SDM NEWS
System Design and Management

July 2014

Message from the Faculty

The Power to Create a Future Filled with Hope

Looking at the recent trend of the world, I often feel that there is a big current shift in each of the social, political and economic spheres – in particular since the Great East Japan Earthquake. In the social sphere, regarding the need to address the falling birth rate and aging population (the population decrease) a consensus is being built gradually and concrete measures are beginning to be taken. Concerning international politics, the cold war ended and the U.S. is not the superpower it once was. This has completely changed the political landscape for Japan as well. With regard to the internal affairs of Japan, as the liberal parties have declined, the conservatives have come back into the picture. As the economy is moving out of a period of deflation, the big old companies are rapidly losing their power, while smaller companies with distinct business models and superior qualities are emerging. In this situation, the 2020 Olympic Games offer a beacon of hope. There is no doubt that the key to Japan's bright future is "innovation" in various social, political and economic spheres. Innovation has been flourishing in both the public and the private sector. However, I am not entirely sure that innovation, by which I mean entrepreneurial spirit and risk-taking attitude for unknown businesses, can really take root in Japan. I had a chance to discuss this with young entrepreneurs and venture capitalists the other day. Among the various topics that we discussed, what struck me was that the group of young entrepreneurs was concentrated in an area of 500 square meters around Dogenzaka, Shibuya – it was as if their businesses were an extension of the university's extra-curricular activities. In this area, a safety net for business failures and a reputation system are functioning, while a number of students are establishing their own companies after interning there. Keio SDM is beginning to function as a society, as such. I was happy to think that the innovations of the latter half of the 21st century would be generated by young minds such as these.

Kenichi Takano, Professor
Graduate School of System Design and Management

News

TOPIC 1 — Reports on the International Symposium: CESUN 2014

The Fourth International Engineering Systems Symposium was held at Stevens Institute of Technology in New Jersey, U.S. from Sunday, June 8 to Wednesday, June 11, 2014. Keio SDM's faculty and students normally attend this symposium, as the research areas are quite relevant. Professor Masaru Nakano, Associate Professor Seiko Shirasaka and Ph.D. student Akiko Otsuka attended this year. The symposium generated lively discussions through five keynote speeches, 70 lectures, six panel sessions, 55 poster presentations and one dialogue-style workshop. Ms. Otsuka made a presentation entitled "System Architecture of the Active Debris Removal (ADR) by Akiko Otsuka and Yoshiaki Ohkami" and discussed the system architecture of a debris-removal project.

As many faculty members and students from Keio SDM's partners, such as the Delft University of Technology in the Netherlands and Purdue University and MIT in the U.S. participate in CESUN, it helps us strengthen our ties with our partners more efficiently than visiting each partner university individually. In fact, this year we met representatives of Delft University of Technology to discuss further collaboration at international conferences and joint research. With MIT and Purdue University we had informal discussions not only with faculty members but also former exchange students at Keio SDM, as well as those interested in signing up as exchange students.

Since many people suggested at the closing ceremony that they would like to see CESUN held one year in Asia, Keio SDM is currently considering hosting it at Keio University in the future. We will strive to establish and maintain world-leading networks by continuing to closely collaborate with universities that are internationally recognized.

TOPIC 2

Mr. Nobuyuki Idei's Extension Lecture and SDM Information Session on Friday, June 20, 2014

The Keio SDM Extension Lecture was held on Friday, June 20, 2014. We invited Mr. Nobuyuki Idei, former chairman of the Sony Corporation and a founder and CEO of Quantum Leaps Corporation, to give the lecture. Looking back on 1995, when he became the president of Sony Corporation, coinciding with the commercialization of the Internet, Mr. Idei spoke on "A Quick Overview of Innovation," sharing a range of examples. He explained how innovations used to be generated by major companies, but that the Internet has brought a big change such that "individual" ideas have become the engine for innovation.

