

Engineering Systems Division

The MIT [Engineering Systems Division](#) (ESD) encompasses bold, forward-thinking educational and research efforts aimed at tackling real-world challenges, or “trillion-dollar problems.” Using new framing and modeling methodologies, ESD research integrates approaches from engineering, management, and social sciences. A truly interdisciplinary academic unit, ESD spans most departments within the School of Engineering, as well as all five MIT schools.

ESD brings together students and faculty interested in research that focuses on complex systems involving technology, organizations, and individuals. The division focuses primarily on four key domains: extended enterprises, energy and sustainability, critical infrastructure, and health care delivery. ESD recognizes that the major challenges in these areas do not have purely technical solutions but require more holistic analysis and interdisciplinary approaches. ESD’s research approaches often focus on the areas of people and technology, uncertainty and dynamics, design and implementation, networks and flows, and policy and standards. The division’s faculty and students have forged novel relationships with partners in industry, government, and academia.

Approximately 60 faculty members, most holding dual or joint appointments within ESD and another MIT unit, are devoted to teaching and research in the field of engineering systems. As of spring 2012, 366 students were enrolled in ESD’s five master’s programs, with another 55 students in the PhD program.

ESD’s values, mission, and vision are further described in the [updated version](#) of the division’s 2008 strategic report. Another document, [Engineering Systems Impacts](#) (produced in 2010), illustrates some of the clear, measurable, global impacts of ESD’s wide-ranging research and education activities. In addition, a seven-minute video available on [TechTV](#) provides a look at some of the division’s activities.

Faculty

The ESD interim director is Joseph Sussman, JR East professor of engineering systems and civil and environmental engineering. Olivier de Weck, associate professor of aeronautics and astronautics and engineering systems, chairs the ESD Education Policy Committee and oversees ESD’s PhD program, including admissions.

In 2011–2012, ESD welcomed a new joint faculty member, Cesar Hidalgo, assistant professor of media arts and sciences in the Media Lab.

Graduate Education

The [ESD PhD program](#) has reached a steady state, admitting 17 of 77 applicants for AY2012 (with 13 students matriculating in September 2011). Applications have substantially increased, with 131 students applying to begin the program in AY2012. ESD awarded 172 degrees in AY2012. In addition to the engineering systems PhD and master of science programs, master's-level programs include [Leaders for Global Operations](#), the [MIT Supply Chain Management Program](#) (which awards the master of engineering in logistics degree), the System Design and Management program, and the [Technology and Policy Program](#) (TPP).

Research

ESD continues to encompass several major research centers, including the [Center for Engineering Systems Fundamentals](#) (CESF), the [Sociotechnical Systems Research Center](#) (SSRC), the MIT Center for Transportation & Logistics (MIT CTL), and the [Center for Biomedical Innovation](#) (CBI). These research programs are described later in this report.

The [MIT Portugal Program](#) (MPP), launched in October 2006 and hosted by ESD, is a strategic investment in people, knowledge, and ideas by the Portuguese government to strengthen the country's knowledge base and international competitiveness. This transatlantic collaboration involves MIT and government, academia, and industry in Portugal in the development of education and research programs in engineering systems.

MIT Press Engineering Systems Books Series

ESD officially launched the MIT Press Engineering Systems Book Series, which explores different facets of the field of engineering systems and provides a new venue for publication of textbooks and scholarly works that push forward research and education in this field. The series started with the four publications listed below:

- Flexibility in Engineering Design, Richard de Neufville and Stefan Scholtes (August 2011)
- Engineering Systems: Meeting Human Needs in a Complex Technological World, Olivier L. de Weck, Daniel Roos, and Christopher L. Magee (November 2011)
- Engineering a Safer World: Systems Thinking Applied to Safety, Nancy G. Leveson (November 2011)
- Design Structure Matrix Methods and Applications, Steven D. Eppinger and Tyson R. Browning (June 2012)

The book series editorial board includes individuals from outside MIT, representing Stanford, Georgia Tech, Carnegie Mellon University, and other institutions.

ESD has been working closely with MIT Press to promote this new book series throughout the academic year.

ESD Achievements

Faculty and Teaching Staff Highlights

Joseph Coughlin received an honorary doctor of science degree from the State University of New York at Oswego on May 12, 2012.

Olivier de Weck and Michael Pasqual's paper "Multilayer Network Model for Analysis and Management of Change Propagation" won a Reviewers' Favorite Award at the 2011 International Conference on Engineering Design (ICED11). The paper was based on Michael's 2010 joint Department of Aeronautics and Astronautics and TPP master's thesis (for which he shared the 2010 TPP Best Thesis Award with Ellie Ereira).

Warren Seering, Christoph Knoblinger, Josef Oehmen, Eric Rebentisch, and Katharina Helten's paper "Requirements for Product Development Self-Assessment Tools" won a Reviewers' Choice Award at ICED11. The paper was based on Christoph Knoblinger's thesis research that was conducted while he was a visiting student at the [Lean Advancement Initiative](#) (LAI).

In May, John Sterman was awarded an honorary doctorate at the Università della Svizzera italiana in Lugano, Switzerland.

Professor Sussman presented a talk, "Engineering Systems: Evolution of a Field of Study," at Columbia University as part of the Dean's Distinguished Lecture Series.

Jessika Trancik was named a 2011 PopTech Science and Public Leadership Fellow. This fellowship is designed to address the need for scientists to be collaborative and socially engaged public communicators.

Maria Yang was honored with the 2012 Earl Murman Award for Excellence in Advising. This award is presented to a faculty member "who has served as an excellent advisor and mentor for undergraduates and who has had a significant impact on their personal lives and academic success."

Employee Recognition

Jennifer Kratochwill, assistant director of ESD and the MIT Portugal Program, received a School of Engineering Infinite Mile Award for Excellence.

Conferences and Lectures

Richard K. Miller, president of the Franklin W. Olin College of Engineering, presented the 2011 Brunel Lecture on Complex Systems, "[From the Ground Up: A Comprehensive Systems Approach to the Redesign of Engineering Education.](#)"

The 2012 Charles L. Miller Lecture, "[Complex Sociotechnical Systems: The Case for a New Field of Study,](#)" was presented by Joseph Sussman, ESD interim director and JR East professor of civil and environmental engineering and engineering systems.

Major Meetings

ESD PhD Alumni Symposium

ESD held an alumni symposium on September 16, 2011, commemorating the division's first 100 doctors and exploring the impact they have had on academia, government, and industry. Speakers included Professors Sussman and de Neufville, with closing remarks from Professor de Weck.

CESUN Symposium

The CESUN (Council of Engineering Systems Universities) 2012 International Engineering Systems Symposium, held at TU Delft, was the third in the series. Since the first two highly successful symposia in 2006 and 2009, the field of engineering systems has grown by leaps and bounds. CESUN 2012 focused on the theme of effective design and governance of engineering systems. The three-day event provided broad perspectives on the latest advances in research, cutting-edge techniques for framing the challenges in the field, and insights into the tools that work in practice.

