 as an IT support unit under the Grameen Trust. The GCC was established in 2007 as a research center in Grameen Communications.

(3) The Organization

The Grameen group includes Gramneen Bank, as well as a telecommunication company, a cellular operator, etc. One of the group companies is Grameen Communications which hosted us during the survey, and GCC is part of Grameen Communications.

(4) Activities

Grameen does not conduct joint projects with the government. The government conducts projects that are rooted in the entire country, but they take time. Grameen gradually implements advanced projects starting on a small scale and creates success stories. If they work well, it may hand over the projects to the public sector. Therefore, Grameen and the government have different roles. IT is the infrastructure which enables the operation of all the services including the education services, the agricultural services and the healthcare services. In order to support the services, Grameen Communications creates village communication centers.

The Village Computer & Internet Project focuses on IT infrastructure development and education for villagers. Grameen Communications also conducts a project which establishes remote healthcare centers, where those who have difficulty accessing hospitals can visit and receive medical consultation services via the phone.

Grameen Communications signed an exchange agreement with Kyushu University and they have jointly conducted the following projects, among others: the village information platform which uses IT (GramWeb); the Income Generation Project for Farmers Using ICT (JICA-IGPF); the IC card-based digitized passbook system (e-Passbook); health improvement in rural areas (Portable Clinic); and Social Services on Wheels (Toyota-SSW).

Column 1: Outline of Bangladesh

- Bangladesh is mainly made up of low-lying areas. It is about 1.7 times the size of Hokkaido, and has a population of 150 million. Up until recently agriculture was the number one industry, with the garment industry second and Bangladeshi overseas workers' earnings coming third, but today the garment industry is the largest industry.
- There are 15 export processing zones (EPZs) in Bangladesh, including two in the suburbs of Dhaka. EPZs are industrial zones for exports, where foreign companies build factories to manufacture products for exportation. The government provides benefits including tax mitigation measures and a stable power supply. South Korea and China have EPZs exclusively for their respective countries.
- Japan has a good reputation in Bangladesh. The reasons for this include: Japan is the second largest aid donor after Saudi Arabia; Japan has been providing support since Bangladesh became independent in 1971; people have a good image of Japanese people; and Japan has excellent electronic technologies.
  However, an overwhelming number of people choose to study in the US. Japan tends not to be chosen because: Japan is not promoted enough as a destination for international students; living costs are high; it is difficult to obtain a visa; and there is a language problem.
- Between 1971 when Bangladesh gained independence from Pakistan and by 2014, the population doubled. The area of land under cultivation decreased. However, the country still has a 100% food self-sufficiency rate because productivity increased by about four times, but there is still room for improvement.
  The garment industry earns foreign exchange. In addition, Bangladesh tries to add value to agricultural products by shifting from the exportation of ingredients to the exportation of processed foods, as well as maintaining the food self-sufficiency rate.

3.4.2 Report on Site Visits

(Dates of the visits)

The whole day of February 23 (Sun.) (a site visit in Tangail)

The whole day of February 24 (Mon.) (site visits in Gazipur and GCC in Dhaka)

(Sites visited)

Global Communication Center, Grameen Communications, 9F, Grameen Bank Bhaban, Mirpur-2, Dhaka-1216; and others

(Interviewees)

Dr. Kazi Rafiqul Islam Maruf, Consultant

Partha Pratim Ghosh, Information Management Specialist

Md. Abdullah Al Emran, Senior expert, Business Development

Nayeen Al Amin, IT system staff, IGPF

Foyez Ahmed, Field Supervisor, IGPF

■ Social Services on Wheels (SSW) (Elenga)

It is a joint project conducted by Grameen, Kyushu University and Toyota. Vehicles called Gram Cars visit areas with no permanent support center and deliver various services. The main services include transportation, healthcare and the distribution of products. They are basically paid services. It is important to facilitate independence rather than providing welfare. There is an administrative division called a "union" which is a group of villages. About 5,000 people live in each union. A total of three Gram Cars provide services once a week. According to villagers, nearly everyone knows about the service.

Gram Car: The car tours villages with staff and equipment in order to deliver various services. An electric power supply and telecommunication facilities are not available at every site.

Transportation services are mainly provided for female students to commute to school. Education for women is a major issue, and the government is taking measures such as the provision of scholarships. Even then, other family members stop girls from commuting to school if further support is not provided. Gram Cars go around predetermined routes at commuting times so that students can go to school and come back from school using the cars. Gram Cars are also used as ambulances in emergencies.

With regard to healthcare, a team which includes a paramedic, an assistant, an IT expert, etc. visits villages and gives health consultation services. Health reports are created for individual villagers. Villagers can also consult with a doctor who is at the Grameen center on a TV phone via the Internet, if circumstances require it. The doctor then gives advice on everyday life and medical prescriptions, which are printed out and given to the patients. The villagers had to visit a hospital which was 20 km away, before the Gram Car service started.

The paramedics conduct medical interviews. The villagers consult with a doctor at the call center in Dhaka via TV phone when necessary. The doctor then gives advice on everyday life and medical prescriptions.

The person at the back is a paramedic. The person in front is an intern. It is important that they wear white clothes. The villagers can have their blood pressure, blood glucose level, blood type, etc. checked.

A consultation with a doctor via TV phone, using an iPad and Skype. It is important that the patient can see the doctor's face. The iPad is popular because it is easier to use than other types of PC.

Products sold. Products that help to improve people's lives are being sold, including clothes, anti-insect nets and energy-saving electric lights. They are called social goods.

The paramedics conduct medical interviews. The villagers consult with a doctor at the call center in Dhaka via TV phone when necessary. The doctor then gives advice on everyday life and medical prescriptions.

Products are distributed through catalog sales. The products sold are limited to daily necessities including clothes, anti-insect nets, torches and battery chargers.

