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The SDM Pulse@MIT

The newsletter of Massachusetts Institute of Technology's
System Design and Management Program

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MIT's SDM Program marks 10 years of evolution, success

A decade after its creation in 1996, MIT's System Design and Management (SDM) program continues to attract some of the world's most talented mid-level leaders. Each year, accomplished engineers, entrepreneurs, career military personnel, and rocket scientists, among many others, expand their horizons by choosing an SDM degree over a traditional MBA or Master of Science degree.

According to Pat Hale, Director of the SDM Fellows program, there are several reasons why.

"Mid-career technical professionals often find that the traditional MBA does not offer adequate, if any, engineering or science subjects, while a master's in engineering does not provide education in business and managerial issues," he explains.

Consequently, as SDM's first-rate reputation continues to spread, an increasing number of mid-career professionals choose to pursue SDM's Master of Engineering and Management degree over an MBA to help them gain the technical, as well as the managerial, knowledge they need to lead in a wide range of functions, in virtually any industry. The degree is conferred jointly by MIT Sloan School of Management and MIT's School of Engineering.

Another plus for students and their employers is SDM's career compatible formats. "SDM was initially intended to help partner

companies prepare future product development leaders for more complex system design and management challenges, which is why we always included a distance-option and a career compatible, two-year program," Hale explains. Students can finish the program in 13 months under the full-time option or in 24 months by commuting to the MIT campus or attending classes with their peers via distance learning.

John M. Grace, SDM's Industry Co-Director, says that SDM professors strive to design project assignments that allow part-time students to apply their learnings to challenges they face on the job. "Employers of SDM students can begin to see ROI quickly," says Grace.

Grace notes that SDM graduates hold leadership positions in engineering, operations, project management, general marketing and sales in industries as diverse as high tech, banking, consulting, and automotive (see chart, page 5).

"SDM is now the prestige program for mid-career leaders from technical backgrounds," says Grace, who during his tenure as VP of Engineering and Technology sponsored several high-potential leaders to the program. "As importantly, companies are recognizing that having SDM alums with their state-of-the-art MIT education in engineering and management gives them a significant competitive advantage.

Welcome



Welcome to the SDM Pulse.

Welcome to the inaugural edition of the *SDM Pulse@MIT*, produced by students and staff of MIT's System Design and Management (SDM) program. Our name, suggested by SDM student Ken Huang, represents a living, working, and hopefully growing, organism, one that reflects the importance of ongoing communication and collaboration among SDM's students, alumni, faculty, and staff, and our readers.

On these pages you will find an introduction to MIT's SDM program and the SDM community. You'll get a glimpse of the cutting-edge activities that SDM students undertake as they learn to apply systems thinking in a business context and use these learnings to bring value and innovation to employers. In addition, our calendar section includes several events that you might find of interest. We invite you to join us for some or all!

The *SDM Pulse@MIT* welcomes your questions, comments and suggestions. In the spirit of ongoing communication and collaboration, we hope to incorporate your input into future editions.

Sincerely,



John M. Grace

Industry Co-Director

MIT System Design and Management program

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The SDM Pulse@MIT

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For further information on MIT's System Design and Management program, visit <http://sdm.mit.edu>. For further information on MIT's Engineering Systems Division, visit <http://esd.mit.edu>

A special invitation

to companies interested in participating in the MIT SDM program

On November 8, MIT's SDM program will hold a day-long session for companies interested in establishing or deepening their involvement with SDM – whether in terms of sponsoring students, sponsoring research, both – or more!

The meeting will examine industry's pivotal role in SDM's evolution. Led by SDM Industry Co-director John Grace and SDM's Director of Fellows Pat Hale, the session will highlight the experience to-date of firms in the program and the value they have received. A flexible partnership model demonstrating the range

of opportunities for companies' involvement in SDM will be highlighted. Other topics will include expanding the portfolio of SDM offerings to cover a wider range of opportunities within MIT.

The meeting will be held at The Broad Institute near the MIT campus. Lunch will be served.

RSVP/More information: John Grace, jmgrace@mit.edu, 617.253.2081

Perspectives on innovation

By Rajiv Ramaratnam, SDM '07

In my first year as an SDM student, I took two courses that offered different perspectives on how companies can address innovation.

The first, "Innovation in the Marketplace," introduced radical views. Instructor Eric von Hippel proposed that innovation today is driven primarily by customers vs. manufacturers. By this, von Hippel believes that the user often finds a way to use a product that the manufacturer did not anticipate. These 'lead users,' the first to use a new product or technology, often tend to be the most creative innovators for an existing product. Von Hippel argued that companies must find ways to involve the user community early and encourage them to put the product to new uses.