ESD Alumni Advisory Council Meeting

The ESD Alumni Advisory Council meeting was held in April 2012. ESD maintains communications with the council during the academic year through letters from the ESD interim director.

Joseph Sussman

Interim Director, Engineering Systems Division

JR East Professor of Engineering Systems and Civil and Environmental Engineering

Leaders for Global Operations

The MIT [Leaders for Global Operations](#) (LGO) program, now in its 24th year, offers an MBA or an SM from the MIT Sloan School of Management and an SM from the MIT School of Engineering. Focused on leadership and teamwork, the two-year LGO experience features a cross-disciplinary curriculum, a global orientation, and internship opportunities.

Program Leadership and Personnel

Faculty co-directors for the LGO and System Design and Management (SDM) programs are professor David Simchi-Levi from the School of Engineering and professor Georgia Perakis from the Sloan School of Management. Donald Rosenfield continues to serve as the LGO program director, while Vah Erdekian remains as industry co-director. Alice Waugh was hired as communications director. Leigh Hafrey has been named senior lecturer in leadership at the Sloan School and will oversee the LGO leadership program, taking the place of Jan Klein, who retired from MIT Sloan.

Governance

LGO is run by a governing board of senior officers from the managing partner companies, program co-directors, and MIT deans and is co-chaired by Jeff Wilke, LGO '93, of Amazon.com and Tom van Laar of Novartis. The operating committee, chaired by Vah Erdekian, handles ongoing program management and includes company representatives, faculty, and directors.

The May 2012 joint governing board/operating committee workshop honored former LGO governing board member and founding industry co-director Bill Hanson as well as retiring senior lecturer Klein.

Academic Program

The LGO curriculum offers a mix of management and engineering courses. LGO students can earn engineering degrees in seven engineering disciplines. Within their departments, students can focus on departmental courses of study as well as topic areas related to manufacturing and operations in seven engineering tracks:

- Energy and environmental sustainability (Civil and Environmental Engineering, ESD, and Mechanical Engineering)
- Information and decision systems (Electrical Engineering and Computer Science)
- Manufacturing systems and supply chains (ESD)
- Manufacturing systems (Mechanical Engineering)
- Ocean engineering systems management (Mechanical Engineering)
- Systems engineering (ESD)
- Transportation (Civil and Environmental Engineering)

Admissions

Forty-eight new students (LGO Class of 2014) matriculated and began an intensive summer session in June. The class has an average of five years of work experience, a modest increase from last year.

The entering Class of 2014, broken down by engineering discipline, is as follows:

- Aeronautics and Astronautics: 4
- Biological Engineering: 2
- Chemical Engineering: 1
- Civil and Environmental Engineering: 1
- Electrical Engineering and Computer Science: 5
- Engineering Systems Division: 16
- Mechanical Engineering: 19

LGO received 286 applications (down from 308 the previous year), and there was an 86% yield of admitted candidates accepting a place in the program.

Internships and Research

The LGO Class of 2012 had 47 graduates in June. Each graduate completed a six-month internship at a partner company. These internships, which are focused projects of concern to partners and are accomplished by interns with company support and MIT faculty guidance, lead to master's theses.

The LGO Class of 2013 had a significant number (14) of international internships in Argentina, Finland, Italy, Spain, Switzerland, the United Kingdom, and Uruguay. A number of follow-on internships from the work done by the LGO class of 2012 were handed off to LGO '13s, resulting in continuity of research.

Future of Manufacturing in the US Conference

In May, LGO co-sponsored a very successful and well-attended conference at MIT on The Future of Manufacturing in the US. Speakers and panelists included US secretary of commerce John Bryson, numerous high-level executives of large manufacturing firms, former MIT president Susan Hockfield, associate provost Martin Schmidt, LGO program director Don Rosenfield, and LGO professors David Simchi-Levi (LGO faculty co-director), Olivier de Weck, Charles Fine, David Hardt, and Thomas Kochan. There was also a poster session showcasing LGO student research at partner companies during the students' internships. The conference was co-sponsored by the MIT Industrial Liaison Program and the MIT Forum for Supply Chain Innovation.

China Leaders for Global Operations

The China Leaders for Global Operations (CLGO) program was established in 2006 to help US and other multinational companies obtain better leadership talent in China. Twenty-seven Shanghai Jiao Tong University (SJTU) faculty members have been trained using MIT Sloan's teach-the-teacher model, and three classes of CLGO students have graduated. LGO and CLGO students take part in joint industry projects called Lion Teams. These projects focus on operational issues, involve two teams of six students, and include a weeklong site visit in China. In April, 30 LGO students visited Shanghai as part of the international plant trek and joined with CLGO students in cultural events as well as site visits to Cisco and Nike facilities. That same month, the SJTU CLGO steering committee, a cross-university advisory group led by the university's vice president, visited MIT to meet with the deans of engineering and MIT Sloan to gain an understanding of issues surrounding interdisciplinary graduate programs and to coordinate support for CLGO. The entire CLGO class visited MIT in July to participate in a joint cross-cultural communications seminar with LGO students, go on plant tours, and sit in on some LGO courses.

In May, Professor Perakis led the fourth CLGO review committee, whose findings revealed significant successes in levels of student application and quality as well as CLGO graduates' salaries and impact on partner companies. The group traveled to Shanghai, where they met with SJTU deans, faculty, students, and staff. From there, they sent a report to the SJTU deans responsible for CLGO.

Plant Tours

Local plant tours were held at Amgen, Genzyme, Caterpillar, National Grid, New Balance, Raytheon, and United Technologies Corporation–Pratt & Whitney. Students on the annual two-week domestic plant trek visited Caterpillar in Peoria, IL; General Motors and the Ford Motor Company in Detroit; the Boeing Company in Seattle; Amazon in Phoenix; Dell in Austin; and Amgen in Puerto Rico. The LGO international plant trek visited Asia, with tours at Nike and Cisco in Shanghai and Nissan and Sony in Tokyo.

LGO Alumni

The LGO 2011 alumni conference was held in Basel, Switzerland, the first time the annual conference has taken place outside the United States. Speakers from Nokia and former MIT professor Thomas Roemer addressed the conference theme of generating value through high-cost-country operations.

Aaron Raphel (LGO '06) was elected as the official alumni voice on the LGO operating committee. MIT faculty as well as LGO and SDM alumni continued to present periodic webcasts and were instrumental in setting up an infrastructure to support LGO. An alumni advisory board headed by Andy Storm (LGO '08) continues to work on folding alumni activities into one group that oversees fundraising, the annual conference, operating committee representation, and networking events.

Through an organized fundraising effort, alumni contribute to three funds: the William C. Hanson, Don W. Davis, and Jan Klein Leadership Fund (renamed this year to honor retiring leadership faculty member Klein); the Alumni Annual Fund; and the Endowed Discretionary Fund. Portions of the funds were used for immediate needs and were distributed to support student scholarships and plant tour expenses. The alumni fundraising total was approximately \$90,000.

Career Development

Sponsored and nonsponsored LGO students are highly sought upon graduation. Partner companies and other organizations take a special interest in LGO students, as indicated by their active participation in the Global Operations Leadership Seminar sessions throughout the year and recruiting week. Of the 2012 class to date, 69% have accepted positions in manufacturing and operations companies, and 54% of these positions are in partner companies.

