

## MIT Center for Transportation and Logistics

For nearly 50 years, the [MIT Center for Transportation and Logistics \(CTL\)](#) has been a world leader in supply chain management (SCM), logistics, and transportation education and research. Through its online and in-person educational offerings, CTL has taught thousands of students at the graduate and executive levels. The center's world-renowned research programs directly involve more than 80 faculty and research staff from a wide range of academic disciplines as well as researchers from various affiliate organizations around the world. MIT's program is consistently ranked first among graduate business programs in logistics and SCM.

There were 79 active research projects in fiscal year 2018, along with almost a dozen different educational programs. Major projects and initiatives are described below.

### Accomplishments and Awards

- The MIT Supply Chain Management Master's Program was ranked as the world's number one graduate business program in supply chain and logistics by Eduniversal for the third year.
- Chris Caplice, director of the MITx MicroMasters Program in Supply Chain Management, and the MicroMasters team won the following awards:
  - Irwin Sizer Award for the Most Significant Improvement for MIT Education, May 10, 2018
  - MITx Prize for Teaching and Learning in Massive Online Open Courses, May 11, 2018
  - MIT Teaching—Digital Technology Award—student-nominated award to recognize instructors who effectively use digital technology to improve teaching and learning at MIT, June 5, 2018.
- An additional 445 students earned a MicroMasters credential in SCM. The number of people holding a MicroMasters credential through this pioneering program is now 1,067.
- The first class of 40 MicroMasters credential holders accepted into the newly created Supply Chain Management Blended Program matriculated in January and graduated with master's degrees in June. This was the first "blended" class to graduate at MIT under the new MicroMasters initiatives.
- Yossi Sheffi's fifth book, *Balancing Green: When to Embrace Sustainability in a Business (and When Not To)*, was published.
- Joseph Coughlin's book, *The Longevity Economy: Unlocking the World's Fastest-Growing, Most Misunderstood Market*, was published.
- Christopher Mejia Argueta's book, *Reaching 50 Million Nanostores: Retail Distribution in Emerging Megacities*, was published. He co-edited the book with Edgar E. Blanco and Jan C. Fransoo.

- Postdoctoral associate Karla Gamez—previously assistant professor at Mexico’s Monterrey Institute of Technology and Higher Education—received the Most Inspiring Professor award from the Monterrey Institute for academic year 2017.
- More than 80 eligible SCM MicroMasters students attended the inaugural MIT SCx Supply Chain Boot Camp in August.
- CTL researchers published more than 40 articles in various mainstream and industry publications. In addition, faculty members were interviewed and quoted extensively on supply chain issues.
- CTL published weekly blog posts that were republished by other blogs and publications, a quarterly electronic newsletter published in English and Spanish for the Global Supply Chain and Logistics Excellence (SCALE) Network community, and a monthly article based on an SCM master’s thesis in the leading trade journal, *Supply Chain Management Review*.
- The number of corporate partners in the CTL Supply Chain Exchange Membership Program stayed above 40.
- CTL moved back to newly renovated office spaces in Building E40.

## Education

### MIT Supply Chain Management Residential Program

The MIT Supply Chain Management Residential (SCMr) Program attracts a diverse group of talented and motivated students from across the globe. Students work directly with researchers and industry experts on complex and challenging problems in all aspects of SCM. MIT SCMr students bring their classroom and laboratory learning straight into industry. They graduate from the program as thought leaders ready to engage in an international and highly competitive marketplace.

The SCMr Program receives four to five times as many applications as there are available slots in the program. The program’s collaboration with other SCALE programs (in Malaysia, Latin America, Spain, Luxembourg, and China) continues to increase with cross-center teams and international travel. All SCALE students congregate at MIT in January for an intense month of team projects, lectures, workshops, and presentations.

The SCMr Program established the MIT Supply Chain Excellence Award for undergraduate programs at eight leading US universities and Mexico’s Monterrey Institute of Technology and Higher Education. The MIT award is given annually to the most outstanding graduating supply chain or industrial engineering student in each school. Over the past six years, \$2.164 million has been awarded to 56 students; another 63 students were named as honorable mentions. Winners and those with honorable mentions receive a partial scholarship to attend the MIT SCMr Program after they have obtained two to five years of work experience.

### ***The MIT Supply Chain Management Resident Program Class of 2018***

In spring 2017, 42 students (17 women and 25 men) were selected to join the SCMr Program as its class of 2018. Students came from 16 countries, with an average age of 28; they had an average of six years of professional experience.

More than 50 companies recruited SCMr students in AY2018. Of students who sought employment, 92% received job offers within a month of graduation, and 97% of employed students secured employment in the US. Their median base compensation was \$127,500; their average base compensation was \$121,600; the range was \$82,000 to \$150,800. International students reported a median increase in compensation of 160%; US students received a 54% increase in compensation. Some 74% of employed students secured their positions through activities facilitated through either MIT or the SCM Program, including, but not limited to: on-campus recruiting, career fairs, and referrals from faculty, staff, and alumni.