At present, there are two problems. One problem is that the vehicles are expensive. SSW rents the vehicles, and it is struggling to turn a profit by providing the services to villagers. The other problem is the internet connection. Currently, SSW uses the cellular phone circuit, but the connection sometimes cuts off and it is sometimes affected by weather conditions. It also has a relatively low transmission rate because it is a GSM (global system for mobile communications) connection. Therefore, there is a basic infrastructural problem.

A GSM modem connected to a PC's USB port. The modem is raised as high as possible because the radio waves are weak. The modem is hung from the roof.

The PC is powered by a battery that was brought to the venue because it does not have mains electrical power.

■ Union Information and Service Centre (UISC) (Paikora)

A UISC is an e-government outlet which was established by the government in each union. There are 4,500 UISCs nationwide.

Basic services provided for residents include resident registration, visa processing, government forms download, employment information, the issuing of certificates, among others. UISCs are also used for communications within the government, including reporting from unions to the national government and instructions from the national government to unions.

We visited a union called Paikora which is situated in the Dhaka District. The UISC in Paikora is the most active among all the UISCs in Bangladesh. We interviewed the union council chairperson. They were not experiencing any problems because they have a broadband internet connection and also they have 4-5 PCs, which is more than the other local governments. The main reason for this UISC becoming the most active in Bangladesh is that the person in charge was enthusiastic about the activities, although there are also historical and geographical reasons. A project conducted by the Japan International Cooperation Agency (JICA) also studied the UISC in Paikora as a model case. The UISC has 40-50 users a day.

The UISC is also utilized for education, because there are several PCs. The UISC employs villagers who are familiar with IT. The educational courses started in 2009 and so far 92 people have graduated. Certificates are issued, and this gives the graduates an advantage when job-hunting. The fee for a three-month course is 1,500 takas (if this fee was equated to the typical worker's salary and commodity prices in Japan, it would amount to about 80,000 yen, although it is about 1,800 yen when simply converting 1,500 takas to yen). The courses teach data entry, Microsoft Office, the Internet, etc., in addition to the basic operation of a PC.

A company called Bengal Telecom takes care of the Internet connection, operation, maintenance, security, etc. The UISC does not conduct these tasks. A nearby repair center takes care of hardware problems. This is part of the Digital Bangladesh policy implemented by the government.

■ Telecenter (Tangail)

A telecenter is equivalent to the combination of an Internet cafe and a PC school in Japan. We visited a telecenter (a PC school) situated in a town called Pouzan Bazar. It provides a three-month basic course, a six-month Microsoft Office course, a database course, etc. The course content is similar to the ones offered at the UISC explained above.

Nearly 10 students were learning when we visited. It is a harsh environment for PC hardware due to the frequent power failures, the high temperatures and the high humidity. One of the teachers knows about hardware and he repairs minor malfunctions by himself.

Students at the telecenter. They are taking the course in order to learn how to use a PC after graduating from high school. They have their own PCs at home.

■ Income Generation Project for Farmers Using ICT (Gazipur)

The Income Generation Project for Farmers Using ICT (IGPF) is a project which aims to increase income in rural areas. The project is supported by JICA. We visited a village situated in Kapushia in the Gazipur District.

① Village Communication Center

Grameen has been supporting the establishment of village communication centers (VCCs), in order to help the private sector to provide UISC-like services. Those who wish to provide the services as a business can launch a center. Grameen helps them, but they are basically independent businesses. The center in this village has 70-80 users a day.

The telecenter is used to provide IGPF services to the rural community. Its main service is the provision of agricultural information with the aim of increasing and stabilizing agricultural income. The center is used to ship agricultural products, as well as to provide guidance on land, fertilizers, sowing seeds, irrigation, etc. Farmers can obtain information using the IGPF portal at the telecenter. If farmers need further support, field supervisors (who give agricultural guidance) help the farmers. Currently, organic farming is conducted at two sites, and 15 farm households are participating at each site.

If the crops harvested in this village are taken to Dhaka, they can be sold at prices two or three times higher than if they are sold locally. Farmers have been exploited by brokers. Farmers' income can be increased by shipping crops to appropriate markets using the Internet or directly selling crops to those who need them via the Internet. Of course, middlemen resist the idea, but Grameen is trying to put the project on track by providing middlemen with business opportunities such as transportation. It is not possible to evaluate the project quantitatively at this stage.

The project could give farmers a stable income through a tie-up with major food service chains, although it has not been able to sign a contract. A stable supply is necessary for them.

The problem that the center faces is the internet connection. The center had been connected to the Internet via a GSM service and a modem, but the connection was unstable and slow. Speeds improved after 3G was introduced, however, the fees increased from 300 takas per month (which equates to about 20,000 yen in Japan) to 900 takas per week (which equates to about 50,000 yen in Japan).

IGPF-VCC.
The lady in the middle is the owner of the shop. She launched her business with the support of Grameen. She said that she makes a living from the business.

② Farm Household

We visited a farm household which organically cultivates vegetables in accordance with IGPF guidance. They use a companion crop system in accordance with the guidance from Kyushu University, where they grow a mixture of cucumbers, cabbages, tomatoes, pumpkins, coriander, etc. in one field. It has the advantages of saving space, controlling pests and preventing diseases from spreading.

In many farm households, the men are mainly engaged in farming and the women concentrate on housework. The participation of women in the labor market is needed in order to increase incomes. IGPF aims to create jobs for women in particular, in order to create new income sources. The women conduct organic farming using unused fields when not doing housework. The men have no complaints about this arrangement and the IGPF activities seem to have been accepted. We were told that the men had been in charge of the whole family budget, but the women's income had made it possible to allocate some funds to the children's education.

We were told about other projects that we did not visit, as shown below.

○ Grameen Yukiguni Maitake Ltd.

Grameen and Yukiguni Maitake Ltd. are jointly cultivating mung beans to be shipped to Japan, which will then be used to produce bean sprouts. 7,000 farm households participate in the production of the beans and there are 15 supervisors. A system was put in place so that farmers can report their work situation because the supervisors cannot monitor everything in person. Since farmers do not have PCs, they use Short Message Service (SMS) to enter their farm household IDs and work phases (cultivating, sowing seeds, fertilizing, harvesting, etc.) and the information can be checked at the centers (including Tokyo). Currently, the system is being tested through a pilot demonstration with the participation of 200 people, and it will be used by 3,000 people from March 2014. This IT environment was developed by Grameen.