For example, when Lego first introduced its Robotics 'Mindstorms' kits to the market, it primarily targeted teens and high school students. However, groups of older users began to create varieties of software for the kit, bypassing the basic software tools that came with it. This created a new set of consumers, in a market segment that Lego had not initially anticipated.

The second class I took was: "Disruptive Technologies: Predator or Prey?" taught by Professor James Utterback. He theorized that when a company introduces a new product in the marketplace, new entrants enter its market causing increased

competition. Soon a "dominant design" takes shape and becomes the standardized, acceptable way to build the product.

To illustrate, Professor Utterback traced the history of the light bulb. Although many competitors arrived on the scene when Edison first introduced it, his superior filament design won over the others and became a dominant design for the modern day light bulb.

These courses have not only offered me fresh insights into industry trends and innovation, like those above, but also to practical steps I can take to add value to my future employer. For example, I could design and develop a marketing plan to build a user community around a freshly launched product. I could also help spot or push a dominant design for a recently introduced product and thus help my company corner a certain segment of the marketplace.

These are just a few of the many ideas for product development and strategy that are taught in the SDM program to help its students differentiate themselves, and add value to their respective corporations.



The SDM Community

Pat Hale, Director, MIT SDM Fellows Program



Pat Hale, director of the MIT System Design and Management (SDM) Fellows Program, has been involved in SDM since its creation 10 years ago.

At that time, Hale worked for Otis Elevator Company as Director of Systems Engineering and participated as an industry stakeholder in planning a new engineering degree at MIT in

which students earn a master of science in engineering and management, eventually christened SDM.

Hale recalls that prior to SDM's creation, engineers had only the narrow choice of an executive MBA program, which didn't address technical requirements, or a masters in their chosen technical field, which tended to limit their professional focus. "We needed more engineers who could understand the theory and practice of systems architecture and the implications of systems thinking," he explains. Thus the SDM program, MIT's first degree-granting program with a distance learning option, was born.

In 2002, Hale left Otis, but continued to serve in an advisory role for SDM. He also ran the SDM Certificate program, a one

year program for product developers designed to prepare them for system-level roles.

In 2004, Hale was named Director of the SDM Fellows Program. In addition to administering the program, he also teaches classes in product design and development and systems engineering.

In the future, Hale would like to see systems engineering mature as a discipline, including application in new domains and development of a 'common language' for systems engineers and product developers to use in sharing best practices. He plans to use his position as president-elect of the International Council on Systems Engineering (INCOSE) to promote this vision.

"Just as systems engineering is cross-disciplinary, our language and models must converge to bridge domains (aerospace, consumer products, services, etc.) to facilitate learning and an understanding of what it means to be a systems engineer," he explains. "There are many potentially valuable examples of best practice that we fail to share or understand across industries because of this gap in semantics, and it hampers both our companies' success and our ability to teach and develop tomorrow's systems and product developers. The SDM program is helping to address this vital need."

SDM Students The SDM student body is very diverse in its interests and its background, but all students have a shared desire to improve their capability and become leaders by integrating engineering and management skills in a systems-thinking context. The typical SDM student is an early- to mid-career engineering professional, mid thirties age (range 25-50+) with 10 or more years of work experience (range 3-20+). The class entering in 2006 consists of 57 students, 35 who already hold graduate degrees—including four Ph.D.s. The diversity of SDM students' cultural backgrounds, knowledge and experience provides a vibrant and rich learning environment.



SDM Staff the SDM Staff, from left: Ted Hoppe, Student Liaison; Jon Griffith, Director of Operations and Partner Integration; William F. Foley, Program Administrator, Academics & Distance Learning.

Not pictured: Christine L. Bates, Program Administrator, Finance/Admissions.

John M. Grace, Industry Co-Director, MIT System Design and Management Program

John M. Grace joined SDM as Industry Co-Director in 2005. He is responsible for cultivating and enriching relationships with SDM's industry partners to help them maximize their investment in sending employees to SDM's Master in Engineering and Management program and fully utilize their new skills when they return to the workplace.

Jack, as he is known by his friends and colleagues, initially became involved with SDM when, as VP of Engineering and Technology at ArvinMeritor, he sent several candidates targeted as the company's future leaders to the program. These individuals were usually in the early phase of their professional careers but had excellent potential, based on outstanding educational and work experience.