### ***Supply Chain Management Capstone/Thesis Partners***

Twelve companies participated as Supply Chain Exchange partners for students' capstone projects or theses. This year's projects included:

- Pattern Recognition in Consumer Packaged Goods Data
- Online Grocery and Omnichannel Strategy
- Predicting Carrier Load Cancellation
- Improving the Survival Rate of Small Firms in Latin America: A Case Study in Aguascalientes, Mexico
- 3D Printing's Impact on the Metalworking Industry
- Forecasting Short-Term Trucking Rates
- The Hidden Impact of Micro Retailers' Survival Rate on the Logistics Cost of Consumer Packaged Goods Companies
- International Production Network Planning
- Driving Savings via Inbound Logistics Network Design
- Optimal Supply Chain Operating Strategies by Replenishment Stream
- Improving Shipping Contracts with the Use of Blockchains
- Uberization Effects on Freight Procurement
- Palm Oil Traceability: Blockchain Meets Supply Chain
- Improving the Process of Container Shipping Using Blockchain
- Analyzing Out of Stock Patterns for a Consumer Goods Company
- Learning from Route Plan Delivery for Last-Mile Delivery
- Endogenous Demand in Supply Chain Network Design

- Modeling Regulatory Impacts on Medical Device Supply Chains
- Lot Traceability of a Breakthrough Food Science Technology
- Operating Strategies for a Segmented Supply Chain
- Understanding Shipper Performance in the LTL Market
- A State-Level Capacity Utilization Analysis of the US Natural Gas Transmission Pipeline System and Risk Management for a Gas-Fueled Nation
- Simulated Annealing Algorithm for a Customer-Centric Location Routing Problem
- Planning for Peak Demand in Reverse Logistics
- Improving Supply Chain Planning with Advanced Analytics: Analyzing Lead Time as a Case Study
- Last-Mile Delivery Optimization Model with Drones
- Improving Forecast Accuracy Through Demand Sensing

### **MIT Supply Chain Management Blended Program**

The MIT [Supply Chain Management Blended \(SCMb\) Program](#) is a new offering that combines an MITx online learning model plus a five-month on-campus term that allows a student to complete a master's degree from MIT. Offering a blended model of education allows CTL to reach a wider network of students who may not have considered traditional pathways toward a master's degree. Students in the SCMb Program come to MIT with a rich background in SCM and logistics and a wealth of work experience that contributes to an engaging classroom environment. Graduates leave MIT with a deeper understanding of the field and a passion to become leaders in the industry.

Applicants to the SCMb Program come from a diverse pool of MITx MicroMasters credential holders. Students are required to complete five rigorous online subjects and pass a proctored comprehensive final examination to receive the MITx MicroMasters credential in SCM. Applicants are admitted in the summer and begin developing their research project ideas in the fall. Students arrive in January for an intensive month of classes, seminars, and workshops. The immersive experience continues through the spring term as students complete the research project and subject requirements. Students earn a total of 42 units for the completion of the MicroMasters credential and must earn an additional 48 units in order to graduate from MIT with 90 units.

### ***The MIT Supply Chain Management Blended Program Class of 2018***

In summer 2017, 40 students (11 women and 29 men), were selected to join the SCMb Program's class of 2018. Students came from 21 countries; they were, on average, aged 32 and had nine years of work experience. When the class graduated in June 2018, 20% of students were sponsored by a previous employer or were pursuing self-employment. By mid-July, of the remaining students, 59% were employed or considering offers and 41% were seeking employment.

The employment picture for students with eligibility to work in the US without restriction was markedly better than for those without such eligibility, with 86% of the former employed or self-employed after graduating. Of those students who reported a salary, the median base compensation was \$106,000 and the range was \$52,000 to \$300,000. Domestic employers or sponsors included: Amazon, Google, McKinsey & Company, Ernst & Young, GE, Bertelsmann, National Grid, Maxim Integrated, Converse, Black & Decker, Ahold, Schlumberger, and Médecins Sans Frontières.

*MIT News* published coverage of the program when the [first students arrived](#) and again when the [first class graduated](#).

### **Research Project Partners**

The SCMb Program gives students the opportunity to propose their own research project with a company of their choosing. After a rigorous review of project goals, scope, and fit with MIT advisors, students work individually or in pairs to complete their projects. This year's projects included:

- Beyond the Seaport: Assessing the Inland Container Transport Chain Using System Dynamics
- Combinatorial Reverse Auctions in Construction Procurement
- Demand Forecasting of the Bike-Sharing Service in Beijing
- Dynamic Customer Service Levels: Evolving Safety Stock Requirements for Changing Business Needs
- Effect of Override Size on Forecast Value Add
- Effects and Mitigation of Natural Hazards in Retail Networks
- Enhancing Sales and Operations Planning Performance with Analytics
- Evaluation of Different Delivery Policies in the Cement Industry
- Forecasting Seasonal Footwear Demand Using Machine Learning
- Internal Inventory Management, Analysis, and Improvement for a CPG Company
- Key Supply Chain Integration Factors for Success of Medical Device Start-ups
- Lead Time Reduction of Laboratory Testing Services
- LNG Supply Chain Resilience
- Logistics Cost Minimization and Inventory Management Decision for Yarn Manufacturers in China
- Network Design for Mid-Day Meal Program
- Network Design Model for Fuel Retail
- Quantifying the Impact of Digitalization on Manufacturing Supply Chain Management (SCM) in a Power Generation Company