○ GramHealth PHC (Portable Health Clinic)

Medical care is a major issue in Bangladesh. There are about two doctors for every 10,000 patients, which is less than one-tenth of the number in Japan, etc. Although increasing the number of doctors is a priority, preemptive medicine including health checkups is also important, in terms of reducing the number of patients. However, there is little awareness about its importance among individuals or organizations. Therefore, Grameen provides group health checkup services. Grameen conducts health checkups efficiently, by connecting a blood pressure manometer, a blood glucose meter and other measuring instruments via the network. Grameen staff visit different areas in cars loaded with the instruments and machinery. It provides services in rural districts, but there is also demand for health checkups in urban areas. Grameen conducts health checkups because companies are not required to provide the service to their employees.

3.5 Science of Life Studies (SOLS) 24/7 (Malaysia)

3.5.1 The Organization's Profile

(1) Description

Science of Life Studies (SOLS) 24/7 is an international NGO with the mission of providing the best holistic education to all young people. It has its international headquarters in Malaysia and provides English education and other life skills ("SOLS Smart" skills) to young people in Cambodia, East Timor, etc.

(2) Establishment

SOLS 24/7 was established in Cambodia in January 2000.

Founders: Madenjit Singh, Dhinu Dhanveer Singh, Raj Ridvan Singh

In Cambodia and East Timor, SOLS 24/7 is the largest informal educational institute.

One of the founders Dr. Madenjit Singh was given the Personality of the Year Award 2012 by the Better Malaysia Foundation.

(3) The Organization

SOLS 24/7 conducts projects in five countries as of 2014 (it has trained 138,000 young people so far).

Cambodia: January 2000 onwards, 50 education centers, three business centers

East Timor: November 2006 onwards, 39 education centers

Malaysia: November 2007 onwards, 33 education centers

Laos: November 2009 onwards, five education centers

India: August 2013 onwards, one education center

(4) Activities

SOLS 24/7 gives holistic education under the banner of "SOLS Smart." It has developed study modules for "Science of Life Systems" which it advocates. It provides life skills for free or by providing scholarships, through a two-year training and boarding program. The education centers are maintained by giving young people responsibilities for the preparation of meals as well as in their disciplined boarding life. It delivers medical services, food and clothing to local communities, and raises civil awareness in local communities. It also helps young people and local communities to build social service networks. It accepts the same number of male and female students in order to provide equal opportunities to boys and girls.

The projects vary slightly depending on the country. The following projects are ongoing in schools in Malaysia.

- English and Life Skills: It provides students with practical English programs, along with Maths, Computer and SOLS Smart programs.
- SOLS Tech: With the recognition that "in the 21st century literacy is about the ability to use computers and mobile phones, in addition to the ability to read and write," SOLS Tech provides computer literacy to the poor. It receives used PCs, which are then repaired, distributed and set up so that people can use them. It gives education on how to repair and reuse computers.
- Scholarship Management (June 2012 onwards): SOLS 24/7 provided English education,

Computer Skills, character development, etc. to 210 specially selected Malaysian university students.

- Sustainable Development: This program provides SOLS Smart training for companies.

Column 2: The 9 SOLS Smarts

In order to help participants maximize their potential and develop abilities, SOLS 24/7 focuses on 9 skills when providing education ("9 SOLS Smarts"). In classes, the 9 SOLS Smart skills are introduced to individuals through storytelling, group discussions and consultations with mentors. SOLS 24/7's methodology has been developed with the aim of improving attitudes, enhancing relationships, building confidence and maintaining the mental health of their clients. The purpose behind its philosophy is to help participants to reduce stress, frustration and emotional pain to achieve greater harmony in the work and family environments (SOLS 24/7 can be characterized by its belief that providing knowledge and skills alone is not sufficient).

http://www.solssmart.org/about-us/philosophy/

1) Self Smart (Attitude Development)

   Confidence, Realising potential, Educational foundation, Dynamism, Self-belief stories and a Self-talk (building self esteem) course.

2) Book Smart (Memory Development)

   Practice, Job Skills, Hard skills, English, Computer, Maths, Technical and Scientific.

3) Street Smart (Intelligence Development)

   Thinking, Finding ways to solve, Finding ways to survive, Achieving, Playing games.

4) Scientific Smart (Scientific Thinking Development)

   Logical thinking, Benchmarks, Five views of life, Opinion, Controversy, debate, belief systems.

5) Economic Smart (Survival Development)

   Being adventurous, Management skills, Decision making, Understanding the system of economy, Setting up a business and Risk taking.

6) Relationship Smart (Aura & Synergy Development)

   Cooperative learning, Interaction, Inter-dependence, Team building, Stress Management, Community, Understanding, Forgiveness.

7) Life Smart (Wisdom Development)

   Reflection, Holistic perspective, Life is a challenge, Progression in life and education, Insight into personal life.

8) Spiritual Smart (Thought Power Development)

   Psychosomatic, Principles of thought energy, Law of attraction.

9) Transformational Smart (Self Control Development)

   Turning negative knowledge to positive, Turning motive/intentions into actions, Training the sub-conscious.

3.5.2 Report on Site Visits

(Dates of the visits)

The whole day of February 26 (Wed.)

(Sites visited)

SOLS 24/7, 1 Petaling Commerz & Residential Condos, Units 1 to 18, Level 1, Jalan 1C/149, Off Jalan Sungai Besi, Sungai Besi, 57100 Kuala Lumpur, Malaysia

(Interviewees)

Madenjit Singh, Co-founder

Raj Ridvan Singh, Co-founder

Adam Taylor, Deputy Director, Youth Development

Yussef Gheriani, Program Manager, SOLS TECH

Chris Rosado, Head, Strategy

■ Organizational Management Structure

SOLS had been managed on a volunteer basis until financial support became available and the number of employees increased. Directors are working hard to become professionals.