Global Operations Leadership Seminars

LGO students attend weekly on-campus seminars with faculty and industry experts to explore local, national, and international manufacturing, leadership, and business issues. The more than 30 speakers in fall 2011 and spring 2012 included Jeff Turner, CEO of Spirit AeroSystems; Viju Menon, vice president of supply chain for Verizon Wireless; Steve Isakowitz, CTO for Virgin Galactic; Doug Field, vice president of product design for Apple; and Carrie Freeman, director of sustainable business innovation for Intel.

New Partners

An active student, staff, and company committee has succeeded in bringing new partners to LGO. Nike and Verizon Wireless have joined in the past year, and other companies are in discussions to join the partnership in the coming year.

LGO Awards

Steve Herington, LGO '13: Charles Harrison Smith III Memorial Award

Jeremy Lieberman, LGO '12: LGO Best Thesis Award

Georgia Perakis: Samuel E. Seegal '22 Faculty Prize, for inspiring students to pursue and achieve excellence

Neal Hartman and Retsef Levi, LGO contributing faculty members: Jamieson Prizes for Excellence in Teaching from the Sloan School of Management

Zeynep Ton, LGO contributing faculty member: Outstanding Teacher Award from the Sloan School of Management

Georgia Perakis, Codirector

William F. Pounds Professor of Operations Research

David Simchi-Levi, Codirector

Professor of Civil and Environmental Engineering and Engineering Systems

Vah Erdekian, Industry Codirector

Don Rosenfield, Director, LGO Program

System Design and Management

The [System Design and Management Program](#) combines cutting-edge courses from the MIT Sloan School of Management and the School of Engineering, enriching the program experience with innovative distance learning, flexible matriculation options, and an interdisciplinary perspective.

Senior lecturer Patrick Hale continues as executive director for his eighth year. SDM's academic co-directors, Professors Seering and Eppinger, are now in their third year with SDM. Both are experts in the field of product development and design and worked with SDM during its founding. Joan Rubin joined SDM as industry co-director in January 2011. Her focus in the near term is to expand the breadth and depth of industry sponsors.

Program Communications, Marketing, and Corporate Sponsorship

SDM's marketing activities continue to be highly successful. The program held several information evenings for local MIT alumni and others interested in SDM, as a way to recruit prospective students for SDM's Classes of 2013 and 2014. Additionally, the program continued the MIT SDM Systems Thinking Webinar Series, which had close to 3,500 attendees in 2011 and 2012. SDM also hosted more than 300 attendees at its annual conference in October 2011.

SDM continued to grow its role in the Master of Engineering Management Programs Consortium, hosting the two most recent meetings in November 2011 and April 2012. In spring 2012, the group reassessed its overall strategies.

Student Statistics

In January 2012 SDM admitted its 16th class, enrolling 62 students.

System Design and Management Student Statistics, AY2008–AY2012

Year	2008	2009	2010	2011	2012
Applications	108	141	117	190	256
Company admits	16	27	22	24	23
Self-sponsored admits	44	57	50	51	39
Total admits	60	84	72	75	62
Research assistants	4	0	14	12	12
Distance education	16	19	10	11	11
Enrolled current round	53	63	52	53	56
Total enrolled*	55	64	54	71	62

*Includes six second-major students.

SDM Industry Partners and the MIT Graduate Certificate in Systems and Product Development

The MIT Graduate Certificate Program in Systems and Product Development is now in its 12th year. Company sponsors have included United Technologies Corporation, John Deere, Cummins, Draper Laboratory, Instrumentation Laboratory, and Booz Allen Hamilton, among others. United Technologies Corporation now has more than 250 employees who have benefited from the SDM program.

Student Awards

Azamat Abdymomunov (SDM '10) received the SDM Best Thesis Award for "Application of System Safety Framework in Hybrid Socio-Technical Environment of Eurasia."

Sergey Naumov won the MIT SDM Award for Leadership, Innovation, and Systems Thinking. The annual award was established by SDM staff to recognize strategic, sustainable contributions to the SDM and MIT communities.

Andrea Ippolito was one of five recipients of the 2012 Ronald I. Heller Entrepreneurship Grant.

A team of SDM students including Andrew Campanella, Ali Kamil, Lesley Lu, and Abijith Neerkaje won the MIT Clean Energy Prize in the Renewable Energy Category.

Chunguang (Charlotte) Wang and her teammates received a Community Choice Award of \$1,500 in MIT's annual IDEAS Competition and Global Challenge.

Alumnus John Helferich (SDM '10) was honored with an MIT Sloan Teaching Award as one of two outstanding teaching assistants for the 2011–2012 academic year.

Staffing

Melissa Parrillo was promoted to marketing, logistics, and alumni relations coordinator. Christine Bates is the operations manager. Professors Eppinger and Seering codirect the program. Joan Rubin is the industry codirector.

Patrick Hale

Executive Director, SDM Program

Center for Engineering Systems Fundamentals

Research and educational initiatives at the [Center for Engineering Systems Fundamentals](#) were funded by a variety of sources during AY2012.

The MIT Education-as-a-Complex-System Group is funded by a four-year grant from the National Institutes of Health (in collaboration with Ohio State University) and by a three-year contract from Fujitsu Laboratories of America. Progress has been made on a number of fronts, including the planning and holding of MIT's first-ever high school-focused STEM (science, technology, engineering, and mathematics) workshop.

Pandemic influenza research is supported by the US Centers for Disease Control and Prevention, under a five-year cooperative agreement with the Harvard School of Public Health, and by the Alfred P. Sloan Foundation of New York.

Supported by the MIT Portugal Program, the "Energy Box" is being created as a software system to manage electricity usage in a home or small business from a desktop computer.

BLOSSOMS (Blended Learning Open Source Science or Math Studies) is supported by the William and Flora Hewlett Foundation, the Alfred P. Sloan Foundation of New York, the Lord Foundation of Massachusetts, and the Lounsbery Foundation, with corporate sponsorship from Fujitsu of America, IBM, and Saudi Aramco Corporation (new this year). More than 100 BLOSSOMS video learning modules are now available from MIT, Lebanon, Pakistan, and Saudi Arabia; modules are also available from volunteers in the Washington, DC, public school system and Singapore, as well as volunteers at Georgia Tech, the University of Wisconsin, IBM, and Teachers Without Borders. During this past year, the program offered numerous teacher training workshops, including two five-day workshops for a total of 400 teachers in Saudi Arabia and several workshops in Florida,

Washington, DC, and Massachusetts. BLOSSOMS is about to have 38 video modules available in Portuguese. BLOSSOMS also launched a professionally developed website that includes social media such as Facebook and Twitter.

Professor Richard Larson serves on the senior advisory board of the School of Science and Engineering, Lahore University of Management Sciences (Pakistan).