- Risk Mitigation at Call Centers
- Route Clustering in Transportation with Geospatial Analysis and Machine Learning to Reduce CO<sub>2</sub> Emissions
- Supply Chain Network Optimization for Global Distribution of Cementitious Materials
- The \$100 Question: Supply Chain Priorities for Small Firms
- Toward Effective Common Operating Policies for Medical Items in Ongoing Humanitarian Operations—The Science and Art of Segmentation—A Case Study
- “Would You Be Willing to Wait?”: Consumer Preference for Green Last Mile Home Delivery
- Using K-Means Clustering to Create Cost and Demand Functions that Decrease Excess Inventory and Better Manage Inventory in Defense

### **MicroMasters Credential in Supply Chain Management**

The MicroMasters credential is partly earned by completing five intensive online courses covering all aspects of logistics and SCM (equivalent to one semester’s worth of courses in the SCMr program). Students submit graded homework every week and take midterm and final exams in each SCx course. To earn the MITx MicroMasters credential they also have to pass a proctored comprehensive final examination. The total cost of the MicroMasters credential in SCM in 2018 is \$1,200, including the cost of the five courses and the comprehensive final exam. The courses are:

- CTL.SC0x Supply Chain Analytics
- CTL.SC1x Supply Chain Fundamentals
- CTL.SC2x Supply Chain Design
- CTL.SC3x Supply Chain Dynamics
- CTL.SC4x Supply Chain Technology and Systems
- CFx (comprehensive proctored final examination)

The MicroMasters program is not a degree-granting program, nor is it a guarantee of admissions to MIT or to the SCM graduate program. It is a separate stand-alone professional certificate called the MITx MicroMasters Credential in Supply Chain Management.

During the period of July 1, 2017, to June 30, 2018, SCM offered 10 SCx courses. In 2017, the five SCx courses were revised to establish a standard of eight weeks of content, weekly graded assignments, a midterm examination, and a final examination for each course. The content of the five SCx courses was changed to add more recitations, interviews with experts, and live events to interact with the SCx online learners. SCM created and developed at least 30 live events in this period. In February 2018, SCM developed and administered the second CFx for those students that qualified by having passed all five courses. The examination was proctored both online and in person.



In addition to creating the materials for the courses, the SCM Program worked on ensuring that the MicroMasters SCM credential has value in the market by creating a culture of honesty within the program. For this purpose:

- SCM developed a set of randomized problems in all four SCx courses (CTL.SC0x, CTL.SC1x, CTL.SC2x, CTL.SC3x, and CTL.SC4x). All graded assignments and examinations included randomized problems. The team is also working on having a unique set of values for each student.
- SCM created a process for identifying, catching, and removing students who violated the honesty policy.
- SCM tested and implemented online proctoring software during a weekly graded assignment in SC4x and in two administrations of the comprehensive final examination. An improved version of the proctoring software was tested in the last run of SC4x (May 2018); it will be used for the next administration of the Cfx in August 2018.

SCM also worked to create new material and bring reality to the SCx courses by providing:

- Interviews with experts have been filmed and included as part of the supplemental materials for SC3x Supply Chain Dynamics and SC4x Supply Chain Technology and Systems.
- A virtual field trip interview has been developed to bring real projects to the SCx courses, in particular to SC4x Supply Chain Technology and Systems. The initial field trip explored a research project conducted by CTL's [Megacity Logistics Lab](#) along with Anheuser-Busch Companies, LLC.

As of June 2018, more than 245,000 students from more than 196 countries across the globe have participated in at least one MicroMasters course. A total of 20,356 individual verified course certificates have been issued to 10,614 students. A total of 1,062 MicroMasters credentials in SCM have been granted—622 in May 2017 and 440 in February 2018. The first cohort of MicroMasters graduates completed their master's degrees in applied science in the SCMb program. The MicroMasters team offered 10 SCx courses last year and administered two Cfx. The team is preparing the next run of the Cfx for August 2018 and is currently running two SCx courses this summer.

CTL participated in several conferences and academic events to disseminate the results of the MicroMasters program. These included the Production and Operations Management Society, an MIT CTL Partners meeting, a GE webinar, an ABi Live Event, a presentation to the International Federation of Freight Forwarders Associations, and other academic and industry events.

Chris Caplice, CTL's leader, received the [Irwin Sizer Award](#) for the Most Significant Improvement for MIT Education, the MITx Prize for Teaching and Learning in Massive Online Open Courses, and the MIT Teaching with Digital Technology Award—a student-nominated award to recognize instructors who effectively use digital technology to improve teaching and learning at MIT.

## MIT Global Supply Chain and Logistics Excellence Network

The [MIT Global SCALE Network](#) now spans six centers on four continents, with more than 12 educational programs (both online and in residence), more than 50 academic partners, 80 researchers and faculty members, 150 corporate partners, and more than 1,000 alumni working worldwide. The six centers include CTL and the five centers described below.

### Zaragoza Logistics Center

Zaragoza Logistics Center (ZLC) is a research institute established by the government of Aragón, Spain, in partnership with MIT and the University of Zaragoza. Founded in 2003, the ZLC campus is located in the heart of Plataforma Logística Zaragoza, the largest logistics park in southwest Europe. It serves as a working laboratory to transfer new knowledge and working practices.

AY2018 was marked by the launch of two new curricula within the MIT-Zaragoza Master of Engineering in Logistics and Supply Chain Management (ZLOG) from the MIT-Zaragoza Supply Chain Management Program. Personnel consisted of 35 people, including seven faculty members, five researchers and doctoral students, and 23 professionals in the areas of finance, marketing, information technology, human resources, and education and research management.