The lecture was held at Hiroshi Fujiwara Hall – which was constructed with the help of a donation from Mr. Hiroshi Fujiwara, the very person who introduced the Internet to Japan. The lecture attracted many participants, from and outside the university, and the hall was packed, including the upstairs seating. Following the lecture, Mr. Idei carefully responded to each of the many questions from the floor. After Mr. Idei's lecture, an SDM information session was held in one of the Keio SDM classrooms. Nearly 40 individuals attended the information session. After a briefing by Associate Professor Tetsuya Toma, participants attentively listened to faculty and current students, who spoke about their individual experiences. It was the first time that a "consultation corner" has been set up as part of the information session. The idea came from the suggestions of Keio SDM students. The current students who gave consultations included some who had joined the graduate

The lecturer, Mr. Nobuyuki Idei

program upon completing bachelor degrees as well as some who are working while studying. Participants were able to listen to first-hand experiences of the topics that they were keen to find out about, such as student life and balancing study with work. The session was well received by the participants.

TOPIC 3

Health Social Big Data Project

A research proposal entitled "Improvement of Health Literacy by Health Information Feedback based on Life Log Data Analysis," by Professor Tetsuro Ogi (leader), Associate Professor Tetsuya Toma, Associate Professor Naohiko Kohtake from Keio SDM, Professor Michiko Watanabe and Associate Professor Yuko Oguma from the Graduate School of Health Management, together with TANITA Health Link Inc., was selected by the National Institute of Information and Communications Technology (NICT) as part of their program "Research and Development on Utilization of Fundamental Technologies for Social Big Data", and a four-year research project began. Health is an important issue for Japan, which faces a progressively aging society and is gearing up for the Tokyo Olympics. Although everyone takes his/her own health seriously, many people face challenges such that their efforts can prove unsustainable. This research project aims to help
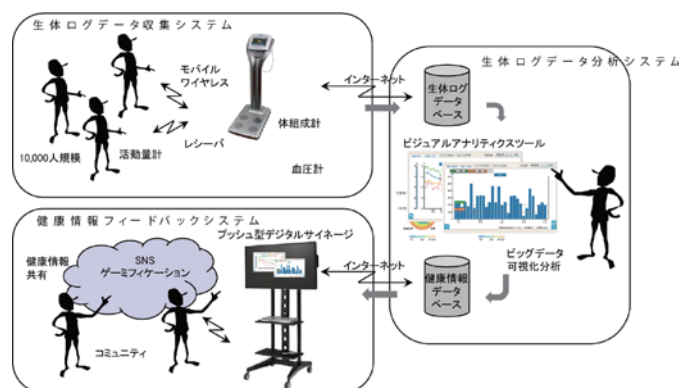

Illustration of the health information feedback system

people to develop their health literacy by encouraging them to record their life-log data using devices to measure activity quantity and body composition, and by providing health advice for each person based on the analysis of big data collected from a multitude of people.

More technically, the project aims to realize a healthy social system by integrating cutting-edge technologies and research findings such as mobile communication, visual analytics, big data analysis, digital signage, social networking service and gamification.

TOPIC 4

KPRI Demonstrates Research Findings at the Yagami Campus Tour Organized for the 75-year anniversary of the Faculty of Science & Technology of Keio University

The ceremony celebrating the 75th anniversary of the Faculty of Science and Technology took place on Saturday, June 14, 2014 and was attended by nearly 700 people including the hosts, faculty graduates and the general public. In a Yagami Campus Tour organized as part of the ceremony, the Keio Photonics Research Institute (KPRI), affiliated with the Faculty of Science and Technology, displayed its research findings from the Project Koike, supported by the Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST). From Keio SDM, Associate Professor Tetsuya Toma, who serves as Deputy Director of KPRI, as well as Research Assistant Iwane Maida and Researcher Hiroshi Takizuka of the SDM Research Institute, reported on the research findings to the visitors. A research group within the project led by Associate Professor Toma has been conducting research and development on technologies for transmitting high-definition video in real time, using the world's fastest Graded Index Plastic Optical Fiber (GI-POF).