Richard Larson

**Director, Center for Engineering Systems Fundamentals
Mitsui Professor of Engineering Systems**

Center for Biomedical Innovation

The [Center for Biomedical Innovation](#) (CBI) is pleased to report unprecedented growth in the scope and scale of its activities over the past year. Highlights of CBI's activities and accomplishments are described below.

Research Activities

Multistakeholder Collaborations

NEW Drug Development ParaDIGmS (NEWDIGS) is a unique collaborative learning and innovation program focused on enhancing the value of pharmaceutical research, development, and delivery for all key stakeholders. Initial research activities address emerging technical and system design considerations in global regulation of new drugs. Plans for a new module of activities focused on optimizing combination treatment regimens in oncology are now being defined in collaboration with MIT's Koch Institute for Integrative Cancer Research.

The MIT CBI Biomanufacturing (BioMAN) Program is a collaborative research environment for developing new knowledge, science, technologies, and strategies that advance the manufacture and global delivery of high-quality biopharmaceuticals. Research focus areas include new analytical tools for improving quality and consistency during manufacturing, microscale manufacturing platforms, and regulatory science.

The research activities of the Consortium on Adventitious Agent Contamination in Biomanufacturing (CAACB) are focused on the confidential collection and analysis of industry adventitious agent contamination data and examination of new technologies that can be applied to lower the risk of adventitious agent contamination during production.

Industry/Academia Collaborations

The alliance between Sanofi and MIT CBI provides \$4.2 million toward funding a biomedical innovation award program. The program has funded 12 innovation awards since October 2010, including four this year to professors Polina Anikeeva, Michael Cima, Hidde Ploegh, and Ron Weiss.

Sponsored Research Projects

Supported by the Alfred P. Sloan Foundation, the “Regulatory Economics of Global Biopharmaceutical Manufacturing” research program examines the organizational, technical, and location-specific factors underlying manufacturing and regulatory performance.

Managed by CBI, projects under the master research agreement with Novartis include advanced sensor and formulation projects in the labs of professor Michael Strano and professor Alex Klivanov, respectively.

Educational Activities

In spring 2012, CBI organized and helped teach a new seminar, 10.03/10.53 Advances in Biomanufacturing (in Course 10), that examines how biopharmaceuticals, an increasingly important class of pharmaceuticals, are manufactured. Topics ranged from fundamental bioprocesses to new technologies and the economics of biomanufacturing. The class also covered the impact of globalization on regulation and quality approaches as well as supply chain integrity.

Plans are now being finalized for the piloting of a new CBI fellowship in regulatory science and systems in September 2013.

Collaborator Community

A priority for CBI is to serve as an integrator of high-impact collaborative efforts across the MIT campus, as well as with external stakeholders. Our ecosystem of collaborators is continuing to grow and diversify in exciting ways. Current participants in CBI’s research and educational activities include the following.

Industry

Aetna
 Alnylam Pharmaceuticals
 Amgen
 Baxter
 Biogen Idec
 BioMarin
 Boehringer Ingelheim
 Bristol-Myers Squibb
 EMD Millipore
 Genentech
 Genzyme
 Inno Biologics Sdn. Bhd.
 Johnson & Johnson
 KEW Group
 Life Technologies
 Medimmune
 Merial
 Merrimack Pharmaceuticals

Metabolix
 Millennium Pharmaceuticals
 Novartis Pharma AG
 Novartis Vaccines & Diagnostics
 Pfizer
 Quintiles
 Sanofi
 Sanofi Pasteur
 Shire

Government Agencies

Centers for Disease Control and Prevention
 European Medicines Agency
 Food and Drug Administration
 Health Canada
 National Institute for Clinical Excellence
 National Institutes of Health
 National Institutes of Standards and Technology
 Singapore Health Sciences Authority

Academia (including teaching hospitals)

MIT (School of Science, School of Engineering, Sloan School of Management, and School of Humanities, Arts, and Social Sciences)
 Georgetown University
 Harvard Medical School
 Massachusetts General Hospital
 Memorial Sloan Kettering Cancer Center
 University of Prince Edward Island

Paula (Gigi) Hirsh

Executive Director, Center for Biomedical Innovation

MIT Sociotechnical Systems Research Center

The [MIT Sociotechnical Systems Research Center](#) is an interdisciplinary research center that seeks collaborative, holistic, systems-based solutions to complex sociotechnical challenges.

SSRC brings together faculty, researchers, students, and staff from across MIT with partners from around the world to study complex enterprises that span government, industry, the service sector, and health care. Professor Deborah Nightingale directs the center (formerly the Center for Technology, Policy, and Industrial Development, founded in 1985). SSRC's total research volume in FY2012 was more than \$9 million.

MIT SSRC stakeholders include:

- Center for Biomedical Innovation (CBI)
- Center for Engineering Systems Fundamentals (CESF)
- Ford-MIT Alliance

- Lean Advancement Initiative (LAI)
- Materials Systems Laboratory (MSL)
- MIT Geospatial Data Center (GDC)
- MIT Information Quality Program (MITIQ)
- MIT Project Health (MITPH)
- Systems Engineering Advancement Research Initiative (SEArI)

Ford-MIT Alliance

The [Ford-MIT Alliance](#) is MIT's longest running large-scale partnership with industry. Established in 1997, the alliance has funded some 100 projects across the Institute, and Ford has invested more than \$40 million to date.

The alliance focuses its research on future mobility; vehicle electrification, connectivity, and lightweighting; active safety; powertrain fuel efficiency technologies; business analytics and enterprise modeling; and in-vehicle health and wellness. An operating committee that includes the alliance's co-directors, professor John Leonard and Ed Krause (Ford manager for external alliances, research, and advanced engineering), manages the research portfolio. The operating committee reports to the executive committee, which includes professor Claude Canizares, vice president for research and associate provost, and Paul Mascarenas, CTO and vice president, Ford Research and Innovation.

Lean Advancement Initiative

Since 1993, LAI has managed a successful consortium of industry, government, and academic partners to enable the effective and sustainable transformation of complex enterprises. LAI produces a unique body of research, methodologies, and tools based on collaborative interactions with sponsors. LAI's Educational Network (EdNet) is a unique international consortium of 75 academic institutions that translate LAI research findings and practitioner knowledge into undergraduate and graduate lean and lean health care curricula. The LAI co-directors are Professor Nightingale and professor John Carroll, and the executive director is Richard Lewis.

LAI and Collaborative Initiatives at MIT are working in partnership with the US Military Health System, with collaboration from the US Armed Services, on the project "Post-Traumatic Stress Innovations: US Military Enterprise Analysis." The project, which started in fall 2010, is designed to develop innovative recommendations and help the military enterprise identify opportunities to better manage posttraumatic stress and related conditions in support of service members and their families.

Materials Systems Laboratory

The [Materials Systems Laboratory](#) (MSL) studies the strategic implications of materials and materials processing choices and works jointly with corporate, government, academic, and industrial consortia as research partners. MSL's research seeks to understand the competitive position of materials in specific applications, such as assessments of different candidate materials and process technologies and evaluation

of the economic and noneconomic consequences of each alternative. MSL also evaluates the promise and limits of materials, processes, and designs; identifies specific areas of improvement for each alternative that will improve its competitiveness; and determines the best-case scenario for each option.