There are 35-40 staff members at the Malaysian headquarters. 200-300 people can stay at the Malaysian headquarters.

The entire first floor of the building is occupied by SOLS. There are also SOLS accommodation facilities on other floors. There are more vacant rooms in the building, which can be used when SOLS grows.

Schools in each country are managed independently from schools in other countries. Education is provided for free at schools in Malaysia. In East Timor for example, there are 700 students and the schools are run by collecting monthly tuition fees of several dollars from each student. Boarding students are exempted from paying the tuition fee.

The students' ages vary, but the schools mainly contain students aged 10-12. Many of them have dropped out of school.

The school welcomes everyone with the sign which says "Academy for the poor."

■ The Largest Supporter of Schools in Malaysia

The Better Malaysia Foundation (BMF) supports SOLS. Its owner is Mr. Tan Sri Vincent Tan who is the founder of a Malaysian corporate group called Berjaya (he is famous for being the owner of a Barclays Premier League team Cardiff City Football Club), and he supports SOLS.

■ English Education

Those who cannot speak any English can learn how to speak English within three months, if the training system (methodology) developed by SOLS is used. The East Timor government and the South Korean government are interested in the methodology and are trying to introduce it in their countries.


A class

The main point about SOLS programs is that they are developed based on the idea that "character is a skill." Poverty results from a poor mentality and SOLS programs can change that. Instead of giving students knowledge for two hours, the programs focus on motivating students to change their way of thinking and their character, and creating an environment which makes them want to study.

■ Project 100

It is a program which aims to create 100 communities (branch schools) in Malaysia. It is expected to achieve the goal by the end of 2014.

The program aims at community driven development (CDD). SOLS finds local key people who understand the activities of SOLS and ask them to invite SOLS to their areas (Trying to establish schools in areas where people do not understand SOLS's methods does not work).

■ Scholarship Management Program

It is a program which motivates college students to enter university by teaching English and SOLS Smart skills (colleges are two-year educational institutes that high school graduates go to before they enter university).

In order to send students to universities around the world, it is necessary to understand university and college systems. SOLS also ascertains facts about relevant tests necessary to proceed to higher education such as SPM (Sijil Pelajaran Malaysia) and STPM (Sijil Tinggi Persekolahan Malaysia), A Levels, IB (International Baccalaureate), CPU ((Canadian Pre University), ADFP (American Degree Foundation Program) and concentrates on teaching students the content that will help them to prepare for the tests.

■ SOLS University

SOLS has applied for approval from the Malaysian government to establish a university.

It has waited for nine months (at February, 2014), but it has not received the approval. It will probably take time to obtain the approval.

■ Library Project

It is a project conducted in cooperation with Magic Bird Publishing where SOLS asks well-wishers to purchase books for children, which are then delivered to the children. SOLS also conducts a similar project for toys. Toys will be distributed to community centers ("communities") to be created in Malaysia and the centers will then lend them to children.

Good toys stimulate children's creativity. Children in developed countries can purchase toys, but rural children in Malaysia cannot.

Toys which will be distributed to rural children

■ SOLS Tech

SOLS Tech activities have three objectives as shown below.

(1) Provide children with PC literacy through repair work.

(2) Give rural people access to PCs.

(3) Reduce illegal dumping of PCs, etc. (unusable parts will be disposed of legally).

It is a project where used PCs (up to eight years old) are collected and repaired before they are distributed to rural village communities. SOLS has collected 300-400 used PCs at the headquarters and in Sagambur. PCs are formatted and software is reinstalled (as part of Microsoft's CSR activities, the operating systems to be installed for the recycling of used PCs are licensed for six dollars). When considering the manufacturing costs and the versatility of knowledge, used PCs are cheaper than the Hundred Dollar Laptops developed by MIT. If Google's free software is to be used in the future, the project may not need to use Microsoft products any more. Recycling printers is difficult because each company uses different inks.

Used PCs and monitors that were collected from various areas

Most members of the public are still unaware of the problems of environmental pollution caused by the illegal dumping of electricities (e-Waste).

According to figures published by the Malaysian government, the number of people who have no access to the Internet in Malaysia is between three million and four million. The number is probably larger in reality. However, Malaysia ranks high in the world for the percentage of people who use Facebook.

3.6 NEC Laboratories Singapore (NLS) (Singapore)

NEC Empowered by Innovation

3.6.1 The Organization's Profile

(1) Description

NEC Laboratories Singapore is the center for global solution research in Asia.

(2) Establishment

In September 2013, NEC Laboratories Singapore (NLS) was established in NEC Asia Pacific Pte Ltd (NEC APAC), which is NEC's Singapore-based regional headquarters for the Asia Pacific region.

(3) The Organization

Director Keiji Yamada leads the NLS. Personnel are dispatched from Japan as the need arises. Currently, there are eight personnel members.

(4) Activities

The NLS establishes a flexible joint research framework with government agencies, organizations and businesses in the country. It develops and tests cutting-edge solutions that utilize advanced NEC technologies, including data mining technologies, image analysis and audio analysis technologies, in order to help resolve infrastructure challenges both locally and globally.

Special attention is paid to the areas of safety, big data, security and smart energy. Solutions developed at the NLS are applied to Asia and globally.

3.6.2 Report on Site Visits

(Dates of the visits)

16:30-18:30, February 27 (Thu.)

(Sites visited)

NEC Asia Pacific Pte. Ltd., No.1 Maritime Square, #12-10 Harbourfront Centre, Singapore 099253

(Interviewees)

Keiji Yamada, Senior Vice President / Head (NEC Laboratories Singapore)

■ Briefing on the NEC Corporation

Mr. Yamada (Director) gave us a briefing on NEC.

