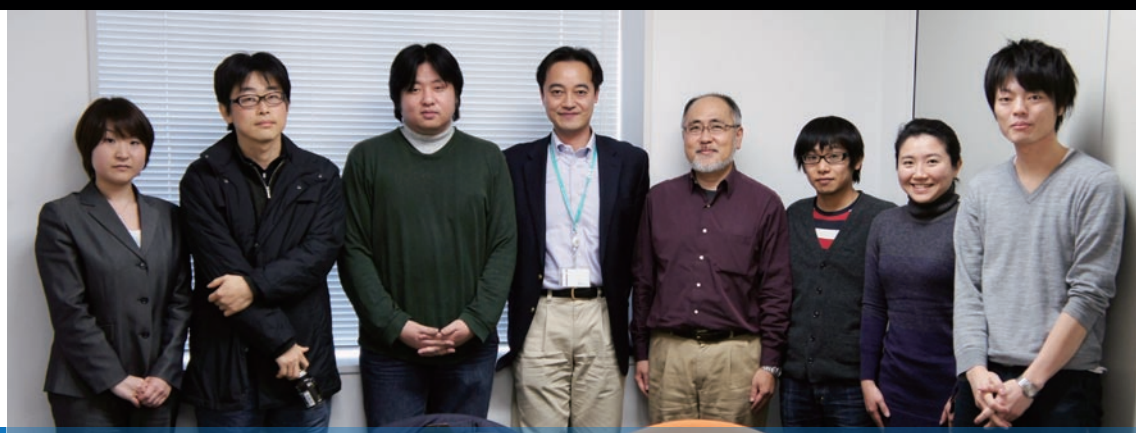
SDM
System Design and Management
NEWS

March 2011



Members of Architecting Laboratory (Lab director: Associate Prof. Shirasaka)

Message from the Director and Dean
Greetings and Gratitude: Expectations for a New Beginning

Yoshiaki Ohkami
Director, SDM Research Institute
Dean, Graduate School of
System Design and Management

The Graduate School of System Design and Management (SDM) marks a milestone this month. Since opening in April 2008, we have awarded seven Ph.D.s and 107 Master's degrees. We currently have 199 students enrolled and are well on our way to achieving our initial targets. SDM began with the idea of training talented leaders in the drastically changing society of the 21st century from Japan and other countries in a true fusion of the sciences and humanities, enhanced by interaction among generations. We achieved our goal of creating a revolutionary graduate school, where the faculty and students alike take on challenges in unexplored domains. Though "System design" is not a familiar academic endeavor to most, a large number of companies and organizations see its value. Our ideas have resonated with researchers, educators, technologists, and business people in Japan and many other countries. All of these organizations and individuals have provided unstinting support for our activities. We should also note that we received critical support from the Ministry of Education, Culture, Sports, Science and Technology 21st-century COE Program in the planning stages and benefit from the Ministry's Global COE Program's support today. The generous support and subsidies we have received from numerous companies and the Japanese government have been instrumental in the SDM's development, and we wish to express our gratitude for these substantial contributions.

April 2011 marks the start of a new academic year as well as some significant changes for the SDM. The first thing you will notice is a substantial rejuvenation of the full-time faculty. We expect our new professors to take on even more ambitious challenges. We have identified the best directions for our educational and research activities, and have obtained a number of "best practices" and "lessons learned" over the last three years. Our new faculty has been instrumental in analyzing them to formulate a more systematic and unified curriculum, to upgrade our international project design subject, ALPS (Active Learning Project Sequence), to bring in more corporate participation, and to add greater depth and variety to our Master's studies. We are confident that our students, if they are willing to make use of this drive and power to tackle difficult problems, will emerge as the new concept leaders in the 21st century, not just in technology systems, but in social systems as well. We hope to see Japan become more comfortable with the concept of system design, and to combine our skills at precision design and manufacturing with the integrated concepts of system design and management.

As I step down from my position as Dean, I would like to express my heartfelt gratitude to the many companies, organizations and individuals who have provided such generous support for the Graduate School of System Design and Management and our Research Institute, and I would like to ask for their continued support as they go forward.