Professor Joel Clark is the MSL faculty director, research associate Richard Roth is the MSL director, and ESD PhD graduate Randolph Kirchain is principal research scientist. A list of [current projects](#) and [recent publications](#) is available on the MSL website.

MIT Geospatial Data Center

The [MIT Geospatial Data Center](#) (GDC), led by professor John William and executive director Abel Sanchez, won several contracts in cyber security, including contracts for King Abdulaziz City for Science and Technology (Center for Complex Engineering Systems), the Intelligent Advanced Research Projects Agency, and MIT Lincoln Laboratory. GDC has established collaborations with researchers at major institutions worldwide, including the Oxford University Center for Cyber Security and the US Cyber Command. GDC offered a successful MIT professional education summer course on cyber security.

MIT Information Quality Program

The [MIT Information Quality \(MITIQ\) Program](#) focuses on developing pragmatic solutions to data quality problems related to the collection, storage, and use of data in enterprise systems. MITIQ conducts research in the financial, health care, and technology industries and in government and military organizations, including emerging trends, technologies, and policies. Research has examined issues of information integration and isolation in the intelligence community, which parallel concerns in many areas in government and industry. MITIQ and SSRC sponsored the 2012 Chief Data Officer Forum for Senior Executives and the CDOIQ Symposium and collaborated with Shaanxi Province (China) and Xi'an Jiaotong University on developing programs in IQ and data science. In addition, MITIQ helped establish the QIBRAS Information Quality Society in Brazil. Professors Stuart Madnick and Yang Lee continue to edit the ACM Journal of Data and Information Quality.

MIT Project Health

MIT Project Health is a new initiative focused on addressing complex national and global health systems issues and challenges. Housed within SSRC, Project Health is a rich interdisciplinary resource offering new integrative and holistic approaches and perspectives for creating more effective and efficient health and health-related systems.

Systems Engineering Advancement Research Initiative

The [Systems Engineering Advancement Research Initiative](#) (SEArI) brings together sponsored research projects and a consortium of systems engineering leaders from industry, government, and academia. Research is focused on the realm of complex systems with expanded system-of-systems scope, complex contexts requiring a sociotechnical approach, and methods to take a value-driven perspective where value propositions involve the synthesis of many stakeholder needs. Several research projects

were continued with government agencies in the United States, Singapore, and Norway. Fifteen graduate students, one visiting graduate student, and six undergraduate students from several departments performed research with the group. Sponsors and invited leaders from 10 government agencies and corporations attended SEArI's annual research summit in October. The SEArI group presented 17 conference papers (two award winning) and published five journal papers.

Deborah Nightingale

Director, Sociotechnical Systems Research Center

Professor of the Practice of Aeronautics and Astronautics and Engineering Systems

Technology and Policy Program

The **Technology and Policy Program** is an interdisciplinary graduate program focusing on issues at the interface of technology, society, and the sociotechnical aspects of complex systems. For the past 36 years, TPP has remained dedicated to educating engineers and scientists who wish to lead in the development and implementation of responsible technology strategies and policies to benefit humankind.

Students

TPP offers a two-year master's of science program and supports the ESD PhD doctoral program by encouraging research in the areas of technology, management, and policy. While TPP receives most of its applications from outside MIT, several students already enrolled in other MIT graduate programs join TPP each year; roughly one third of TPP students concurrently pursue a second master's or a doctoral degree in another department. TPP entering classes average 40 students. Over the past five years, more than 40% of students have been women and about 10% have been underrepresented minority students; less than 40% have been international students. In AY2012, 47 students graduated with an SM in technology and policy. Over 25% of these students will pursue a doctoral degree following the completion of their SM. Other graduates have taken jobs in industry, government service, or consulting; this year several are pursuing startups that relate to their thesis research and other work they started at MIT.

Research

TPP students are funded for their graduate studies with full or partial research assistantships or fellowships in a wide range of research areas across MIT. TPP students are advised by faculty in all five schools at MIT, with the majority in the School of Engineering.

Many TPP students are affiliated with the MIT Energy Initiative, where they study the technology and policy issues impacting energy choices, sustainability, and the environment. TPP students also conduct research for many other labs and centers across campus, including the Joint Program on the Science and Policy of Global Change, the Center for Energy and Environmental Policy Research, the Industrial Performance

Center, the Computer Science and Artificial Intelligence Laboratory, the Partnership for Air Transportation Noise & Emission Reduction, and a number of research initiatives connected with ESD, including the Lean Advancement Initiative, the Sociotechnical Systems Research Center, and the Center for Biomedical Innovation.

TPP faculty continue to lead the MIT Portugal Program in bioengineering systems, sustainable energy and transportation, and design-inspired products, while many TPP students are pursuing collaborative international research projects in engineering systems as part of MPP. TPP students are also working with MIT and Singapore University of Technology and Design (SUTD) faculty in the development of new curricula for SUTD and, in particular, the International Design Centre.

Fellowships

TPP fellowship funding comes from the Leading Technology Policy Initiative, the Rabinowitz Fund, and the de Neufville Fund. Also, the Office of the Dean for Graduate Education (ODGE) provides tuition fellowship funding for incoming underrepresented minority students. With these ODGE fellowships, TPP has been able to achieve a very high yield, attracting almost all admitted minority students over the past five years. Institute-wide fellowships were also awarded to TPP students in AY2012; for example, first-year student Morgan Edwards was awarded a Lemelson Presidential Fellowship.

Additionally, many TPP students were awarded external fellowships, including fellowships from the National Science Foundation and the Natural Sciences and Engineering Research Council of Canada as well as from Japan, Mexico, Germany, Sweden, Spain, and Chile.

Curriculum

Teaching schedules in AY2011 and AY2012 required adjustments to the standard TPP curriculum. In fall 2011, first-year TPP students enrolled in ESD.103 Science, Technology, and Public Policy and ESD.S41 Introduction to Technology and Policy. In the spring, ESD.864 Modeling and Assessment for Policy was offered as the second portion of the traditional Introduction to Technology and Policy core course.

TPP Policy Internship Program

Twelve TPP students representing six countries traveled to Washington, DC, in March 2012. This annual trip affords students an opportunity to build professional networks with others working at the intersection of science, technology and policy. TPP alumni arranged and hosted presentations at the US Department of State, the Environmental Protection Agency, the World Bank, NASA, the White House Office of Management and Budget (Energy Division), SRI International, and the International Council on Clean Energy. During the trip, TPP hosted a reception where alumni had a chance to reconnect and students had an opportunity to have informal conversations with alumni about working in the technology policy space.

In summer 2012, TPP funding will support students participating in unpaid internship programs. One student is interning at the National Academy of Sciences and another at the Woodrow Wilson Center. Beyond TPP-funded internships, other students are pursuing paid technology policy internships in the US and abroad.

Conferences and Workshops

TPP is a founding member of the Technology Management and Policy Graduate Consortium, which includes programs in North America, Europe, and Asia and allows TPP students and ESD doctoral students to share their research and network with students in sister programs across the globe. The 2011 meeting of the consortium was hosted at Pennsylvania State University, and four students (two TPP students and two ESD PhD students) presented. Jordan Peck (ESD PhD candidate/TPP '08) won the Best Paper Award this year.