・NEC Mid-term Management Plan

In the Mid-term Management Plan for the period up to the end of the 2015, NEC aims at "Transformation into Social Value Innovator." Its focus is shifting from selling consumer products to selling enablers. For example, in the area of disaster management, it has been manufacturing observation satellites. Now it is also moving into data analysis, monitoring and operating satellites. For many years NEC has been installing submarine cables. Now it can install cables that enable the collection of various types of ocean floor information using

sensors installed on the cable repeaters.

We consider NEC APAC a competency center, where we develop solutions for various parts of the world. Regarding safety businesses, we have already established a business division based in Singapore. With regard to retail businesses, we are providing solutions for POS (point of sale), distribution control, etc.

・Central Research Laboratories (Including Overseas Laboratories)

By focusing on social value creation, we have revised our existing research themes and narrowed them down significantly. They now include: data analysis, data acquisition and data platforms, security, networks, service integration and energy. We will only focus on our world leading technologies such as face recognition, machine learning and software-defined networking, rather than working on technologies which are at a similar level to our competitors'.

■ NEC Laboratories Singapore (NLS)

NLS conducts trials to find out how technologies can provide solutions to social problems, in order to provide a "Proof of Concept for Social Value Creation in Customer's Field." Solving problems is the main objective and technologies are procured from outside NLS where needed. NLS solutions are disseminated globally.

NLS is currently working on urban surveillance, cybersecurity, infrastructure management and energy. We are developing solutions for each issue in cooperation with the Singaporean government, etc. For example, in the field of urban surveillance, we are trying to detect fights and other forms of violence in cities, using video, sound, SNS, etc. Safety is an important resource for tourism.

Contribution to the Land Transport Master Plan 2030 of Land Transport Authority (LTA) of Singapore providing solutions is also one of the activities of the NLS.

3.7 Strategic Policy Office (SPO) (Singapore)

PRIME MINISTER'S OFFICE
SINGAPORE

3.7.1 The Organization's Profile

(1) Description

The Prime Minister's Office (PMO) in Singapore comprises divisions which support the Prime Minister in carrying out his responsibility. Each division is responsible for different areas, including population and talent policies, R&D and national security.

The Strategic Policy Office (SPO) is a strategic planning organization within the PMO. While many staff members are relatively young, most have experience in other agencies in the government or in the private sector. The SPO also includes the Centre for Strategic Futures, a a think tank dedicated to looking at the future.

(2) The Organization

The Strategic Policy Office (SPO) is part of the Public Service Division (PSD) in the Prime Minister's Office (PMO). The SPO includes the Centre for Strategic Futures (CSF).

(3) Activities

The SPO conducts activities that contribute towards building a progressive and forward-looking Public Service. It does this by developing strategic planning capabilities and helping to shape policy across the Public Service to manage challenges that cut across Ministry boundaries, in an increasingly complex environment. The CSF is a think tank that is focused on researching emerging strategic issues with a potentially significant impact on the government. Its main duties are the analysis of the present situation and the formulation of strategies for the future. It focuses on future potential problems rather than obvious current problems in society.

Scenario planning within the Singaporean government started when the Ministry of Defense conducted scenario planning in the 1980s using the Shell method. The Scenario Planning Office was established in 1995 (it was later renamed the Strategic Policy Office). Its roles include preparing scenarios and translating them into strategic government action.

3.7.2 Report on Site Visits

(Dates of the visits)

14:00-16:00, February 27 (Thu.)

(Sites visited)

Public Service Division, Prime Minister's Office, Level 10 Conference

Room: Treasury Building 100 High Street

(Interviewees)

Jonathan Ng, Assistant Director, Centre for Strategic Futures / Strategic Policy Office

Bai Huifen, Senior Strategist, Centre for Strategic Futures / Strategic Policy Office

Terence Poon, Senior Strategist, Centre for Strategic Futures / Strategic Policy Office

■ History of Scenario Planning Activities by the Singaporean Government

Scenario planning activities by the Singaporean government started in the latter half of the 1980s at the scenario planning department of the Ministry of Defense. In 1991, the government launched its attempt to use scenario planning as a tool to develop policies based on long-term strategies. The government took reference from the scenario planning method used by Shell, while another key initiative that helped to jump-start its capabilities was its membership of the Global Business Network. In 1995, the Scenario Planning Office (SPO) was established in the Prime Minister's Office. The SPO conducted activities with the aim of developing national scenarios, disseminating the scenarios and summarizing their policy implications. It also worked to increase its expertise in scenario planning methodology.

In 1997, the first set of scenarios created by the SPO was published and the official participation of ministries and agencies in the process of converting the scenarios into strategies was approved within the government. In 2003, the SPO was renamed the Strategic Policy Office (SPO) and was given the mission of driving the formation of cross-agency teams to formulate government-wide strategies. More specifically, the SPO conducted specific follow-up activities for key issues which were identified in the national scenarios (which include diverse topics from financial regulation and the situation that middle-income earners face, to potential opportunities and challenges for young people who will shape Singapore's future). In close cooperation with the Ministry of Finance, the SPO harmonized budget planning and allocation, with the strategy development process. This led to the formulation of "block budgets" which set a spending cap for each ministry/agency, within which they were allowed to make final allocations based on strategic outcomes and priorities.

3.8 The Agency for Science, Technology and Research (A*STAR) (Singapore)

3.8.1 The Organization's Profile

(1) Description

The Agency for Science, Technology and Research (A*STAR) is a statutory board which oversees and supports scientific and technological research in Singapore. It conducts activities such as human resource development, strengthening R&D, and international exchange, in the fields of biotechnology, IT, electronics, etc. It oversees many research entities, which conduct various R&D activities.

(2) Establishment

A*STAR was established in 2002. It is the leading agency for scientific and technological research in Singapore and it is overseen by the Ministry of Trade and Industry (MTI). It aims to foster world-class scientific research and talent for a knowledge-based and innovation-driven Singapore.

(3) The Organization

A*STAR comprises the following entities.