The goals for the SDM candidates were for them to become well-grounded in systems thinking and form a cadre of like-minded change agents for systems engineering at ArvinMeritor. This cadre would become central to incorporating and diffusing systems thinking into the product development process.

Because of their experiences in SDM, several graduates have subsequently been responsible for expanding ArvinMeritor's product portfolio.

Jack officially retired from ArvinMeritor in January of 2005. His career began at Cornell Aeronautical Laboratory (CAL)/Calspan Corp. At Arvin Industries, the parent company of Calspan, in Columbus, Ind., Jack was VP of Engineering. In 2000, when Arvin Industries joined with Meritor Corp. to form ArvinMeritor, he became VP of Engineering and Technology.

Jack holds a B.S. and an M.S. in Mechanical Engineering from the University of Notre Dame; an M.S. in Applied Mathematics from Cornell University, and an MBA from the University of Dayton.



SDM Alumni and their Employers

Typical positions that SDM alumni hold include System Architect, New Product Manager, Project Manager, Technology Strategist, R&D Manager, and System Engineer. More senior SDM Alumni fill such positions as Chief Technology Officer, VP of Engineering, VP of Product Development, and VP of Global Wealth Management, as well as other senior positions. Here is a partial list of companies that employ SDM graduates:

Adobe Systems
Analog Devices
Apple Computer
Amazon.com
American Express
Arthur Andersen
ArvinMeritor
AT Kearney
AT&T
Bank of America

BAE Systems
Bain Consulting
Boeing Integrated Defense Systems
Booz Allen Hamilton
Bristol-Myers Squibb
Cisco Systems
Computer Associates, International
Cummins
Delphi

EMC²
Ernst & Young
Fidelity
Ford
General Electric
General Motors
IBM
Intel Corporation
ITT
HP
Kodak
Los Alamos National Laboratory
McKinsey & Co
Microsoft Corporation
MIT
MITRE
Morgan Stanley & Co.
Motorola
NASA
Northrop Grumman

Oracle USA
UTC Pratt & Whitney
The Aerospace Corp.
The Boeing Commercial Airplane Corp.
The Vanguard Group
RaytheonRolls-Royce
Sandia National Laboratories
Sun Microsystems
Teradyne
Texas Instruments
Toyota Motor Company
US Airforce
US Navy
UTC Research Center
UTC Power
Verizon
Visteon
World Bank
Xerox



Helen Trimble, Director of SDM Career Development

Helen Mirich Trimble, Director of SDM Career Development, also serves as Learning Director of SDM's Graduate Certificate Program in Systems Engineering and its Organizational Leaders Seminars. She holds a B.S. in Occupational Therapy, an Ed.M. in Higher Education Administration with emphasis on Adult Learning, and an Ed.D in Educational Foundations and has both academic and corporate experience.

SDM graduate receives McGovern Award for Entrepreneurship



Vineet Thuvara, who graduated from the System Design and Management program in June 2006, is the first SDM graduate to win the prestigious Patrick J. McGovern, Jr., '59 Entrepreneurship Award. The award is presented annually to an individual student or student team that has made a significant impact on the quality, visibility, and overall spirit of entrepreneurship education and support across the Institute.

The award letter specifically cited Thuvara's "amazing support" for the classes in which he was a TA, as well as his willingness to help at the MIT Entrepreneurship Center with associated projects, student organizations and individual initiatives. For example, as a teaching assistant for a course entitled "Corporations at the Crossroads – The CEO Perspective," Thuvara was instrumental in convincing some of America's most successful CEOs to speak to his class. They included: **Bob Pozen**, Chairman, MFS Investments; **Larry Haverty**, Associate Portfolio Manager, Gabelli Global Multimedia Trust and Former Managing Director, State Street Research; **James Owens**, President and CEO, Caterpillar; **Brian Walker**,

President and CEO, Herman Miller; **Bob Lutz**, Vice Chairman, General Motors; **Strauss Zelnick**, President & CEO, Zelnickmedia; **Michelle Peluso**, President and CEO, Travelocity; **Brian Fetherstonhaugh**, CEO, Ogilvy One; **Joe Tucci**, President and CEO, EMC; **Gary Kelly**, President and CEO, South West Airlines; **Jim Tobin**, President and CEO, Boston Scientific.

He was also successful in convincing each one of them to stay for dinner with the students and agreed to set up connections for students to discuss their internship and job interests with their companies.