The annual MIT Energy Conference leadership team featured TPP students. Current TPP students are involved in leadership of a number of organizations and initiatives across the Institute, including the MIT Energy Club, the MIT Clean Energy Prize, and the Science, Technology, and Policy Crossroads initiative.

TPP Student Society

The Technology and Policy Student Society maintains its high level of activity. The society organizes talks, workshops, and social events and also plays an important role in the programming of both the TPP orientation and the annual TPP open house for admitted students. Among this year's highlights were the InterYear Retreat, which helps develop and strengthen bonds between the two classes of TPP students.

Alumni Engagement

With more than 1,000 alumni, TPP continues to foster a strong alumni community by bringing alumni back to campus, providing current alumni updates, publishing a biannual alumni directory, and holding regional gatherings in Washington, DC, and Boston.

TPP alumni and donors have been generous with their time and resources, coordinating hosts and speakers during Washington, DC, visits. Financially, alumni have supported student and program initiatives, including funding for summer internships, recruitment and outreach, and support for women in technology and policy.

Joel Clark

Acting Director, Technology and Policy Program

Professor, Materials Science and Engineering and Engineering Systems

MIT Center for Transportation & Logistics

For more than 35 years, the [MIT Center for Transportation & Logistics](#) has been a world leader in supply chain management, logistics, and transportation education and research. The center's world-renowned research programs directly involve

approximately 50 faculty and research staff from a wide range of academic disciplines, as well as researchers in various affiliate organizations around the world. In education, MIT is consistently ranked first among business programs in logistics and supply chain management.

Research

During the past academic year, many new research projects were added to existing ones, with 140 active projects in FY2012. Major projects and initiatives are described below.

MIT Global SCALE Network

The **MIT Global SCALE (Supply Chain and Logistics Excellence) Network** continued to grow in AY2012. As the only international alliance of leading research and education centers dedicated to the development of supply chain and logistics excellence through innovation, the SCALE Network promises to increase the center's research and education reach and reputation. Currently, the SCALE Network spans North America, Latin America, Europe, and Asia and consists of MIT CTL; the Center for Latin-American Logistics Innovation in Bogotá, Colombia; the Zaragoza Logistics Center in Zaragoza, Spain; and the Malaysia Institute for Supply Chain Innovation (MISI). MIT CTL continues to explore additional centers in China, India, and other global logistics hubs.

Center for Latin-American Logistics Innovation

In the four years since it was formed, the Center for Latin-American Logistics Innovation has launched multiple research projects, has established a regional network for academic collaboration, and has recruited leading companies as corporate strategic partners. The center has cultivated deep relationships with 23 top Latin American universities and institutions outside the region.

The center is structured around the three core elements of its mission: education, research, and outreach. Its flagship student program is the Graduate Certificate in Logistics and Supply Chain Management, the most extensive nonformal education program of its kind in Latin America. Offered by the center and presented by MIT CTL faculty, the program's overarching goal is to train aspiring logistics and supply chain professionals in the region. The 26 students in the fourth class of this program were selected from 46 applicants from 16 universities in Argentina, Brazil, Colombia, Mexico, Panama, Peru, Ecuador, and Chile. To date, the program has graduated 40 students, hosting them for three weeks in Bogotá and two weeks on the MIT campus alongside students from MIT CTL and the Zaragoza Logistics Center.

The second level of the center's initiative in education is designed to "teach the teachers." This is achieved through a series of English-language academic workshops that take place annually at various venues in the region. The latest workshop took place in October 2011 at Valparaiso, following a series of meetings in the United States, Panama, Colombia, and Brazil. Also available at the faculty level are three- to six-month visiting research fellow positions at MIT CTL. In the past four years, eight faculty members have taken advantage of this program: two from Mexico, two from Colombia, and one each from Chile, Panama, Brazil, and Ecuador.

Corporate education represents the third layer of the center's educational base. The center currently has 12 corporate partners with which it develops a wide range of executive and collaborative research.

The Center for Latin-American Logistics Innovation is consolidating as one of the region's leading centers for supply chain research. It currently has eight full-time research staff and, as an official national center of excellence, has access to government grants and various thought leadership opportunities. It is actively pursuing more funding from the government of Colombia to scale up research and doctoral programs in the upcoming years.

MIT-Zaragoza International Logistics Program

MIT CTL has a multiyear partnership with the government of Aragón, Spain, to help create the leading European education and research program for logistics and supply chain management in its capital city of Zaragoza. MIT works with the Zaragoza Logistics Center (ZLC), a research institute associated with the University of Zaragoza, on research, graduate education, executive training, and outreach events for the international community. The ZLC team comprises 53 members. ZLC has a culturally diverse faculty educated at some of the most prestigious universities from around the world and with extensive industry experience. There are nine permanent faculty members and 20 adjunct faculty, postdoctoral researchers, research assistants, and doctoral students. Research and education are ably supported by a staff of 24 professionals in the areas of finance, marketing, information technology, human resources (HR), program administration, and knowledge transfer.

Over the past year, 250 students participated in the educational programs administered by ZLC. Last May, 31 students (from 25 different countries) from the seventh class of the MIT-Zaragoza Master of Engineering in Logistics and Supply Chain Management program (ZLOG) graduated. The program was ranked first in the field of logistics in El Mundo's ranking of the 250 best master's programs in Spain. Also, the MIT-Zaragoza doctoral program grew to a total of nine students. More than 25 students participated in the fourth edition of its annual PhD summer academy, which every year brings together the best scholars and doctoral students from programs at prestigious schools such as IESE (Instituto de Estudios Superiores de la Empresa), HEC Paris (Hautes études commerciales de Paris), the Hong Kong University of Science & Technology, and the University of Seville. In addition, 158 professionals participated in different executive education programs designed and taught by ZLC for the INCAE Business School, Middlesex University, CLI Colombia, the European Business School, the Spanish Army, and the European Car Group (ECG Academy).

The research program is aligned to ZLC's mission of enhancing economic growth and competitiveness through innovation and knowledge transfer. ZLC's core research areas are supply chain and finance, green supply chains, transport and urban mobility, supply chain network design, supply chain organizational behavior, global health supply chains, and humanitarian logistics. In 2011, there were 30 funded research projects at ZLC, including projects with private companies, the Spanish Ministry of Science and

Innovation, the European Commission, and the Aragon regional government. The research work at ZLC has resulted in eight articles published in refereed journals, 12 working papers, one book chapter, and several research reports.

In addition to the active participation of the ZLC faculty and research staff in key national and international conferences, last year ZLC organized several outreach activities attended by more than 400 people. Major events included a conference organized in collaboration with the MIT AgeLab and a joint workshop on security and defense with the Círculo Foundation, an initiative promoted by the Spanish Ministry of Defense. More than a dozen experts from prestigious institutions such as the University of Texas, Georgia Tech, New York University, Sabanci University, the European Business School, and the Hanken School of Economics participated in the MIT-Zaragoza speaker series at ZLC.