- The Biomedical Research Council (BMRC): The BMRC supports and oversees public sector biomedical R&D activities in Singapore.
- The Science and Engineering Research Council (SERC): The SERC supports and oversees public sector R&D in science and engineering.
- The Joint Council Office (JCO): The JCO supports interdisciplinary research programs between the BMRC and the SERC.
- The A*STAR Graduate Academy (A*GA): A*GA provides science-related scholarships and conducts various human resource development programs.
- Exploit Technologies Private Ltd. (ETPL): ETPL is the technology transfer arm of A*STAR, which aims to commercialize A*STAR's R&D outcomes.
- Corporate Group (the policy and management division of A*STAR): The Corporate Group manages the budget and human resources of A*STAR.

(4) Activities

There are many research institutes and consortiums under the BMRC and the SERC, which conduct various R&D activities, joint research with corporations, human resource development, etc.

3.8.2 Report on Site Visits

(Dates of the visits)

16:00-17:00, February 28 (Fri.)

(Sites visited)

Agency for Science, Technology and Research (A*STAR), 1 Fusionopolis Way, #23-10 Connexis (North Tower), Singapore 138632

(Interviewees)

Tan Geok Leng, Executive Director, Science and Engineering Research Council

■ The Process of Formulating the iN2015 Masterplan at the iDA (Infocomm Development Authority of Singapore)

The scope of the iDA's responsibilities is different from A*STAR's. A*STAR funds and performs mission orientated research to support industry in Singapore, whereas iDA is the infocomm sector champion and it is responsible for planning and development of the infocomm ecosystem in Singapore. In the iN2015 formulation process, we discussed the kinds of infrastructures needed in order to increase Singapore's competitiveness. Working groups were created for sectors such as infrastructure, healthcare, education, transportation systems, etc. The leader of each group is a well-known and respected industry person. There were about 10 to 12 members in each working group and they included members from industry, government, university professors, and researchers from relevant fields. The members of the groups put their efforts for the integration of the many perspectives and ideas, and for the decisions on the trade-off between cost and speed to achieve the goals set. It takes nearly 2 years to formulate the master plan. The master plan is updated every five years.

The master plan was submitted to the Ministry for Information, Communication and the Arts. After the master plan has been accepted by the Ministry, there was a major effort to communicate the master plan with various sectors of Singapore, including Government Agencies, Industry, academia, etc. The master plan is also used to shape policies and programs by government agencies.

■ How Should the Negative Aspects of IT Be Handled?

IT is a tool, and therefore the first thing that needs to be done is to educate those who will use the IT. The introduction of regulations should also be considered as part of the development of an IT environment. It is also possible for IT to monitor its own operations and prevent misuse, just like other machines which have safety devices.

■ CRDS's Strategy Planning Process

Singapore uses a similar process to identify R&D themes, although it does so from more of a state perspective and the process is somewhat smaller in scale than the one used in Japan.

4. Vital Social Issues (Answers to Seven Questions)

At the eight sites we visited, we asked seven questions to 11 experts (A-J) in order to learn about vital social issues. The answers to the questions are summarized below, without disclosing the respondents' names. The seven questions are about:

① the vital issues, ② the current status of the issues, ③ a favorable outcome, ④ an unfavorable outcome, ⑤ lesson from past successes and failures, ⑥ decisions which have to be faced now when looking forward 10 years, and ⑦ the roles of IT. Please see Appendix 1 for details of the questions.

Table 4-1 Answers to the Seven Questions

	Contribution-A	Contribution-B	Contribution-C
①	Maintaining the sustainability of villages/	Sustainable ecosystems for business startups/ Appropriate education/ Waste management/	The aging population/ Agricultural productivity/ High quality education/
②	Farmers are migrating to cities. Basic services are lacking in rural communities. Agricultural productivity is low.	There is no infrastructure although there are rich human resources.	The custom of respecting old people has disappeared. The farmland is fragmented and the water supply is unstable. The income is decreasing and living costs are rising. It is difficult to access high quality education.
③	Rural people will become happy.	Students will have the option of becoming entrepreneurs as well as doctors and engineers when they choose their careers.	We will have very vigorous economic growth.
④	Rural communities will decline.	(The question was not asked.)	Social unrest will break out.
⑤	Trial and error we went through since we started our business/	Population increases and language & cultural differences/	Population increases and the fragmentation of farmland/
⑥	Make 800 rural villages sustainable within 10 years.	Expand the population of entrepreneurs to include students.	Develop water management technologies. Create roles for elderly people.
⑦	Promote the efficient operation and cost reduction. Promote the efficient and effective distribution of information. Advance new manufacturing technologies. Transfer advanced technologies into rural area.	(The question was not asked.)	Manage water and agriculture. Connect care givers of elderly people and and encourage mutual support. Utilze wisdoms of eldery people as a teacher, counselor, dispute adjudicator, juries etc.

① the vital issues, ② the current status of the issues, ③ a favorable outcome, ④ an unfavorable outcome, ⑤ lesson from past successes and failures, ⑥ decisions which have to be faced now when looking forward 10 years, and ⑦ the roles of IT. Please see Appendix 1 for details of the questions.

Table 4-2 Answers to the Seven Questions

	Contribution-D	Contribution-E	Contribution-F
①	Improving rural people's livelihoods/ The utilization of young human resources/	Balance amongst business, technology, and nature and society as the fundamentals/	Increase the gap of inequality/
②	We want to use IT, but the infrastructure is fragile. Many people are using IT.	The balance is losing.	Poor people do not have access to good education and technologies.
③	Development will continue and health and happiness will be enhanced.	More people will have access to social services.	Poor people's mindsets will change. Equal access to technologies (access to PCs and the Internet) will be achieved.
④	Jobs for young people will not be created due to insufficient industrial development and this will lead to social unrest.	Less people will be able to access social services.	We will lose trust as a training organization.
⑤	National growth supported by the income from agriculture, the garment industry and remittance of overseas workers/	Overheating of the for-profit economy/	Trial and error while living with students in developing countries/
⑥	Strengthen IT promotion initiative of the government.	Promote inclusive technology development for underserved people.	Solve the problem of not being able to speak English. Distribute PCs in impoverished areas.
⑦	Achieve telemedicine and preventive medicine using IT.	Support information sharing.	It is one of the essential technologies and fundamentals for our lives.