On June 1, 2018, more than 80 students from 28 countries attended their graduation ceremony at the Pignatelli Building of the government of Aragón. The students came from the 70th class of the master en dirección de supply chain (MDSC), the 14th ZLOG class, the first class of the MIT-Zaragoza-Ningbo Master of Engineering in Logistics and Supply Chain Management Program (3C), and the first class of the blended MIT-Zaragoza Master of Engineering in Logistics and Supply Chain Management Program (ZLOGb). Cummins, Johnson & Johnson, Roche, Halliburton, Heineken, Médecins Sans Frontières, Leo Pharma, Securemarking, and others sponsored thesis projects. The average rating for professors was 6.1 on a 7 point scale.

AY2018 saw a ZLOG class of 27 students from 17 countries, an MDSC class of 31 students from five countries, a 3C class of six students from three countries, and a ZLOGb class of 17 students from 10 countries. New ZLOG academic partners for this academic year are Heineken, LEO Pharma, and Securemarking. So far 53 companies have participated in this program, including a number of firms among the Gartner Supply Chain Top 25.

In terms of worldwide recognition, the MIT SCALE master's degree in SCM was ranked number one in the field of logistics and SCM by Eduniversal Ranking for the third year in a row. SCM World voted ZLC the best-specialized university for supply chain in Spain and the fourth best in Europe. The MIT-Zaragoza master's degree in SCM management was ranked number one in the field of logistics in the "250 Best Master's in Spain" rankings by the newspaper *El Mundo* in 2018 for the eighth consecutive year. Graduates of the MDSC program won the Foro Pilot Award for the best MDSC master's thesis and the Asociación Empresarial PLAZA (AEPLA) Award for the most innovative master's thesis.



The MIT-Zaragoza doctoral program had four students during this academic year. Sixteen PhD students from universities all over the globe participated in the 11th edition of ZLC's annual PhD Summer Academy, conducted over two weekseach summer. Instructors came from the Cranfield School of Management, Instituto Centroamericano de Administración de Empresas (INCAE) Business School, Kühne Logistics University, and the Georgia Institute of Technology.

More than 360 professionals participated in executive education programs and workshops in SCM designed and taught by ZLC and MIT SCALE faculty members, such as the executive course for the Spanish military, the fourth Global Supply Chain Research Forum; and courses for executives at Roche, Singapore Business Federation, LOGYCA, Supply Studio Colombia, TAT Technologies Group, LC Waikiki, Colegio Oficial de Ingenieros Industriales de Aragón y de la Rioja, Cluster de Empresas de Automoción de Galicia, and Kuoni Group. Additionally, the ZLC Supply Chain Executive Club was launched in 2017 as a tool to approach professionals in the sector and the alumni network to foster a collaborative environment at every level. To date, 70 supply chain professionals have joined the club from top companies such as Roche, BOSAL, Amazon, Heineken España, AENA, TMZ, Accenture, Clariant, Procter & Gamble, and Lidl Stiftung & Co. KG, among others.

Within this period, there were 18 ongoing research and development projects at ZLC. Funding sources included the European Commission (which funded 12 projects), private companies (which funded four projects), the Spanish Ministry of Industry, Trade, and Tourism (which funded one project), and the government of Aragón (which funded one project). With these results, ZLC became the entity in Spain with the highest number of European research and development projects in logistics and SCM. ZLC has continued its participation in the Alliance for Logistics Innovation through Collaboration in Europe (ALICE), an initiative that was promoted by ZLC. ALICE advises the European Commission on shaping the European logistics research agenda. ZLC's director is a member of ALICE's steering group; ZLC also participates in four of ALICE's five working groups (supply chain security, synchronomodality, collaboration, and urban logistics).

Research at ZLC has resulted in nine articles in peer-reviewed journals and one book chapter. The articles have been published in recognized research journals, such as the *European Journal of Transport and Infrastructure Research*, the *International Journal of Production Economics*; *Journal of Operations Management*; *European Journal of Operational Research*; *Foundations and Trends in Technology, Information and Operations Management*; *Technological Forecasting and Social Change*; and the *International Journal of Logistics Systems and Management*. Another three articles are to be published in the coming months. ZLC faculty and research staff presented their research findings in key national and international conferences.

ZLC received visits from prestigious international representatives, such as Holger Kömm, Adidas Group's director of the Data Science Laboratory; David J. Sarley, Bill and Melinda Gates Foundation; Azuka Nneka Okeke, Africa Resource Center for Supply Chain; and Lotte Engels, Barcelona, Spain's director of the Netherlands Business Support Office. Additionally, ZLC hosted institutional representatives from China's Shanxi province, Instituto para la Formación y Aprovechamiento de Recursos Humanos in Panama, and China's Chengdu Qingbaijing Intermodal Logistics Hub.

ZLC also had an estimated financial effect of more than €6 million on the local community during the past five years.

### **Malaysia Institute for Supply Chain Innovation**

the Malaysia Institute for Supply Chain Innovation (MISI)—located in Shah Alam, Malaysia, near Kuala Lumpur—was launched in March 2011 by the prime minister of Malaysia as a joint initiative with MIT. The fourth center in the SCALE Network, MISI is now in its eighth operational year as an institute of higher learning.