Thuvara holds a master's degree in Industrial Design from Indian Institute of Technology and a bachelor's degree in Mechanical Engineering. He was named "Best Incoming Student for 1995" at IIT Delhi, and recipient of the "1996 Arpan Bannerjee Memorial Award for Outstanding contribution to the culture of IIT Delhi."

Thuvara is now working at Microsoft Corporation in Redmond, Washington, as a Product Manager in the Windows Servers and Tools Division under the auspices of the Marketing Leadership Program. His responsibilities include developing mission-critical value proposition strategies and execution of go-to-market strategies.

SDM alumni share insights on career progression

By *Dhiman Bhattacharjee, SDM '07*



In March, 2006, SDM held the first of three annual business trips – week-long sessions that bring together the program's distance, commuter, and full-time on-campus students for a series of speakers sessions, workshops, and panel discussions.

One of the week's highlights was an SDM alumni panel focused on career progression.

Members included four distinguished SDM alumni – Bank of America Vice President of Global Wealth Management Mesbah Haque, SDM '04; Sun Microsystems Director of Engineering Worldwide Operations, Volume Systems Product Group, Steve Klosterman, SDM '98; France Telecom R&D Engagement Manager Sylvie Bokshorn, SDM '00, and OzRoot's Chief Technology Office Tim Root, SDM '98. SDM student Dhiman Bhattacharjee, acted as moderator.

Audience members discussed their career progression before and after SDM and how SDM has benefited their employers.

SDM student receives "Hispanic in Technology-Government" Award

Leticia Soto, who entered MIT's System Design and Management (SDM) program in January, 2006, was honored by the Society of Hispanic Professional Engineers with the "Hispanic in Technology – Government Award" at that organization's national convention held just a few days after she began SDM. The award is presented to an individual whose outstanding achievements have contributed to the field of engineering on a continuous basis, through design, production, management, research or any phase of engineering, and resulted in significant impact.

Soto serves in the US Navy as a Naval Officer with the rank of Lieutenant in the Civil Engineer Corps. Most recently she was deployed to Kuwait and Iraq, in support of Operation Iraqi Freedom. During her deployment she was assigned as a Naval Liaison Officer for a Joint Special Operations Task Force, Soto was responsible for all design and construction efforts to support 2,500 special operations forces throughout Iraq. She received an Army Commendation Medal, which is rarely awarded to so junior an officer.

Soto then transitioned to become Officer in Charge of a 75 person detachment spearheading camp infrastructure development for the Naval Construction Forces. Her contributions included providing multi-disciplinary engineering solutions, including electrical load analysis, phone and data communication systems, and design and construction of fresh and waste water distribution and collection. Soto also personally oversaw traffic flow analysis and executed numerous improvements to several main supply routes.

"Leticia's recent award by the Society of Hispanic Professional Engineers is a huge achievement," said Rear Adm. Mike Loose, Commander, Naval Facilities Engineering Command and Chief

of Civil Engineers. "She earned the award not only for her courageous efforts as a Seabee in support of Operation Iraqi Freedom but as a leader and exemplary role model to all young men and women who strive for high personal and professional goals.

"I and her NAVFAC colleagues couldn't be more proud of Leticia," Loose continued "She exemplifies the best and brightest of our Navy civil engineers as evidenced by being accepted into MIT's prestigious SDM program. Our Navy and our nation will be the biggest benefactors when she graduates from this demanding leadership and management program."

Soto is looking forward to her studies. "After conducting extensive research on programs at other several universities, I felt that MIT's SDM was the program that best integrated the management and technical innovation into a systems approach that would best serve me in my current job and any position I may have in the future," she explained. "SDM will help me learn key concepts to help me maximize the potential of people I lead, whether by optimizing project processes from a system's perspective or effectively integrating teams."

Upon graduation in 2007, Soto hopes to be assigned to a Navy Facilities Engineering Command in a Future Planning Operation's billet, where she can oversee design and acquisition processes.



SDM mentor program launched

By Sorin Grama, SDM '06

In an effort to continually enhance the value of the SDM program to both students and potential employers, the SDM '06 cohort launched the SDM Alumni-Student Mentor Program. The purpose of the program is to connect MIT alumni with students to help them explore the wide range of career possibilities and how they can apply their education to best benefit their employers.

The SDM Alumni-Student Mentor Program makes the most of the alumni/student connection. MIT alumni will mentor students on their careers, their studies, and on work-family issues that face mid-career students at this stage of their professional development.