① the vital issues, ② the current status of the issues, ③ a favorable outcome, ④ an unfavorable outcome, ⑤ lesson from past successes and failures, ⑥ decisions which have to be faced now when looking forward 10 years, and ⑦ the roles of IT. Please see Appendix 1 for details of the questions.

Table 4-3 Answers to the Seven Questions

	Contribution-G	Contribution-H
①	The loss of the foundation for understanding what life means/	The increasing population reaching the limits of resources/
②	Principles for children to live by in order to discipline themselves are being lost. More people are contracting diseases due to their stress, frustration and anger.	We have not identified the amount of resources nor do we understand the current use of resources. There is inequality in the allocation of resources.
③	People will understand the ecology of life.	Surplus resources will become tradable.
④	Leadership will be lost and social order will be lost.	The effective sharing of resources will become impossible.
⑤	The loss of the ecology of life/	Perhaps problems concerning distribution systems and the idea of prioritizing national interests/
⑥	Reconstruct life systems.	Visualize amount and usages of resources.
⑦	Fill the gap of inequality.	Sensing、Dynamic and reatime allocation of resources, prediction of the future situation, dynamic control of the huge amount of components.

① the vital issues, ② the current status of the issues, ③ a favorable outcome, ④ an unfavorable outcome, ⑤ lesson from past successes and failures, ⑥ decisions which have to be faced now when looking forward 10 years, and ⑦ the roles of IT. Please see Appendix 1 for details of the questions.

Table 4-4 Answers to the Seven Questions

	Contribution-I	Contribution-J
①	Increasing complexity and uncertainty in the operating environment, arising from issues such as increasing income inequality, an ageing population, increasing diversity in society, and the need to enhance economic resilience/	Aging/ Medical services/ Resources (Water, Energy)/ Livability in the country/ Income equality/ Geopolitical change/
②	There is a widening income gap, as well as a greying population and very low birth rates.	Science and Technology have made big advancement of our life. We need to carry on.
③	An increase in birth rate, an improvement in social mobility and better cohesion and creativity amidst diversity could be desirable outcomes.	The advancement of science and technology will bring about a better world. (food, QoL, healthcare, communication, entertainment, etc.)
④	An erosion of the national identity, decline in economic competitiveness and mass migration to other countries could be a negative outcomes.	Negative impact (new diseases, privacy, cyber criminal) would appear due to the misuse of science and technology.
⑤	No distinct events that led to the current situation/ Underlying trends: i.e. Higher rates of education and the government's population policies might have contributed to low birth rates and the ageing population. The widening income gap might also have been because of global competition.	Investment in science and technology as well as in human resources for 20 years by the government/ (Before that, we were just users of the technology. The investment has made a culture of R&D.)
⑥	Enhance healthcare for the elderly and facilitate national-level dialogues to facilitate greater understanding among citizens, as well as between citizens and the government. (Steps have already been taken)	Ensure a better flow from the research laboratory to Industry.
⑦	Technology, coupled with measures to redesign jobs and inculcate lifelong learning, might improve the employability of the elderly, lift the wages of the lower-income and raise the productivity of the industries.	Create the infrastructure that enables development of applications. Create new forms of IT that will become new service enablers.

① the vital issues, ② the current status of the issues, ③ a favorable outcome, ④ an unfavorable outcome, ⑤ lesson from past successes and failures, ⑥ decisions which have to be faced now when looking forward 10 years, and ⑦ the roles of IT. Please see Appendix 1 for details of the questions.

Asking the seven questions is an effective way of finding out the views of experts about the future. The answers given by experts from different countries highlighted various issues for the future. We classified the vital issues obtained from asking the seven questions into three categories as shown below.

(1) Inequality

Reducing inequality is recognized as an urgent issue. There is a major inequality between urban areas and rural areas, in skills and education, and in food and resources. People from different areas and different families have unequal opportunities, and inequality is increasing in general. We should recognize that inequality is also increasing in Japan.

(2) Sustainability

In addition to the sustainability of the natural environment, the sustainability of the social environment is seriously threatened. Problems concerning poverty, education, health, agriculture, etc. cannot be solved with temporary funds such as donations or subsidies alone. Sustainability can be ensured by constructing business ecosystems and creating systems through which value circulates. This is also an important point when applying technologies resulting from R&D to Japanese society.

(3) The Development of IT Infrastructure

The need for IT to solve social problems is widely recognized, as can be seen by the interviewees' use of the words "fundamental" or "essential" when describing IT. In particular, there are great expectations for IT infrastructure because it is relatively easy to develop compared to roads, water supply systems, transportation systems, etc.

The important thing here is that value will not be created unless skills and systems are developed to make full use of IT along with the development of IT infrastructure. It is important to increase IT literacy and develop business process communities in order to make full use of IT and make IT a useful tool for improving everyday life. In Japan, it is also essential to integrate information science and technology and social technologies.

As some interviewees commented, IT is a tool. Misuse of the tool can lead to negative consequences. Correct use of IT can bring about excellent results. In emerging nations, the positive side of IT seems to be drawing more attention, but it is essential to fully consider the negative aspects of IT and design appropriate infrastructure when integrating IT with social technologies.

5. Conclusion

At the eight organizations in four countries in Asia that we visited for the surveys, a variety of IT methods were being used to change society in a major way.

There were various problems regarding urban and rural areas, water and other resources, the young and the elderly, which led the organizations to find new uses for IT in society and business. Their efforts included: activities to improve rural life; efforts to launch new businesses; dissemination of education to disadvantaged young people; and infrastructure development by the government. The common issues raised by leaders in each field were, “inequality,” “sustainability” and “the development of IT infrastructure.”