Fifteen students from 10 countries graduated in May 2018 with a master’s degree in SCM. In the part-time master’s degree program there were 115 active students, 105 of whom were Malaysian. In January 2018, 25 students from MISI attended the annual Independent Activities Period program at MIT.

The permanent staff at MISI consists of six faculty members, three researchers, and 16 people in administration. In the past year, MISI faculty members published a dozen research papers in journals, including the *MIT Sloan Management Review*, and one book, published by MIT Press. MISI faculty have delivered keynote addresses at several conferences throughout the Asia-Pacific region. Four MIT faculty members taught at MISI in the past year. MISI and the Asia School of Business—the MIT Sloan School collaboration in Malaysia—regularly exchange faculty members and benefit from each other’s strengths.

### **Luxembourg Center for Logistics**

On December 7, 2015, the government of the Grand Duchy of Luxembourg and the University of Luxembourg, through a long-term partnership with CTL, founded the Luxembourg Center for Logistics and Supply Chain Management (LCL) as a part of the Faculty of Law, Economics, and Finance. The center will support Luxembourg’s development as a transport and logistics hub in Europe. It will offer a master’s degree program in logistics and supply chain management (LSCM) as well as carry out research in close cooperation with industry partners.

The LCL welcomed its first cohort of 15 LSCM master’s degree students in September 2017. Students from 11 countries embarked on this part of their journey to becoming supply chain experts. The students successfully completed their thesis projects in collaboration with industry partners, connected with and learned from fellow students in the SCALE Network during a three-week period in Boston. Throughout the year, students participated in industry visits and joined industry seminars led by expert speakers from within the supply chain industry, including from companies such as Amazon, Google, and Exxon. The academic year culminated in the inaugural LCL Research Fest where students showcased their findings to an audience of industry, academia, and invited guests. Yossi Sheffi joined the event to present the well-deserved certificates from MIT.

The second annual LCL-hosted eXplore conference—led by speakers from MIT, the Luxembourg center, and industry—took place in March 2018, focused on future supply chain trends. Attended by approximately 100 experts in SCM and related fields, the conference was an excellent opportunity to raise the profile of the LCL, showcase the LSCM students, encourage debate, and create an optimal networking environment for all participants.

The LCL Executive Education program was launched in November 2017, with a well-attended two-day session on supply chain financial analysis hosted by MIT's Jim Rice. This was followed in January 2018 with a two-day session, Supply Chain 4.0, co-taught by Kühne Logistik Universität. Participants traveled from as far afield as Uruguay and South Africa.

Outreach activities continued throughout the academic year, bringing supply chain experts together to discuss the impact of technologies on the supply chain. A series of digital roundtables saw debates on trends such as blockchain, artificial intelligence, and e-commerce. In March 2018, the LCL joined the three-day official Luxembourg state visit to France as part of the government trade delegation, raising the visibility of the center and promoting cross-border networking opportunities.

On the academic front, in September 2017, Joachim Arts arrived from Eindhoven University of Technology and joined LCL as an associate professor. In May 2018, Nils Löhndorf also joined the academic team as an associate professor. Prior to joining LCL, Löhndorf was an assistant professor at the Vienna University of Economics and Business, Austria, where he received his postdoctoral habilitation in business administration in 2017.

Two doctoral students joined LCL. Melvin Drent arrived in November 2017; his master's degree thesis had been awarded the Dow Chemical prize for the best master's thesis in the field of operations management and logistics. In May 2018 he was awarded funding for a doctoral degree by the Fonds Nationale de Recherche. He presented his current research on dual-sourcing strategies at the annual Production and Operations Management Society conference in May. LCL also welcomed Nicole Perez Becker as a doctoral student; her research focuses on revenue management applications in service industries. LCL hosted visiting doctoral students from China and Italy. Weichun Chen, from the College of Management and Economics, Tianjin University, China, visited LCL. Chen is a previous winner of the first prize in China's National Postgraduate Mathematical Contest in Modeling.

Several academic visitors passed through LCL, sharing their expertise and latest research, including Mark Ferguson from the Darla Moore Business School, David Gonsalvez from MISI, Martin Dresner from the University of Maryland, and Gudrun Kiesmuller from Otto von Guericke University. Jian Liu of Hohai University, Nanjing, China, joined as a visiting researcher for three months, working on "Supply Chain Channel Selection and Coordination Strategies with Consumer Returns Behavior in E-Commerce Environment."

Over the course of the year, Binyamin Mantin presented his work at several conferences, such as the annual Institute for Operations Research and the Management Sciences (INFORMS) conference and the May 2018 European Working Group on Retail Operations conference. He gave keynote presentations at practitioners' conferences (the Luxembourg Analytics Summit and Gdansk's Maritime and Logistics conference). Joachim Arts presented at the INFORMS meeting in Houston, Texas; the NWO TOP workshop in Eindhoven, the Netherlands, and the Euro2018 conference in Valencia.

## Ningbo Supply Chain Innovation Institute China

The Ningbo Supply Chain Innovation Institute China (NSCIIC) is a nonprofit, independent educational and research institute that was jointly established by the government of Ningbo and MIT in 2016. NSCIIC is located in Ningbo, the most active economic center in the south wing of the Yangtze River delta economic zone. Ningbo has the largest petrochemical industry base with the biggest refinery in the country. The city's large manufacturing base includes the Geely Group VW, where production reaches 10 million vehicles per year. Ningbo has been listed in the *Forbes* "China's Best 100 Cities for Business List" for 10 consecutive years. The Ningbo-Zhoushan Port surpassed Shanghai in 2012 to become the largest port in the world in terms of cargo tonnage, with more than 100 million metric tons of volume in 2017.