Malaysia Institute for Supply Chain Innovation

The fourth center in the SCALE Network (and the third international center) is located in Shah Alam, Malaysia. Finishing touches are being made to receive the first intake of students, which is also the largest start-up class yet of the four centers—a proud achievement for MISI. The pioneer class of 20 students is due to arrive on August 7, 2012.

The sequence of key challenges necessary to open MISI as an institute has now been accomplished, beginning with the raising of funds followed by renovation approval and the interior design planning necessary to reconfigure a previous office facility into a working institute. The MISI “Supply Chain” logo was chosen. Following eight months of administrative preparation, the accreditation for the institute courses and master’s program was approved by the Malaysian Qualifications Agency, after which the Ministry of Higher Education approved the institute’s registration.

The student curriculum has been revised and finalized for the inaugural batch of master’s degree students, using the MIT Supply Chain Management Program as the base. With a global mix of eight international faculty and research staff members and nine administrative staff, the stage is now set for MISI to achieve its goals. In parallel to laying the foundation of MISI, significant efforts were invested in promoting MISI to recruit a rich and diverse class of students and engage industry in intensive interaction to initiate training and research programs. As a result of the successful campaigns, students will be able to choose from 20 or so industry-sponsored thesis projects proposed by companies such as DHL Express, BASF, Schlumberger, WFP, Proton, GE Healthcare, and Barry Callebaut. MISI has also secured funding from the SWIFT Institute to explore the area of supply chain finance.

The successful industry campaign also resulted in a number of executive development programs that were conducted with the help of leading supply chain experts from universities around the world, including MIT (CTL), ETH Zurich, and Technische Universiteit Eindhoven. The programs were very well received, and MISI is planning to offer many more such programs on a regular basis going forward. A strategic partnership program is being actively promoted to engage a select group of companies for long-term commitments.

MISI has been successful in establishing formal relationships with many leading organizations from industry and academia. So far, five memorandums of understanding (MOUs) have been signed. The university MOU collaborations include UiTM and UTAR in Malaysia and Chulalongkorn and Mahidol in Thailand. On the industry side, MISI has signed an MOU with WDA in Singapore. Four more MOUs with similarly high-profile organizations are in the pipeline and will be signed soon to establish MISI as a thought leader in the supply chain domain and as a mainstream organization with broad impact.

After an extremely well-received supply chain conference in July 2011, MISI is now planning a follow-up conference in March 2013. It will also host the annual World Health and Humanitarian Logistics Conference in June 2013.

Global Leaders in Environmental Assessment and Performance

MIT CTL, in partnership with the Materials Systems Laboratory, has developed a dynamic consortium of leading companies called [Global Leaders in Environmental Assessment and Performance](#) (LEAP). LEAP brings together member companies and top environmental and supply chain experts to address company-specific performance issues and plot solutions that will strengthen both the companies and the environment. The outgrowth of the pioneering Carbon Efficient Supply Chains project, LEAP offers an unprecedented opportunity for fact-driven and solution-oriented analysis of companies' products and supply chains. It gives organizations the tools and information needed to measure their total environmental footprint, evaluate tradeoffs, and shape a sustainable action plan.

LEAP partners to date include General Motors, Lockheed Martin, Chiquita, ASICS, and the Environmental Defense Fund. In addition to offering biannual meetings and access to cutting-edge research, LEAP has developed a series of monthly webinars that address strategic topics relevant to environmental supply chain strategy, such as carbon offsets and water footprints.

Humanitarian Response Capacity

Many government and nongovernment organizations establish stockpiles of key commodities in preparing for humanitarian crises. Such stockpiles require critical financial and human resources, and the value of these investments is difficult to assess given the unpredictable nature of humanitarian need. This project evaluates preparedness efforts by assessing both the capacity of existing stockpiles and the response capabilities of key suppliers under contract, with the goal of determining how quickly the supply chain can be ramped up when demand suddenly spikes.

The research is being carried out by the Humanitarian Response Lab. Its mission is to help meet human needs by understanding and improving the crisis response systems behind public services and private markets. The lab combines MIT expertise in engineering, management, technology, economics, urban studies and planning, and other disciplines to drive practical innovation for humanitarian response.

Logistics Clusters

The cluster project looks at the impact of logistics clusters around the world and focuses on the Singapore port area; the Panama Canal Zone; Rotterdam Port in Holland; Zaragoza, Spain; Memphis, TN; and Alliance in Fort Worth, TX. The project looks to add to the emerging theory of logistics clusters in general and to develop insights into why logistics clusters work, the advantages of such clusters to members, how they form, and, most importantly, their impact on economic growth.

New England University Transportation Center

MIT was competitively awarded the Region 1 University Transportation Center for 2012, one of 10 regional centers set up in each of the US Department of Transportation's standard federal regions to provide a national resource for research and education in transportation. The [New England University Transportation Center](#) focuses its research investments on safety and livable communities. With an emphasis on highways and transit, three integrated technology research categories are addressed by the center's research, education, and technology transfer activities: ubiquitous intelligence, big data, and user performance across the lifespan. The grant will allow the development of a living laboratory in Cambridge, the Massachusetts Avenue Area Living Laboratory (MALL), with an urban landscape from Harvard Square to Memorial Drive.

MALL will be the first of its type project to create a platform for research and education in technology development and deployment, travel behavior, retail and commercial development, and architecture and design with a special focus on disadvantaged populations (e.g., elderly people, disabled individuals, and children). The New England center has already launched this initiative in collaboration with AARP and in conjunction with the World Health Organization's Age Friendly City Network. MIT CTL is the Institute's host department for the center, which is a collaboration with the University of Connecticut, University of Maine, University of Massachusetts, and Harvard University. Dr. Coughlin, founder and director of MIT CTL's AgeLab, leads the center.

AgeLab

[AgeLab](#) continues to expand and is defining a new systems approach to the field of aging, technology, and innovation. Working with researchers across MIT, AgeLab has developed a robust research agenda that addresses transportation, well-being, longevity planning, and housing for an aging society. This past year, AgeLab launched a new program on the future of services for older adults and family caregivers in the United States and globally.

AgeLab expects to continue expanding the students, staff, and faculty it engages. Research will explore social science questions around trust and risk in longevity, technology-enabled services, and the role of design in improving independent living. AgeLab now enjoys sponsorship from corporations that have previously not been engaged by ESD or were involved in the needs of an aging society (e.g., retail, auto, financial services, pharma, and consumer products). Companies such as CVS, GSK, Toyota, Denso, and others are now lab members.

Port Resilience Project

MIT CTL is a funded partner in the National Center for Secure and Resilient Maritime Commerce, a Department of Homeland Security Center of Excellence (Center for Maritime, Island, and Port Security) that was launched in July 2008 with the Stevens Institute of Technology as the lead institution. In response, MIT CTL focuses on developing resilient and secure ports. The MIT Port Resilience Project builds upon MIT CTL's recent research on supply chain resilience, supply chain risk management, and supply chain security. MIT's role in the new Center of Excellence will be to develop the principles and actions for making ports resilient to disruptions.