In various parts of Asia, there are undeniable inequalities in access to services concerning everyday life, education, health care, etc. Some people do not have access to even basic services. If efforts are not made to reduce inequalities in society, eventually it will hinder sustainable development. In addition, ongoing environmental pollution and the overuse of resources in Asia (which has a large population) are extremely serious problems for the sustainability of the natural environment. In order to overcome these social problems and increase the percentage of people who have access to basic social services, it is necessary to encourage community-based sustainable activities rather than providing financial support. IT infrastructure has the potential to play a critical role as a tool to enable such activities, and the effective development of IT infrastructure is hoped for.

Efforts to reduce inequality and achieve a sustainable society and natural environment in Asian countries are major social and business trends which cannot be ignored. It is expected that Japan will face the same issues that are causing these major trends in the future.

We will utilize the knowledge obtained from the surveys concerning specific businesses, measures, ideas and various efforts in Asian countries, when defining R&D areas that Japan should work on strategically in the future.

Appendices

Appendix 1 Seven Questions

This technique is used to draw information from key individuals regarding the future. The seven open-ended questions cause the interviewee to pause, think out loud and to place themselves in the future.

This method involves the following steps: defining the scope of the study; preparing explanatory materials; conducting interviews; highlighting key issues; clustering key themes; and compiling the materials.

1. Please tell us about the critical issues that you think will influence global social, business and technological changes.
2. What is the current status of the issues?
3. If things went well, being optimistic but realistic, please talk about what you would see as a desirable outcome.
4. As the converse, if things went wrong, what factors would you worry about?
5. Looking back, what would you identify as the significant events which have produced the current situation?
6. Looking forward 10 years, what would you see as priority actions which should be carried out soon?
7. What would you see as the roles of information science and technology in about 10 years from now, if information science and technology can help to improve the situation?

Source: Horizon Scanning Centre Toolkits, the Government Office for Science (partially modified)

http://hsctoolkit.bis.gov.uk/About-16.html

Appendix 2 Itinerary

17-Feb (Mon)	17:20 Narita >>
18-Feb (Tue)	>>0:20 Delhi, DRISHTEE (a site visit)
19-Feb (Wed)	DRISHTE (an interview), 18:05 Delhi > 21:10 Kochi
20-Feb (Thu)	Startup Village
21-Feb (Fri)	8:25 Kochi > 10:00 Chennai, IIT Madras, RTBI
22-Feb (Sat)	8:25 Chennai > 16:15 Dhaka
23-Feb (Sun)	Grameen Communications (site visits)
24-Feb (Mon)	Grameen Communications (site visits and an interview)
25-Feb (Tue)	12:30 Dhaka > 18:20 Kuala Lumpur
26-Feb (Wed)	SOLS 24/7 (interviews and site visits)
27-Feb (Thu)	10:25 Kuala Lumpur > 11:20 Singapore
	14:00 Prime Minister's Office
	16:30 NEC Laboratories Singapore
28-Feb (Fri)	Agency for Science, Technology and Research (A*STAR)
	22:20 Singapore > 6:00 Haneda (1-Mar)

Appendix 3 List of Cooperators

■ The Japan Research Institute Limited, Japan

Tamako Watanabe, Manager Impact Business Creation Unit

■ Drishtee, India

Nitin Gachhayat, Co-Founder and President, Functions

Swapna Mishra, Assistant Vice President, Marketing & Communication

Prabhat Kumer Tiwari, Division Commander, Mathura

Sachin Pal Singh, Controller, Operation

■ Startup Village, India

George Paul, Director, Partner Network

Gokul K S, Director, Strategic Alliances

Tanish Thakker, Strategic Alliances

■ Rural Technology Business Incubator (RTBI), India

Ashok Jhunjhunwala, Professor, Indian Institute of Technology Madras

Suma Prashant, Director of RTBI

Jayalakshmi Umadikar, RTBI

Janani Rangarajan, RTBI

■ Graduate School of Information Science and Electrical Engineering, Kyushu University, Japan

Ashir Ahmed, Associate Professor

■ Grameen Communications, Bangladesh

Kazi Rafiqul Islam Maruf, Consultant

Partha Pratim Ghosh, Information Management Specialist

Md. Abdullah Al Emran, Senior expert, Business Development

Nayeen Al Amin, IT system staff, IGPF

Foyez Ahmed, Field Supervisor, IGPF

■ SOLS 24/7, Malaysia

Madenjit Singh, Co-founder

Raj Ridvan Singh, Co-founder

Adam Taylor, Deputy Director, Youth Development

Chris Rosado, Head, Strategy

Yussef Gheriani, Program Manager, SOLS TECH

■ Japan Science and Technology Agency (JST), Singapore

Osamu Kobayashi, Director, Singapore Office

■ Public Service Division, Prime Minister's Office, Singapore

Kwa Chin Lum, Deputy Director, Strategic Policy Office / Head (Centre for Strategic Futures)

Jonathan Ng, Assistant Director, Centre for Strategic Futures / Strategic Policy Office

Bai Huifen, Senior Strategist, Centre for Strategic Futures / Strategic Policy Office

Terence Poon, Senior Strategist, Centre for Strategic Futures / Strategic Policy Office

■ NEC Asia Pacific Pte. Ltd., Singapore

Keiji Yamada, Senior Vice President / Head (NEC Laboratories Singapore)

■ Agency for Science, Technology and Research (A*STAR), Singapore

Tan Geok Leng, Executive Director, Science and Engineering Council

Lim Jia Yee, Senior Officer, Strategic Planning

Angeline Ng Chiu Yen, Assistant Manager, Corporate Communications

Lisa Chong, Assistant Manager, Corporate Communications

■This survey was run by:

Kazuyoshi Shimada, Fellow, CRDS
Yosuke Takashima, Fellow, CRDS

CRDS-FY2013-OR-05

Report on the Future Perspective (Asian edition)
Information Science and Technology Field (FY2013)

May 2014

Information Science and Technology Unit,
Center for Research and Development Strategy, Japan Science and Technology Agency

7, Gobancho, Chiyoda-ku, Tokyo, 102-0076, Japan
Phone: +81 3 5214 7481
Fax: +81 3 5214 7385
http://crds.jst.go.jp/