NSCIIC modeled its master's degree and executive education programs on MIT's curriculum to foster international SCM talent. NSCIIC has also established industrial alliances to promote enterprise-wide collaborative innovation and enhance the global competitiveness of its corporate partners.

On August 25, 2017, NSCIIC welcomed the first MIT-Ningbo Supply Chain Management Program class of eight students. In January 2019, the students will attend the annual Independent Activities Period at MIT.

On September 18, 2017, NSCIIC hosted the China Air Transportation Policy and Regional Economic Development Conference. The conference attracted more than 100 distinguished Chinese and international attendees from academia, industry, and government.

On December 13, 2017, NSCIIC received competitive awards at the fifth Tencent Business School Development Forum in Beijing. The forum is a unique showcase for outstanding business education organizations in China. NSCIIC received the award for Outstanding Business Education Brand. Several other universities in China shared the honor with NSCIIC. Professor Shaoxuan Liu, director of NSCIIC, was also recognized at the forum as "the Chinese Figure in Business Education."

On January 31, 2018, NSCIIC welcomed its first cohort of students in the 3C program.

On May 28, 2018, NSCIIC hosted its first graduation ceremony for the six students who had graduated with a recognized master's degree of engineering in logistics and SCM from the University of Zaragoza, Spain. They also received the Graduate Certificate in Logistics and Supply Chain Management, jointly signed by CTL, ZLC, and NSCIIC. The first cohort of 3C students was successfully placed at companies that included C. H. Robinson, Amazon, Pfizer Inc., and Johnson & Johnson.

From July 14 through 16, 2018, NSCIIC hosted the 11th International Conference of Chinese Scholars Association of Management Science and Engineering, with the theme of "Building Intelligent Supply Chains". The conference arranged four keynote speeches, two industrial panel discussions, the Young Scholars Colloquium, the Female Scholar Luncheon, and 46 technical sessions. More than 400 scholars and corporate executives from all over the world attended the conference.

On July 14, 2018, NSCIIC launched the Supply Chain Innovation China Alliance (SCIA) with industry partners. The Alliance aims at gathering the first-rate academic, industrial, technology and capital resources, so as to boost the talent training, technology innovation, industry development, and international cooperation. Twelve companies such as vTradEx, YTO Express, Yunda Express, Rokin Logistics, and China-Base Ningbo Group Co. have become the members of SCIA.

Over 300 professionals participated in different executive education programs and workshops in SCM chain management designed and taught by NSCIIC and MIT SCALE faculty as well as visiting faculty of NSCIIC on topics such as: supply chain strategy, supply chain finance, freight transportation, global sourcing and value chain integration, logistic service innovation, air transportation, and operations management.

Chikage Miyoshi joined NSCIIC as an associate professor in November 2017, arriving from Cranfield University. In June 2018, Lima Zhao also joined NSCIIC as an associate professor. Zhao had been assistant professor in supply chain finance at the Wissenschaftliche Hochschule für Unternehmensführung (WHU)–Otto Beisheim School of Management.

The faculty team at NSCIIC consisted of five faculty members. There were also 13 visiting faculty members from universities around the world, such as MIT, Duke University, New York University, University of California–Irvine, University of British Columbia, the University of Würzburg, and the City University of Hong Kong.

Research at NSCIIC resulted in five articles published in such peer-reviewed journals as *Production and Operations Management*, the *European Journal of Operational Research*; *International Journal of Production Research*; *Journal of Air Transportation Management*, and *Transportation Research Part A: Policy and Practice*. Lima Zhao recently published a new book on supply chain finance jointly with Arnd Huchzermeier, Chair Professor of Production Management at WHU–Otto Beisheim School of Management, Germany. Bo Li and Joyce Jin, two assistant professors of NSCIIC, were selected by the Ningbo government to participate in the 2017 Leader and Top-Notch Talents Training Project.

### **MIT SCALE Latin America and Center for Latin American Logistics Innovation**

The Center for Latin American Logistics Innovation (CLI) is the result of a partnership between CTL and LOGYCA/Research in Bogotá, Colombia. Over time, CLI has cultivated deep relationships with more than 30 top Latin American universities and institutions in the region. It currently has 10 full-time and three part-time research staff. Because CLI is recognized as an official national center of excellence, it has access to government grants and various thought leadership opportunities. Despite the change of requirements in the ranking of research centers published this year by Colciencias—the National Science Foundation of Colombia—CLI remained in the B category because of the high impact of its publications.

The flagship academic program is the MIT Graduate Certificate in Logistics and Supply Chain Management (GCLOG). This is an elite program geared toward outstanding graduate students from Latin America. The program is open to students fully enrolled in graduate programs from areas relevant to SCM and logistics.