The Great Tohoku-Kanto Earthquake

At 2:46 PM on March 11, 2011, a disaster of historical proportions struck the eastern coast of the Tohoku-Kanto area in the form of a magnitude 9.0 earthquake and a tsunami of unprecedented force. We mourn the loss of untold numbers who had no chance to escape in spite of all of the tsunami preparedness and evacuation training that had been done. The tsunami was so devastating that the emergency cooling system at the Fukushima Daiichi Nuclear Plant was rendered inoperable. Workers are now putting their lives at risk to prevent the dispersal of radioactive material from the site, and we give them our deepest respect and our prayers for their safety. Meanwhile, hundreds of thousands of people have been forced to evacuate, and we can only pray that they will return to their former lives as quickly as possible. This unprecedented natural disaster has also brought an extraordinary amount of interest and best wishes from other countries. It will have a tremendous impact not only on Japan but on the global community, and our top priority must be the identification of both short-term and long-term solutions to the obstacles it has raised. At the Graduate School of System Design and Management, we keenly feel the need for dispassionate analysis of what we can and should do, and the need to take proactive steps in response. The Japanese have overcome earthquakes and war in the past. We must learn from our predecessors as we work quickly to rebuild and create a safer, more secure society.

(Written on March 23, 2011)

Thoughts on retirement: SDM and crisis management

On Friday, March 11, 2011, Japan experienced an enormous magnitude 9.0 ocean-trench earthquake. Many people lost their lives in this tragedy, and I would like to express my heartfelt condolences and regrets to their families. I would also like to send my strong wishes for a quick recovery to those who were injured in the disaster.

These events have reinforced for me the importance of crisis management. The basic principle in crisis management is to consider as many options as possible and to ask leaders to choose the optimal solution among them. During the earthquake, local governments and numerous other organizations responded to the earthquake in strict accordance with the manuals that they had prepared. Even the electric power company had trained for an accident. They offered schools to house refugees, sent in the Self-Defense Forces, and quickly sought the cooperation of the US military.

They were able to shut down the nuclear reactor, but the tsunami knocked out the emergency power, which is what led to the crisis. Water continues to be poured on the spent nuclear fuel in an effort to cool it down. We can only bow our heads at the heroism of the employees of the electric power company and other affiliated companies, the firefighters and the Self-Defense Forces who continue to risk their lives to avert the worst outcome.

It was just last August that we visited the Tokyo Electric Power's Kashiwazaki-Kariwa Nuclear Power Plant and toured a containment vessel. We learned about the mechanisms behind the "three principles" for preventing disaster at nuclear reactors: stop, cool, contain. We saw the spent nuclear fuels stored high in the nuclear reactor housing. If nothing else, the accident serves as a warning that we can no longer procrastinate about the final disposal of the spent nuclear fuel nor continue to use as much electric power as we wish to as a society.

The determination of scope is the essence of the act of design. Systems that impinge on human life must be designed with high safety margins, and what was not foreseen in this case was the 9.0 magnitude of the earthquake. Still, the nuclear reactors were shut down, exactly as designed.

If we consider that the Pangaea supercontinent started separating and drifting 200 million years ago and that an ocean trench earthquake of this size occurs once every 500 years when continental plates shift, the Earth has experienced at least 400,000 such quakes in the past. Were we able to perform a Fourier analysis of this event, we would surely find a clear peak for this cycle. Human history is roughly 5 million years old, and the history of Japan, a mere 2,000 years. The annals of science have recorded several earthquakes on par with the great earthquake that hit Tohoku. Nature does not lie. Human beings need to show greater humility. This experience has taught us that we must live in harmony with the system we call "nature."

As I prepare to leave my post on the full-time faculty of the SDM, I would like to express my thanks to the many companies, organizations, and individuals who have provided such generous support to SDM and SDM Research Institute.

Taketoshi Hibiya
Professor, Graduate School of SDM
(Written on March 22, 2011)

Notice

Call for ALPS 2011 projects

Are there any engineering, social, organizational or business problems that you wish to address? Something difficult that you can't take up in your normal, day-to-day activities? A medium or long-term task you need to accomplish? Would you be interested in working with our graduate students to find solutions? The Graduate School of System Design (SDM) is looking for projects related to the "Symbiosis and Synergy," the theme for the AY2011 ALPS design project.

