



"SysML & MBSE Tutorial: Introduction to Agile MBSE Utilizing SysML" by the Systems Engineering Center

Message from the Faculty

From Systematizing Innovation Generation Activities to Concept Engineering



In the 2013 academic year, we attempted to systematize activities for innovation generation based on *system x design thinking*, which Keio SDM has been researching and educating. Special focus was placed on leveraging diversity in order to systematize workshop designs for the purpose of gaining collective wisdom. Keio SDM has been commissioned by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) to implement "Development of Dialogue Tools for Innovations" as part of the COI Stream Seeds Needs Project. In collaboration with thirty different universities and research institutes, we have developed a methodology for the ways in

which different methods can be best combined to generate innovative ideas by building on the wisdom and knowledge accumulated by Keio SDM. More specifically, a methodology for "innovative thinking", i.e., to think more consciously than ever about what you have never considered before ("thinking outside the box"), has been established. However, it is rare that innovations are generated solely through workshops. Rather, it is more common to presume that innovations are generated when workshops are combined with a range of other activities. We will therefore continue our endeavors for systemization, while broadening our theme of covering innovation

generation activities through a new project commissioned by MEXT, "The Project of High-level Coordination Human Resource Development for Innovations." Through this project, teaching materials will be produced for the purpose of nurturing human resources capable of high-level coordination. In addition, we plan to establish "concept engineering", or engineering for concept development, in an effort to further incorporate systems engineering in our activities this academic year. By combining these new activities and approaches, we are able to present yet another year of excitement at Keio SDM.

Seiko Shirasaka, Associate Professor
Graduate School of System Design and Management

News

TOPIC
1

Keio SDM Professor Tomohiko Taniguchi's Lecture at the Keio SDM Information Session

In the early evening on Wednesday, May 21, 2014, Keio SDM held an information session in the North Building on the Mita Campus. The relatively large lecture theater was 80% full, with eighty-six participants attending, including undergraduate students and business individuals who appeared to have taken time out from work to attend the lecture. The session addressed the nature of designing and managing systems and was presented by one of Prime Minister Shinzo Abe's aides, Professor Tomohiko Taniguchi, who joined Keio SDM as Guest Professor in April 2008, right about the time when Keio SDM had been established. In April 2014, he became a full time professor at Keio SDM. Up to the end of March

2014, Professor Taniguchi used to be a full time employee of the Prime Minister's Office as a Cabinet Councilor. According to Professor Taniguchi, who now serves as a Special Adviser to the Cabinet, "Keio SDM has become his new base." Nevertheless, he is still very much needed by Prime Minister Abe. According to Professor Taniguchi, he plays a crucial role in "strategic communication". What exactly does this entail? This can only be answered by the professor himself. One hour was definitely not enough for his lecture titled, "Design and Management of Abe Administration's Systems." Nonetheless, Professor Taniguchi provided valuable and useful information, even if there was not enough time for questions to be asked. According

to the professor, Japan is now undergoing "a phase in which the old political, economic and national security systems are due for renewal. Therefore, the idea of capturing policies as systems in a holistic manner and attempts to decompose or recompose – SDM's approach of thinking outside the box – will be more important than ever." Perhaps due to the announcement made by Associate Professor Naohiko Kohtake who served as the facilitator, quite a few participants stayed behind after the lecture and listened attentively to Dean Takashi Maeno's passionate speech about SDM. Participants had many questions for faculty members, which continued even after the session had finished. This event reaffirmed the keen interests in SDM.

TOPIC 2 “Introduction to Collaborative Creation with System x Design Thinking (Introductory Workshop)”



Participants listening to the skit presentations.



Presenting prototyping in the form of skits.

The first OpenKiDS session of the 2014 year was held on Sunday, May 11, 2014. The OpenKiDS took the form of a workshop this time. The workshop

introduced innovation creation activities that followed

Keio SDM's unique method of combining system and design thinking. For many of the participants, it was their first time experiencing Keio SDM's OpenKiDS event. Participants were asked to select one theme from the following: “smart phones”, “mobility” and “department stores”. They then carried out fieldwork, idea generation and prototyping regarding their chosen theme. Each activity was implemented by paying special attention to system and design thinking, so that participants could understand the differences between the two. Learning by doing, participants were able to realize that the fusion of these two concepts is highly effective for innovation creation activities.