The GCLOG class of 2018 (the ninth cohort) consisted of 29 outstanding students selected from among 50 candidates, most of whom had been recommended directly by members of CLI's network of partner universities throughout Latin America. This class included students from 16 universities in Argentina, Brazil, Colombia, Ecuador, Mexico, Peru, and Bolivia; GCLOG's earlier eight cohorts had 210 students graduate from the program. MIT hosts the students twice a year, for three weeks each time—once in July and again in January. The January visit coincides with the annual SCALE Connect Conference where the GCLOG students network with more than 200 students from the other five MIT Global SCALE master's programs. This year, GCLOG combined online courses with on-campus experience through the online course GCx Excellence in Supply Chain. The course is designed for the edX platform using content from the MITx MicroMaster's in Supply Chain Management curriculum.

CTL, in collaboration with CLI, organizes academic workshops that take place annually at various venues in the Latin American region and at the MIT campus; for example, a workshop was held at Mexico's Monterrey Institute of Technology and Higher Education in March 2018. As a result of the agreements, CLI will continue to host the Undergraduate Certificate in Logistics and Supply Change Management (UCLOG) program, which will welcome its second student cohort in the summer of 2018.

Corporate education is another CLI educational initiative. The center currently has 13 corporate partners with whom it develops a wide range of executive and collaborative research projects in seven research areas. To date, more than 140 collaborative projects with industry have been successfully completed.

## Research

### MIT Megacity Logistics Lab

Beginning in 2012, CTL created the [MIT Megacity Logistics Lab \(MLL\)](#) from an outgrowth of research activities in logistics and supply chains in emerging markets. The lab focuses on understanding and transforming the supply chains that interface with megacities, looking particularly at last-mile delivery operations in large, densely populated, and congested urban environments. In addition to support from the Institute, MLL has secured funding from various industry partners, such as Anheuser-Busch InBev (US), Coca-Cola Femsa (Mexico and Colombia), and Flipkart (India), as well as the World Bank Group, to support its research efforts, partnerships, workshops, and data collection efforts in numerous countries around the world.

Since the lab's foundation, more than 350 people from business, academia, and government have participated in MLL activities. Many graduate and undergraduate students have seen the challenges that accompany moving freight. MLL has also developed partnerships with related initiatives within MIT, such as the Changing Places and City Science groups at the Media Lab, the Norman B. Leventhal Center for Advanced Urbanism, and the Singapore-MIT Alliance for Research and Technology, as well as Sertac Karaman—the Charles Stark Draper Assistant Professor in the Department of Aeronautics and Astronautics.



### **Computational and Visual Education Lab**

The [Computational and Visual Education \(CAVE\) Lab](#) within CTL is a newly founded research and education initiative focused on the use of interactive visualization to improve supply chain and logistics data visibility, advanced data analytics, and data-driven supply chain decision making. Using a newly created physical laboratory space at CTL that is equipped with state-of-the-art visualization technology, CAVE researchers are working on developing interactive visual interfaces to data and analytical tools that address complex supply chain and logistics problems.

CAVE provides students, researchers, and decision makers with a more intuitive understanding of and access to quantitative methods to support strategic design, tactical planning, and operational decision problems in the supply chain and logistics domain and related fields. It provides a hands-on environment for learning about and implementing advanced analytics approaches to complex decision problems. CAVE also permits an in-depth analysis of behavioral aspects of data-driven supply chain and logistics decision making.

### **Recession Readiness of Supply Chains**

CTL Research Engineer Bruce Arntzen and postdoctoral associate Nima Kazemi began a research initiative that examines how ready US small to medium-sized manufacturing firms are to withstand the next recession. Good economic times can lead to risky decisions, such as these, for example:

- Allowing sales staff to give away longer payment terms to close deals
- Allowing product designers to build in unique, non-cancellable components
- Forgetting to include risk-sharing in purchasing agreements

This research identified 10 risky behaviors that hurt companies once a recession hits and determined which financial metrics indicate risky supply chain practices. Arntzen and Kazemi will rate manufacturing firms on their recession readiness, comparing their readiness in 2007, just before the market crash, with their readiness now; this involves polling companies to find out what business practices have been changed since 2009. So far, they have analyzed the recession readiness of 100 small to medium-sized manufacturing companies. The results of this research will be published in *Supply Chain Management Review* in September 2018 and November 2018.

### **MIT Humanitarian Supply Chain Lab**

The mission of the [MIT Humanitarian Supply Chain Lab](#) is to help meet human needs by understanding and improving the supply chain systems behind public services and private markets. The laboratory has a diverse portfolio of supply chain initiatives to improve emergency response during a crisis and to strengthen markets in vulnerable communities.

In AY2018, the lab finished the final year of its five-year major research project with the [Comprehensive Initiative on Technology Evaluation \(CITE\)](#). The US Agency for International Development (USAID) supported the project. Journal articles based on previous study reports for [malaria rapid diagnostics](#) and for [post-harvest storage](#)

[technologies](#) were submitted and published. Two CITE reports were also published this academic year: [Food Aid Packaging](#), based on a field experiment analyzing \$1 million of food commodity shipments, and [Decision Support for Post-Harvest Loss](#), based on field research with operational decision makers in Tanzania.

The lab entered the third year of its four-year project with the USAID mission in Uganda. In collaboration with the [Gralla Laboratory at George Washington University](#), the team developed a methodology for measuring change in market systems and conducted new research studies on farmer market engagement and agribusiness. In addition, the team helped design future monitoring and evaluation approaches for the mission.