"ALPS" projects provide recommendations on the design of innovative products, services and other systems using system design and management approaches developed in collaboration among Keio University, Massachusetts Institute of Technology (MIT), Stanford University in the USA, and Delft University of Technology (TU Delft) in the Netherlands. Five ALPS workshops will be conducted on the Hiyoshi Campus of Keio University for a period of approximately six months from May to the end of November 2011.

Graduate students at the SDM will form teams of approximately six members to investigate products and services related to themes in symbiosis and synergy that are received from Proposer companies and organizations. These teams will define the issues, identify the requirements of interested parties, define system requirements, design concepts, propose architectures, and prototype, test, refine and verify ideas.

"Symbiosis and synergy" refers to the ability of different organizations and organisms to coexist in ways that allow them to accomplish things they could not accomplish individually. For organizations, this may result in new products, services, facilities and policies.

An example of symbiosis can be found in the "artificial photosynthesis" proposed by Nobel Laureate and Purdue University Special Professor Eiichi Negishi in January 2011. Artificial photosynthesis technology will not only reduce the CO2 emissions from materials manufacturing, but actually absorb CO2 from the atmosphere, enabling nature and human beings to coexist symbiotically. An example of synergy is the merger between Continental Airlines and United Airlines. They will share airport hubs, which reduces their costs while expanding their scale of operations.

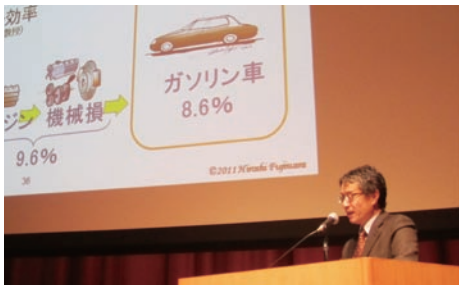
ALPS received financial support from the Norinchukin Bank and the "Center for Education and Research of Symbiotic, Safe and Secure System Design," a Global COE Program under the supervision of the Ministry of Education, Culture, Sports, Science, and Technology.

TOPIC 1

3rd International Symposium on Symbiotic, Safe and Secure System Design "How to Realize System Design Seeing both the Trees and the Forest"

Professor Theo A.J. Toonen

Professor Ockie Bosch



Hiroshi Fujiwara, Special Research Professor at SDM

On February 25, an international symposium was held at the Fujiwara Hiroshi Hall by the Center for Education and Research of Symbiotic, Safe and Secure System Design," a Ministry of Education, Culture, Sports, Science and Technology Global COE Program commissioned to the Graduate School of System Design and Management and the Faculty of Science and Technology, Keio University.

The symposium began with a presentation by Hiroshi Fujiwara, Special Research Professor at the Graduate School of System Design and Management and President of Internet Research Institute, Inc. He spoke from the position of an entrepreneur about the creation of new industries as systems, using examples such as smart grids and tourism. He was followed by Hidenori Kimura, Director of the RIKEN BSI TOYOTA Collaboration Center, Chair of the Transdisciplinary Federation of Science and Technology and Senior Fellow at the JST Center for Research and Development Strategy, who discussed the blueprints for the system science and technology required by the society of the future. Afterwards, Professor Theo A.J. Toonen of Delft University of Technology (Netherlands) and Professor Ockie Bosch of University of Queensland (Australia) gave presentations on teaching people how to solve social issues as systems. Finally, Professor Takashi Maeno, the program leader for the Global COE Program, discussed the unique initiatives undertaken by the program. Graduate students also made poster presentations. All of the speeches and presentations focused on the idea of tackling the issues that face society as large, complex systems in which a wide range of stakeholders cooperate to arrive at solutions. It was a valuable symposium in that it highlighted what the program and SDM can do to encourage information sharing and international collaboration.

TOPIC 2 AY2010 foreign exchange students

SDM sent a number of students overseas on exchange programs during AY2010. Last year, we began an exchange program with the TPM (Faculty of Technology, Policy and Management) at Delft University of Technology (TU Delft) in which three students from each university participated. This year, five students from each university participated. We also began new programs with the National Institute of Applied Science (INSA) Toulouse in France (three students), the DIG (Department of Management, Economics and Industrial Engineering) at Politecnico di Milano (two students currently abroad) and D-MTEC (Department of Management, Technology, and Economics) at the Swiss Federal Institute of Technology Zurich (two students currently abroad).