Outreach

The foundation of MIT CTL's corporate outreach is the Supply Chain Exchange—believed to be the largest and most active membership program in the supply chain management field. Since mid-FY2004, new exchange members have paid an annual fee of \$25,000. Membership in the exchange is a prerequisite to deeper interactions with MIT CTL, including directed research projects, sponsorship of Supply Chain Management thesis projects, and membership in higher tiers of the outreach model (research partner and strategic partner). A list of exchange partners is available on the [MIT CTL website](#).

Corporate Relations

The ongoing strategy that drives MIT CTL's outreach program is to increase the number of its partner organizations via membership in the Supply Chain Exchange program and to deepen its engagement with individual partners by growing their participation in MIT CTL's educational and research activities.

During FY2012, MIT CTL dropped seven companies from the exchange: Estafeta, IPC, Lockheed Martin, Nokia, Ocean Spray, Shaw's Supermarkets, and Shire. This list includes several companies that went on hiatus from active membership during FY2011 and reflects a reduction from FY2011 in the number of companies dropped. MIT CTL continues to maintain and nurture its relationships with these companies and expects some to resume active membership in FY2013.

Six companies were added as partners to the Supply Chain Exchange program: BNSF, Coca-Cola Company, Coyote Logistics, Dow AgroSciences, Intel, and TJX. This list includes companies that have rejoined the exchange after a short-term departure. MIT CTL is optimistic about growing its partner base during the next year, based on an added focus on outreach and expanded development of the Global SCALE Network.

Events

In FY2012, MIT CTL organized symposia, roundtables, workshops, conference sessions, and a research fest to achieve its varied outreach objectives. MIT CTL organized and hosted the third annual partners meeting, which convened key contacts from MIT CTL's partner companies for a review of research and customer feedback and input sessions.

This year's MIT CTL Crossroads Conference, which took place on June 28, 2012, focused on supply chains in transitions, dealing with critical factors and dynamic changes currently taking place in supply chains that will impact near-term performance. The event convened over 130 experts from MIT and industry thought leaders to examine the effects of emerging risks, megacities, material supply constraints, and the talent management crisis. The proceedings are available to MIT CTL partners via the MIT CTL online partner area.

MIT CTL held two sessions of its major supply chain management executive education course ("Supply Chain Management: Driving Strategic Advantage") during the year, in January and June 2012. This four-day program for supply chain executives and management teams offered a combination of MIT-developed hands-on exercises and simulations, case studies, and highly interactive sessions. Both sessions of the executive course included a supply chain scenario-planning exercise featuring unique and applied content based on research conducted by MIT CTL.

This past year, MIT CTL conducted custom scenario-planning workshops at partner locations or at MIT CTL not only as part of a CTL research initiative but also as part of value delivery to the center's partners. Additionally, MIT CTL conducted a custom educational program for a key partner and featured new educational content developed from CTL research.

On January 19, during Independent Activities Period, MIT CTL successfully held its fourth annual networking night/poster session. Students from the SCALE Network programs (including the master of engineering in logistics program, the MIT-Zaragoza international master's degree program, and the Graduate Certificate in Logistics and Supply Chain Management program) presented over 60 thesis projects to more than 50 representatives from 35 companies. Earlier that same day, MIT CTL hosted a specific supply chain forum for HR executives as a way to develop and engage the HR community. The event was very well received and helped profile some of the talent management publications produced by MIT CTL researchers in 2012.

Recognition

MIT CTL's 2011–2012 United Parcel Service Fellowships were awarded to two outstanding students studying logistics, freight transportation, or supply chain management. The winners were Atikhun Unahalehaka (master of science fellowship, master of science in transportation program) and Virod Chiraphadhanakul (PhD fellowship, Operations Research Center).

MIT Supply Chain Management Program

The [Supply Chain Management Program](#) (SCM) enables early-career supply chain practitioners to come back to school; receive advanced training in supply chain, systems analysis, finance, leadership, and analytical methods; and then return as soon as possible to the workforce. The popularity of this intense 9.5-month master's degree program remains strong as the field of supply chain management becomes an increasingly legitimate career path to the board room. SCM has received more applications for the program this year than ever before.

Leadership of SCM underwent a change as Dr. Bruce Arntzen took over as the executive director. SCM also welcomed a new writing instructor, Thea Singer. Activities in the program continue to include more collaboration with the SCM programs at our sister centers in Zaragoza, Spain; Bogotá, Colombia; and Kuala Lumpur, Malaysia. Students gain international exposure and develop a network on four continents as they both work in teams with and travel to the sister centers.

SCM Class of 2012

In spring 2011, 34 students were selected from more than 250 applicants to join SCM as its Class of 2012. The class was geographically dispersed, with students coming from 13 countries on five continents. The students, at an average age of 29 (and a range of 23 to 48), brought several years of professional experience to the program.

Campus recruiting activity continued to grow, with more than 60 companies targeting SCM via information sessions, résumé drops, and interviews in 2011–2012. As a result, 97% of students had one or more job offers by graduation. As in the past, the program had a significant impact on the salary level of the class, with a median outgoing base salary of \$115,000, representing an 84% increase over the median incoming base salary.

SCM Thesis Partners

This year, 15 companies participated as Supply Chain Exchange thesis partners. A team of students is assigned a jointly planned project that has both practical and research aspects. This year's projects included:

- Risk sharing on bidding (third-party logistics company)
- Rail scheduling (major freight railroad)
- Equipment tracking (ocean carrier)
- Transportation management (US beverage company)
- Gulf logistics (oil industry services firm)
- Inventory levels (pharmaceutical company)
- Inventory strategy (medical device company)
- New product launch (international beverage company)
- Distribution of perishable foods (international food company)
- Humanitarian index (CTL's Humanitarian Response Lab)
- Simulating supply chain metrics (aerospace company)
- Project in city planning (Department of Urban Studies and Planning)
- Capacity simulation for an edible seed oil company in Brazil

- Logistics parks in Russia
- Sustainable value proposition (consumer products retailer)
- Supplier performance (industrial equipment manufacturer)
- E-commerce in Korea (luxury apparel company)
- E-commerce in Canada (luxury apparel company)
- Macro-economic model of demand (consumer products company)•
Sharing retailer data (international fresh food company)

SCM Alumni Interaction

SCM now has more than 400 alumni working on all six populated continents in myriad industries, focused predominantly on supply chain management and logistics.

MIT CTL held its seventh annual alumni reconnect event in June 2012. The theme of this one-day event was “So you want to start your own company?” The panel of speakers, consisting of entrepreneurs who were SCM and MLOG (master of engineering in logistics) alumni, included Chris Kerslake (MLOG '05), president and founder of Journeybar; Jeff Silver (MLOG '03), founder and CEO of Coyote Logistics; Bindiya Vakil (MLOG '05), founder and CEO of Resilinc; and John Wass (MLOG '99), founder and CEO of Wavemark.

Yossi Sheffi

Director, MIT Center for Transportation & Logistics

Elisha Gray II Professor of Engineering Systems and Civil and Environmental Engineering