Demonstration of 4K uncompressed video transmission using GI-POF

The demonstration of KPRI's research findings was conducted in a room on the fourth floor of the Education Research Building (Building No. 34), which was inaugurated in January 2014 as part of the 75th anniversary commemoration. Visitors were impressed by the demonstration of POF transmission of ultra-high-definition 4K video from a mobile device onto a large-screen 4K display.

A GI-POF network is available not only in the room where KPRI's demonstration was conducted but also in the entire building (Building No. 34), i.e., transmission

A 150-inch large screen on the wall of the room where KPRI's findings were demonstrated.

and receipt of 10 Gbps information is possible anywhere in the building using GI-POF. The real-time transmission of high-definition video is used for the educational and research activities of the Faculty of Science and Technologies – only one good example of the practical application of the research findings. As part of the campus tour, other technologies were also demonstrated, such that a precision tool on the first floor was filmed in 3D, which was transmitted to the stereoscopic screen in the Collaborative Design Room on the third floor.

Location Business Japan (LBJ) 2014

A seminar at the LBJ 2014

An exhibition and seminar entitled "Location Business Japan 2014 (LBJ 2014)" was held at Makuhari Messe in Chiba City for three consecutive days from Wednesday, June 11 to Friday, June 13, 2014. The executive committee, led by Professor Naohiko Kohtake of Keio SDM with the support of Professor Shinichiro Haruyama, planned and implemented various seminars on a wide range of themes, including: new positioning technologies such as sound waves and Bluetooth Low Energy (BLE); Pedestrian Dead Reckoning (PDR); an information bank where individuals store personal information; industry and retail applications of location information; quasi-zenith satellite systems; and location open data. A new wave of research that has emerged this year has made it possible to obtain more accurate and precise location information (micro location) with advanced technologies; as a result, a variety of new services are being created. The keynote lecture entitled "Impacts of Micro Location Services on Brick-and-Mortar Shops" was delivered by Mr. Yo Shibata, CEO of Spotlight Inc., which operates "Smapo", a smartphone application that offers reward points to customers for walking into various stores using the micro location technology. LBJ 2014 was held simultaneously with the Interop Tokyo 2014, the IMC Tokyo 2014, the Digital Signage Japan 2014 and APPS JAPAN 2014, and received more than 130,000 visitors in total.

COLUMN | **Report on the OMG Technical Meeting in Boston: Thoughts after participating for the first time**

Representative of Systems Engineering Center: Hidekazu Nishimura

Do you know what OMG stands for? When I ask this question to English speakers, many people would tease me and say: "you mean Oh My God?" Of course, it means something else. OMG is an acronym for the Object Management Group (http://www.omg.org/). Although it has been 25 years since the group was established, I came to know about OMG fairly recently. While Keio SDM introduced Systems Modeling Language (SysML) in 2008, OMG published a book on SysML in March 2003. I encountered OMG for the first time in 2007 when I first learned SysML under Dr. Laurent Balmelli (currently Guest Professor of Keio SDM), who was at IBM then. I had the opportunity to take part in the OMG Technical Meeting. The following three new activities formed the focus of this meeting, held in Boston.

- Cloud Standards Customer Council - Cloud Industry Symposium
- Introduction to OMG's Modeling & Middleware Specifications Tutorial
- Model Based Systems Engineering (MBSE) in Healthcare Summit

In addition, the Industrial Internet Consortium (http://www.iiconsortium. org/) also deserves attention. OMG is carrying out a number of activities working toward standardization in collaboration with the International Council on Systems Engineering (INCOSE). These activities involve the Internet of Things (IoT) were began at this meeting and are presumably linked to the movement toward standardization.

It is such a pity that only a limited number of Japanese companies are participating in OMG at this point. I believe that it is no longer possible to do business only within Japan; it is required for firms to keep eyes on what is happening overseas in order for them to carry out their business activities strategically. I also think it is an obvious fact that, globally speaking, standards related to the development of products are based on systems engineering. For instance, management of companies whose products include services like Product Lifecycle Management (PLM) and Product Data Management (PDM) is in fact highly linked to systems engineering, by which Keio SDM orients itself.