Exchange students returning from TU Delft TPM and INSA Toulouse have developed clearer goals and objectives thanks to the classes they took and the research guidance they received. Their time abroad also improved their academic abilities, communication skills, and global perspectives.

We are now in the process of setting up exchange programs with institutions in the United States and Australia for AY2011.

● Reports from students visiting TU Delft TPM

Kohei Ogawa (2nd year masters course)

My experience was somewhat unique; I was assigned for half of the year to an outside laboratory that drew on students from TPM, civil engineering, and aerospace engineering. The laboratory consisted of professors, researchers with PhDs, and doctoral course students only. There were no masters students. There were some problems because of the differences in the research environment and guidelines, but for me, a new graduate, it was an extraordinary, life-changing experience to spend time in such an advanced environment. I lived in a dormitory with a shared kitchen, which enabled me to enjoy deeper exchanges with my fellow international students. We're in frequent contact over Facebook and Skype, and I am sure that I will treasure these friendships my entire life. I am extremely thankful to the SDM for providing these kinds of opportunities. I want to make the consistent, day-in-day-out effort that it takes to become the kind of person who can change and delight the world.

Aya Onoe (2nd year masters course)

My four months as an exchange student were intense and went by very quickly. When I returned to Japan, it felt as if I were waking up from a dream. It was an incredible experience to work with the Dutch people, who are so bold and energetic, and who have quite different values from the Japanese. We collaborated on group work, and I also learned a great deal about how to digest material and express it in written form as I tried to tackle the seemingly endless stream of papers and class work. The environment in the Netherlands was so laid-back that it inspired me to join the orchestra, and to travel around wherever my interests took me. It was extraordinary to be able to see the country up close with my own eyes and talk to so many people. This will be a major asset for me as I go forward. My experiences will serve as the inspiration for new efforts and achievements.

Keita Kato (2nd year masters course)

It is a big world. That is my strongest impression from my time studying abroad. While at Delft, I lived in a dorm with students from all over the world. I learned a great deal from them; better communication skills, how to balance study and play, and how to approach things with a sense of humor. My time with them was an experience that I would not exchange for anything. At TPM, we mainly covered new material in class and then broke off into group work. We gained knowledge from the instruction, but we also learned how to collaborate with people who have different cultures and values. TU Delft attracts talented students from all over the world, and I recommend it particularly for students who want to be active on the global stage. You need to experience the breadth of the world from a small town like Delft.

Yukiko Sugizaki (1st year masters course)

It was only five months, but my time at TU Delft was filled with new experiences and knowledge. Three things left particularly strong impressions on me. The first was how tolerant and accepting the Dutch are. When I did not understand something, it was easy to ask questions and people were always friendly in their responses. The second was how many exchange students are at TU Delft TPM. Because the students were from so many different countries and cultures, there were occasional collisions in our group work. However, I gained the attitude of mutual understanding. The third was the opportunity to travel to many different countries. It was easy to get to neighboring countries so I had the opportunity to come in contact with many different cultures, languages, foods, and customs. I made lots of friends, and found the five months to be very meaningful.

Kenta Takahashi (1st year masters course)

I decided to participate in the exchange program at TU Delft because my goal is to work internationally. I had two main purposes. The first was to be able to live on my own overseas, and the second was to improve my English abilities through lectures and group work. At first, it took a great deal of effort to adjust to life in the Netherlands, but ultimately I was able to achieve my goals. My English skills obviously improved, but I also learned a great deal just by being in an international environment in which 60% of the students were exchange students. I am grateful to the SDM and TPM Department for providing the opportunity to participate in a wonderful exchange program like this, and I want to use my experiences to develop into the kind of person that will make both institutions proud.

● Reports from students visiting INSA Toulouse

Rehito Numata (2nd year masters course)

While at INSA Toulouse, I did research for my masters degree and took classes in risk engineering. I was able to spend a lot of time with students of many different nationalities, ages and backgrounds, both in the classroom and while traveling. It was a very stimulating environment, and one that gave me many new and important discoveries and insights. I will always treasure the acquaintances that I made with faculty, students, and friends both inside and outside of the school, and I continue to maintain contact with them. Classes at the university were taught in English, but the day-to-day living required French skills as well, and because of that, I think this was a more valuable experience then a study abroad program in an English-speaking country.