TOPIC 3 The Systems Engineering Center: SysML & MBSE Tutorial – Introduction to Agile MBSE Utilizing SysML

In collaboration with the Object Management Group (OMG) Japan, the Systems Engineering Center (led by Professor Hidekazu Nishimura) organized a tutorial presented by Dr. Bruce Powell Douglass (Chief Evangelist at IBM US) about SysML and Model Based Systems Engineering (MBSE) on Thursday, May 22, 2014. Dr. Douglass shared his valuable knowledge, based on his rich experience as a consultant. He stressed that modeling was based on a mission statement and was distinct from drawings, in that meanings were embedded within modeling. He also emphasized that a requirement model, which has consistency, can verify requirements, which documents cannot. He further underlined the importance of continued verification and securing traceability for the purpose of ensuring quality. He demonstrated the relationship between MBSE models

and viewpoints, the method of handoff from obtained system architecture to each engineering domain and the importance of cross-component interfacing. Through practical approaches that are in line with IEEE 1220, participants were able to deepen their understanding of the topic. Dr. Douglass promotes the introduction of agile MBSE, advocating an agile process with the minimum utilization of SysML. Students, who learned that a proper process of systems engineering can be realized through the introduction of MBSE, commented, “This session covered the basics of SysML thinking and we learned a great deal.” Researcher Kaoru Kuribayashi of the SDM Research Institute helped translate some of the materials into Japanese. During the afternoon of the same day, OMG Japan organized a global forum on SysML and MBSE with a view to facilitating



Lecture by Dr. Bruce Powell Douglass.

discussions on the future directions, which was attended by more than fifty professionals from the private sector. OMG plans to hold its Technical Meeting in Boston in mid-June 2015, commemorating its 25th anniversary. Professor Hidekazu Nishimura of Keio SDM will attend the meeting.

TOPIC 4 The Future Session: “The Future of Sports Careers in Japan 2020” on Sunday, June 8



Group photo of participants.

The Sports Design Management Laboratory (led by Associate Professor Naohiko Kohtake), among others, held the Future Session, “The Future of Sports Careers in Japan 2020”, at the Collaboration Complex on Sunday, June 8, 2014. It was attended by various sports experts such as Ms. Kuniko Matsumura, a board member of the Japan Professional Football League (J-League), Mr. Takashi Hirano, a former player for the All Japan football team and Mr. Yuta Uwai of Future Sessions, along with other individuals interested in sports. The main objective of the session was to create new movement for the “utilization” of sports with regard to the 2020 Tokyo Olympics and Paralympics. It began with a panel discussion by former national football team

members and American football members, and also included Associate Professor Naohiko Kohtake. This was followed by a brainstorming session. Participants were divided into teams composed of individuals with diverse profiles who worked on the following themes: “What issues exist related to careers in the sports industry?”, “What are the hidden potentials of sports?” and “How can we utilize the power of sports in other fields?” Participants were then asked to reform into new teams to work on idea generation and dialogues for convergence regarding the following seven themes, which participants showed particular interest in: community development, arts and music, children's education, revitalization of companies, interactions with foreigners, meet-a-mate/spouse



A group presenting ideas.

hunting and cross-generation interaction/addressing the problems of an aging society. The results of the above activities were presented to the entire group in the form of “the future newspaper”, which depicted an ideal status for 2020. To conclude the session, each participant shared his/her resolution in the form of the following statement: “What I want to be doing when the time has come for the 2020 Olympics and Paralympics.” The occasion provided the opportunity for reaffirming the power of sport and the skills of athletes. It also provided new perspectives on the ways in which the power of sport and the skills of athletes can be utilized for the purpose of addressing various issues within society, as well as how it can change the sports and society of Japan.

Laboratory / Center profile

Mobility Systems Management Center

Representative: Professor Hidekazu Nishimura

Members: Mr. Yoji Suhara, Representative Director, Community Technology Institute Inc.