I think it is quite dangerous to rush to introduce new tools without comprehending such a basic fact. No matter how much you invest in introducing tools, they are merely tools if there is no spirit. It is increasingly essential that correct ways of utilizing tools based on systems engineering are disseminated within organizations. After participating in the OMG meeting in Boston for three and a half days, I was convinced of the need for Japanese companies and universities to conduct joint research with companies to deepen engagement in such activities. Although technologies and tools are highly important, one needs to develop an ability to look beyond technologies and tools, to "think systems". The Systems Engineering Center carries out various activities in collaboration with the INCOSE Japan (JCOSE) and OMG Japan. The Center is planning to hold an event entitled "Reporting on the OMG Technical Meeting" in the CDF Room in the Collaboration Complex on Hiyoshi Campus, from 1 p.m. to 5 p.m. on Tuesday, July 29, 2014. (For more information, please contact us at info@omg.or.jp) Those interested are most welcome to attend the reporting session.

Laboratory / Center profile

Social Design Center (SDC)

Representative: Professor Takashi Maeno

Overview

What we call "social design" means that multiple stakeholders such as government, companies, universities and citizens participate in problem-solving processes ("multi-stakeholder process"), seeking to create a new society by "working in collaboration" in order to address the issues of an increasingly complex society. The Social Design Center (SDC), which was established in April 2010, aims to serve as a practical platform to realize social design. The following are two cases of such attempts.

Case 1: Multi-Stakeholder Value-Creation Project

The SDC collaborates with an advertising agency, Hakuhodo Inc. (among other such agencies) to implement a value-creation project with multiple stakeholders, with a view to addressing social issues. Currently there are two projects that are on-going. One is the "Food Loss Challenge" project. Under the auspices of this project we have conducted study tours and workshops with the aim of providing tips on how participating companies can change their own behavior, and how to forge opportunities for creating new business. (http://foodlosschallenge.com/ in Japanese)

The other project is the "Conference for Future Education". A kick-off symposium was held in March 2014, at which we shared our concerns on various issues with 250 individuals from the private sector, the public sector, NPOs, and the education sector. We plan to organize study tours in and outside Japan in pursuit of solutions to intrinsic issues. (http://miraikk.jp/)

Case 2: Keio SDM Obuse Social Design Center

The Keio SDM Obuse Social Design Center (office name: Obuse Office, Social Design Center, SDM Research Institute) was established inside the municipal office of Obuse Town in 2014. Working creatively with various stakeholders, we plan to organize Obuse youth meetings, an Obuse summer school, and future Obuse meetings, while carrying out practical research for creating new businesses and developing a happy community.

A logo of the Food Loss Challenge Project

A logo for the Conference for Future Education

A study tour   A workshop

In front of the office
(From left, Professor Koizumi from the University of Tokyo, Project Professor Hayashi, Dean Maeno, Mayor Ichimura, Guest Professor Nakajima and Omiya Researcher)

Systems Approach for Business Engineering

As globalization and other factors make business environments more complex, system-thinking management – aiming to capture things by taking a panoramic view of the whole – is increasingly required. This book aims to enable readers to develop structured creative thinking and systematic problem-solving skills at the same time as illustrating the methodological systems approach. The book was written by Professor Masaru Nakano and Associate Professor Nobuaki Minato of Keio SDM as a textbook or supplementary reader for undergraduate and postgraduate programs concerning business engineering, systems engineering and business management. The book is also meant to motivate managers and those who aim to be managers in the future.

The first part sets out the definition of a system and lays out the basics of systems thinking by emphasizing the importance of capturing business as a system and integrating multi principles. The second part introduces a methodology which enables stakeholders to understand hidden programs concerning business and root causes in a systematic manner, while explaining the ways in which business can be analyzed and evaluated as a system. The third part discusses how the systems approach can effectively be applied in corporate activities such as business strategizing, marketing, finance planning, human-resource and supply-chain management, and business-process reforms.