Tomoya Kase (2nd year masters course)

I studied risk engineering at INSA Toulouse. It was challenging to be outside of an English speaking country and I was constantly running into language barriers, but in two and a half months I was able to hone my skills and enjoy an extraordinary stimulating environment. While I was in France, Thomas, an SDM masters student, provided introductions to French people in my age group, and I was surprised at how interested they were in everything from manga and anime to J-pop and television programs. The Internet provides easy access to information from around the world, and even things that we in Japan may consider a bit vulgar are quickly picked up on overseas. I do not think we are really aware of this when we are in Japan, but we should probably give a bit more thought to how we are viewed around the world. I am grateful to the SDM for providing this opportunity and I strongly encourage my fellow students to take advantage of these wonderful study abroad programs.

TOPIC 3 Report: Study Group on Financial Regulation and Supervisio

Panel discussion

The "Study Group on Financial Regulation and Supervision" is an unofficial study group in the SDM Socio-Critical System Laboratory. It recently held a series of three symposia on finance.

The December symposium was titled "A Business Plan for 13.2 Billion Yen" and featured Mr. Daisuke Iwase, Vice President of the Lifenet Insurance Company, who spoke about his experiences in starting up Japan's first independent internet-based life insurance company.

The second (January) symposium was titled "International Accounting Standards (IFRS), to Japan: Opportunity or Threat?" The lecture was given by Katsumi Fukamachi, Representative Partner at PricewaterhouseCoopers Aarata and Japan's foremost authority on IFRS and systems.

The third (February) symposium was titled "Strategic Exports as a System: Creating a 20 Trillion Yen Market." Deputy Director-General Masakazu Ichikawa of the Ministry of Economy, Trade and Industry spoke on export strategies for package-style infrastructure projects. Following his remarks, he was joined by Takuji Tanaka, Executive Officer at Innovation Network Corporation of Japan, and Professor Yasui for a panel discussion on systems approaches.

The CDF Room was packed for all three sessions, which were planned and organized by interested students.

TOPIC 4 Team wins 2nd prize in Tokyo Institute of Technology's Mobile App Contest "iPhone" app for business people

Mobile App Contest award

The Tokyo Institute of Technology sponsored a "Mobile App Contest" on February 24, 2011. The contest was open to any student wishing to propose applications for the popular "iPhone" mobile telephone terminal. Three students from the Semiconductor Technology Laboratory participated. We created a "candidate selection tool" that we called "Immediate Solutions When You are Confused." The app makes use of requirement analysis, "AsIsToBe" and other well-known approaches. It was unique for combining an "Analytic Hierarchy Process" (AHP) and a framework for use in business. While many student teams proposed games or other entertainment-oriented apps, we decided to go with a business app inspired by a survey of "iPhone" users. The top prize went to a team from the Tokyo Institute of Technology that produced an extremely refined board game. Our 2nd place prize has motivated the laboratory to take on new projects to create services that link smartphones, apps, and hardware. We hope those of you who are interested will join us!

Eiichiro Moritani (1st year doctoral course), Yasuhiro Miyake (2nd year doctoral course), Yutaka Yoshioka (2nd year masters course)

TOPIC 5 Degrees awarded and doctoral thesis titles

A total of 49 masters' degrees were awarded on March 23, 2011. We also had three students receive their Ph.D.s in March 2011.

Number of degrees awarded (March 23, 2011)
Master of System Design and Management: 22
Master of System Engineering: 27
Ph.D. in System Design and Management: 1
Ph.D. in System Engineering: 2

Doctoral thesis titles

Name: Mr. Koichi Homma (3rd year, doctoral course)
Title: A Role of the Citizen to Improve Museums – A Proposal of a Framework Supporting a Social System by Internet Utilization -
Degree: Ph.D. in System Design and Management

Name: Mr. Masaaki Mokuno (3rd year, doctoral course)
Title: Research on System Design of Optical Navigation System for Randezvous Docking
Degree: Ph.D. in System Engineering

Name: Mr. Keiichi Yamamoto (3rd year, doctoral course)
Title: Integrated Control System Design of Active Stabilizer and Electric Power Steering for Automobile
Degree: Ph.D. in System Engineering