Professor Testuro Ogi, Project Associate Professor Noriyasu Kitamura, Project Instructor Satoko Kinoshita, Project Instructor Yun Sunkil

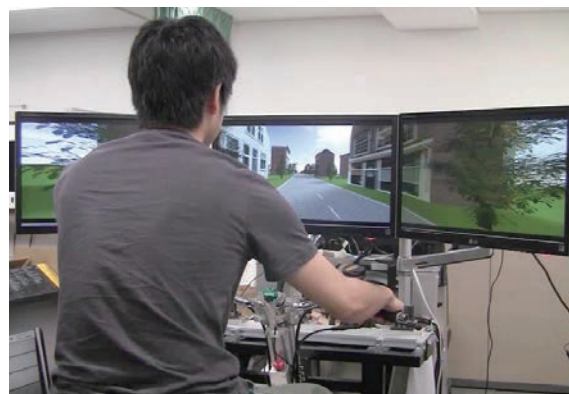
Research Area: safety of mobility systems, model-based systems engineering, environmental symbiosis and regional vitalization

The Mobility Systems Management Center, in collaboration with the Systems Engineering Center, conducts research on crosscutting issues that are relevant to the Symbiotic and Safety System Design Laboratory, the Universal Design Laboratory and the Model-Driven System Development Laboratory. The Mobility Systems Management Center explores solutions to various issues embedded in space-related and public transportation such as train and bus, automobiles, motorbikes, personal mobility, bicycles, pedestrians and wheelchairs, as well as their relationships with localities.

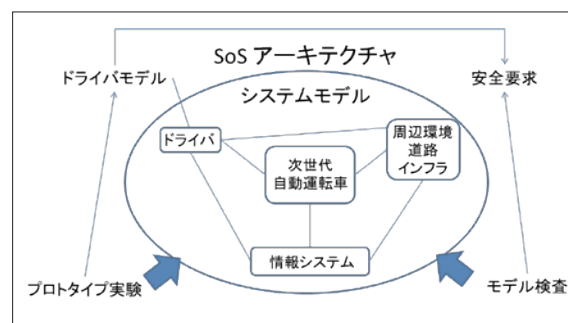
Mobility is extremely important for regional vitalization, as it provides multi-dimensional support to residents in a certain locality. Essential infrastructures supporting the mobility of a locality include public transportation, individually-owned vehicles, car sharing, personal mobility devices, including bicycles and motorbikes, interconnections with paratransit services, as well as associated road development and barrier-free promotion. The center plans to explore the links between biohydrogen and mobility as part of its smart city plan project for Miyako city in the Iwate Prefecture in the future.

A series of basic experiments have been conducted in order to explore the ways in which the elderly can maintain or improve their safe driving skills as a part of joint research with Tokyo Marine & Nichido Risk Consulting Co., Ltd. In addition, as part of a project proposed by JKA (an automobile race) titled "RING! RING! (2011-13)", we developed motorbike simulators while exploring various ways in which stabilizing motorbike riding can be assisted.

Furthermore, as part of the Information-Technology Promotion Agency (IPA)'s assistance for leading research in software engineering 2014, we began our two-year research and development in relation to complex system of systems such as next-generation automobiles and transportation systems, titled "Architecture Design of System of Systems for the Next-Generation Driverless Automobiles with System Model and Repeated Model Checking". Since it is expected that driver-less automobiles will become more common in future transportation systems, we plan to pursue the architecture necessary for ensuring the safety of such systems.



Experiment for a motorbike simulator.



Concept illustration of an approach toward establishing SoS architecture for next-generation automobiles.



Engineering Systems: Meeting Human Needs in a Complex Technological World

The translation version of *Engineering Systems: Meeting Human Needs in a Complex Technological World* was published by Keio University Press Inc. in February 2014. The original authors are Professor Olivier L. de Weck, Professor Daniel Roos and Professor Christopher L. Magee of MIT. The text was translated by Professor Shinichiro Haruyama (editor), Associate Professor Naohiko Kohtake, Associate Professor Seiko Shirasaka and Ms. Junko Tomita. One of the authors, Professor Olivier L. de Weck of MIT, has been giving lectures at Keio SDM since its foundation in 2008; descriptions of some of these lectures have been included in the book. This book features information on engineering

systems, an emerging academic discipline. It explains that engineering systems do not consider engineering-related issues merely as technological problems. Rather, it promotes the idea that engineering should meet human needs by capturing issues more broadly, including social, economic and technical requirements. This approach is in line with Keio SDM's principle of "see the wood and the trees". The original work was published by MIT Press as part of the *Engineering Systems*. The Japanese translation of the book is the first title in the *Engineering Systems Series*, published by Keio University Press Inc. More books from MIT Press' *Engineering Systems* series will be translated into Japanese and published in the future.



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