MIT mentors value the impact they have on a student's career and the rewarding connections they have forged with the SDM community. Companies that employ SDM graduates will ultimately benefit by adding MIT talent that is not only schooled in state-of-the-art engineering and management education, but also part of an international MIT alumni network that they can access as a resource to address industry and marketplace challenges.



SDM Calendar

Fall, 2006 – Winter, 2007

If you or your colleagues are interested in attending any of the events listed below, please contact John M. Grace, MIT SDM Industry Co-director, jmgrace@mit.edu, 617.253.2081.

October 17, 2006

The IBM-MIT/Engineering Systems Division Innovation Lecture Series

Title: Engineering Systems Solutions to Real World Challenges

Speaker: Linda S. Sanford, Senior Vice President, Enterprise On Demand, Transformation & Information Technology, IBM

Location: MIT, Building 34-101 Cambridge, MA

Time: 4:00 pm, with reception to follow

Details: <http://esd.mit.edu/HeadLine/calendar/2006/101706sanford.html>

October 19-20, 2006

SDM Annual Conference

Title: Designing Systems that Deliver Strategic Results

Speakers: Hau Thai-Tang, Director of Advanced Product Creation and SVT, Ford Motor Company; Indra Purkayastha, Product Development Manager, iRobot Corporation; Mark Maier, Distinguished Engineer, The Aerospace Corporation; Kenan Sahin; Founder and CEO, TIAX LLC; Hal Stillman, Director of Technology, International Copper Association; Ed Crawley, Professor, Aeronautics and Astronautics and Engineering Systems, MIT; Daniel Jackson Professor of Computer Science, MIT; Nancy Leveson, Professor of Aeronautics and Astronautics and Engineering Systems, MIT; John Sterman, Jay W. Forrester Professor of Management and Engineering Systems, Director, MIT System Dynamics Group.

Locations: MIT Kresge Auditorium and MIT Faculty Club

November 8, 2006

MIT SDM Partners Meeting

Location: MIT, Broad Institute

Time: 8:30 am - 4:00 pm

Sponsored by: MIT System Design and Management Program

Details: See page 3 of this edition of the SDM Pulse

November 9, 2006

Industry-Faculty Research Forum

Location: MIT Faculty Club

Time: 8:00 am - 4:00 pm

Sponsored by: MIT System Design and Management Program and MIT Leaders for Manufacturing Program

Details: http://lfmsdm.mit.edu/events/110906_lfmsdm/110906_lfmsdm.pdf

December 6-7, 2006

2006 MIT Manufacturing Conference

Title: The Impact of Globalization on New Product Development and Manufacturing: Imperatives for Success

Speakers: Michael McNamara, CEO, Flextronics; James M. Owens, Chairman and CEO, Caterpillar, Inc.; Patrick M. Byrne, Managing Partner, Accenture; David Simchi-Levi, Professor of Civil and Environmental Engineering and Engineering Systems; Co-Director, LFM-SDM Programs; James R. Miller, Senior Vice President, Manufacturing Technology Group, Cisco Systems; Charles H. Fine, Chrysler LFM Professor of Management and Engineering Systems; MIT; William W. Crandall, Senior Director, Global Engineering Services, HP; Karl Ulrich, CIBC Professor and Chair, Operations and Information Management Department; Wharton School, University of Pennsylvania; Thomas J. Allen, Margaret MacVicar Faculty Fellow, Howard W. Johnson Professor of Management, Professor of Engineering Systems, Co-Director, LFM and SDM Programs; Irving Wladawsky-Berger, Vice President, Technical Strategy and Innovation, IBM; Thomas J. Malone, Patrick J. McGovern Professor of Management, MIT Sloan School of Management.

Location: MIT, Wong Auditorium

Details: ilp-www.mit.edu/events/LFM-SDM

Sponsored by: MIT Industrial Liaison Program, http://ilp-www.mit.edu/display_page.a4d?key=H1

MIT Leaders for Manufacturing Program, <http://lfm.mit.edu/>

MIT System Design and Management Program, <http://sdm.mit.edu/>

MIT Forum for Supply Chain Innovation, <http://supplychain.mit.edu/>

December 14, 2007

The IBM-MIT/Engineering Systems Division Innovation Lecture Series

Title: Engineering Systems Solutions to Real World Challenges in Healthcare

Speakers: Senior executives from Vassar Brothers Medical Center

Location: MIT, Building 51-345

Time: 4:00 pm, with reception to follow

Details: TBA

February 1-2, 2006

LFM-SDM Knowledge Review

Location: MIT

Details: TBA

For more event listings, check <http://sdm.mit.edu> and <http://esd.mit.edu>.