Laboratory Profile

Architecting Lab

Associate Professor Seiko Shirasaka

Worked on space development for Mitsubishi Electric Corp. Participated in the development of the ETS-VII (engineering test satellite) and HTV (H-II transfer vehicle). In particular, was involved with the HTV project from the initial designs until the completion of the first mission. Joined Keio University in systems engineering in AY2004. Appointed to current post in AY2010. Areas of expertise: Aerospace engineering, systems engineering, computer safety

Professor Takashi Maeno

Worked as a researcher at Canon, Inc. and became a visiting industrial fellow at the University of California, Berkeley, a visiting professor at Harvard University, and a professor at the Faculty of Science and Technology at Keio University. He has been a professor of the Graduate School of System Design and Management since 2008. Areas of expertise: System design and management methodology, robotics, and science and technology studies

Overview of laboratory

The Architecting Lab is a cross-disciplinary laboratory that investigates "architecting" as a methodology for creating system structures. The methodology of architecting is used in both technology systems and social systems. By developing a theory out of the common ideas of architecting, we have a tool that can be used for the architecting of a wide range of systems. We investigate these systems in our Saturday seminars. At the laboratory, most students are doctoral candidates, but we also have new graduates and outside researchers who bring their own themes to the vigorous discussions.

Main research activities in AY2010

1 Annual theme "System Architecting of the Art"

The theme for AY2010 is "System Architecting of the Art," and we analyze the system of "art" that moves human hearts and minds from the perspective of architecture. Members use this perspective to analyze art that interests them and report on their findings. Presentations to date have included the architecture of film, the architecture of drama, the architecture of musical compositions, the architecture of haiku and the architecture of color. All have been extremely interesting analyses. While the range of topics is broad, we have been able to bring new perspectives to some of the architectural features of art such as the "relationship between tension and resolution" and "the architecture of change over time."

2 Individual research themes

In addition to the annual theme, lab members also report on architectural perspectives of their own research projects, which gives them an opportunity to actively seek out the opinions of other participants. This year, topics included the methodology for developing ultra-miniature satellites, museums, the social system and institutional design, the design of business models that utilize user requirements, and legal compliance. These discussions are fed back into individual projects and provide new impetus for further development of the topic.

3 Others

In addition, participants also gather on their own to discuss scholarly papers that interest them and architectural perspectives on social phenomena and other systems. Rather than being taught by professors, participants learn from each other through their discussions and self-driven discoveries; this cycle is what drives our seminars.

Notice New Curriculum

SDM continuously updates our curriculum in response to the demands of the times. For academic years 2011 and 2012 (AY2011 and AY2012), the Master's program curriculum has been thoroughly revised as follows.

More collaboration and fusion in education (from 2011 Spring enrollment)

In AY2011, the master curriculum in use since AY2008 has been revised. The new curriculum clarifies the relationship between systems engineering and system design and management, integrate technologies and social science, and deepen research and education.

New core subjects: Introduction to Systems Design and Management, System Architecting & Design & Integration, System Verification, and Project Management

The four new Core subjects reassign the core elements in an easy-to-understand format. All supervising professors teach more than one Core subject, which further promotes a collaborative and integrated education. These Core subjects are more closely related to Design Project: Active Learning Project Sequence (ALPS).

Subjects are no longer classified as technology or social science

The classification of subjects as either technology or social science is becoming less important as we are promoting integration of these areas. Therefore, all subjects are now classified as either required or elective subjects. Elective subjects include recommended basic subjects, recommended advanced subjects, and other elective subjects. The recommended sequence of classes has also been clarified; for example, some subjects are more appropriate for second-year students.

Fall enrollees are offered more courses in English and Spring enrollees are offered more courses in Japanese

The curriculum used from AY2008-2010 provided both Japanese and English courses to those enrolling in the spring and in the fall. However, as most international students enroll in the fall, the AY2011 Fall Schedule offers more courses in English. As most Japanese students enroll in the spring, the AY2011 Spring Schedule offers more courses in Japanese. Of course, students can take courses offered in either language in either semester.

Doctoral program for the world's most advanced research

Basically, the Doctoral program is for students who are involved in technical research. The supervising professors welcome contact from those who wish to work on advanced technical research. Our areas of interest are broad and range from science and technology to social science.

Note: The above-mentioned curriculum is subject to change. Please refer to the latest news.

▶ http://www.sdm.keio.ac.jp/en/education/curriculum2011.html

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SDM System Design and Management