With funds from the Bill and Melinda Gates Foundation, the lab completed work in 2018 on the Nigeria Center of Excellence Study. The study engaged public and private organizations in considering the potential for an academic center of excellence in Nigeria; its results were shared in meetings of Nigeria's Industrial Policy Competitiveness Advisory Council, made up of 36 chief executive officers (CEOs) and government leaders. The team also developed a strategy for establishing a SCALE center in Nigeria as a hub for innovation and talent development to transform supply chains and socioeconomic outcomes throughout Africa.

The lab's engagement with the Federal Emergency Management Agency (FEMA) increased significantly in AY2018. In July 2017, work began on Alternatives for FEMA Disaster-Related Housing Assistance, a two-year project intended to develop survivor-centric and cost-effective alternatives for post-disaster direct housing assistance. During the very active 2017 US hurricane season, the lab joined the response effort, operating from FEMA headquarters in Washington, DC, to support supply chain decision making across the public and private sectors. A teaching case study was developed in collaboration with FEMA and a fuel retailer on the basis of experiences during Hurricane Irma. In December, the lab hosted the [Supply Chain Resilience: Restoring Business Operations Following Hurricanes](#) roundtable, which convened supply chain leaders from the public and private sectors. In May 2018, the National Academy of Sciences, Engineering, and Medicine contracted with the lab to conduct research as part of a FEMA-sponsored Federal Advisory Committee Act consensus study on post-hurricane supply chain adaptability.

### **MIT Sustainable Logistics Initiative**

Although different economic sectors, such as manufacturing and power generation, account for the largest share of carbon dioxide (CO<sub>2</sub>) emissions, studies show that transportation—particularly road transportation—is the fastest-growing major source in the US. [The MIT Sustainable Logistics Initiative \(SLI\)](#) focuses on analyzing the implications of considering CO<sub>2</sub> emissions in logistics decisions. Earlier projects with industry partners showed that companies may be able to achieve important reductions in carbon emissions by making better logistics decisions (e.g., truck assignments, replenishment strategies, vehicle routing, and so on).

Researchers began conducting five different research projects with Coppel Mexico, which is one of the largest retail companies in Latin America. The first project, related

to consumer behavior, studies the environmental effects of a same-day delivery promise and the key drivers that can affect a customer's willingness to wait for a home delivery by providing environmental impact information. The second project analyzes how certain vehicles perform in terms of CO<sub>2</sub> emissions in a given delivery area. The third project studies the transportation CO<sub>2</sub> emissions caused by external variables such as weather, delivery time, and region. The fourth project tests the environmental effects of extending the time delivery window from one to two days to four to five days via the transportation consolidation of home deliveries. The fifth project focuses on analyzing the relation between transportation CO<sub>2</sub> emissions and drivers' behavior.

To conduct these five projects, SLI involved four graduate students from SCMB. The initiative also collaborated for six months with Mexico's Monterrey Institute of Technology and Higher Education, specifically with nine campuses including 20 professors and more than 150 undergraduate students. Three students were selected to come to MIT in summer 2018 to conduct research with SLI.

### **Sustainable Supply Chains**

A new generation of the idea of a sustainable supply chain is unfolding, fueled by an increasing awareness by consumers, governments, and investors of environmental and social issues and the shifting responsibilities that the corporate world must satisfy to retain their social license to operate. In response to this new sustainability landscape, CTL launched [MIT Sustainable Supply Chains](#) in early 2018 as a one-stop shop for sustainability research and education.

Focusing on strategy, innovation, and transparency, Sustainable Supply Chains serves as CTL's platform to engage with industry and stakeholders on research that aligns with CTL's core expertise on transportation, logistics, and SCM. The program will also provide an educational platform around supply chain sustainability for MIT students and industry professionals, empowering the next generation of sustainable supply chain leaders.

### **MIT Responsible Supply Chain Lab**

Founded in 2015 as a natural evolution from prior work in sustainable supply chains, the [MIT Responsible Supply Chain Lab](#) was formed to examine the many issues that affect the reduction of the social and environmental impacts of supply chains. The lab examines past, current, and potential future practices of sustainability in SCM across various industries. It develops applied models that businesses can use to implement strategies to improve SCM and control practices.

Although the lab focuses broadly on sustainable supply chains, it has a particular focus on supply chain traceability and transparency. Given the likelihood that environmental or social misdeeds are buried deep in global supply chains, companies are struggling with how to manage supply chains that are extended and sometimes opaque. Recent research in the lab focused on exploration of digital solutions to facilitate supply chain traceability, supplier relationship evaluation and innovation, and stakeholder analysis for supply chain sustainability communication.

Students and faculty from around the world have been hosted at the Responsible Supply Chain Lab for collaborative research. The lab has initiated research collaborations with other entities across MIT, including the Sloan School of Management, the Abdul Latif Jameel World Water and Food Security Lab, and MIT Metals and Minerals for the Environment. Past projects include examining palm oil traceability through blockchain, exploring apparel industry transparency, finding the true cost of water for a major consumer packaged goods company, and a liquid natural gas industry evaluation. The work and writings of the lab's members have been featured in the *Wall Street Journal*, *Sloan Management Review*, *Industry Week*, *Supply Chain Management Review*, and various other publications.

### **MIT FreightLab**

The MIT FreightLab was established in 2008 to advance the art, science, and practice of how shippers, carriers, and third parties design, procure, and manage freight transportation across the globe. In AY2018, the research was focused on master's thesis and capstone project work.

Projects included:

- Uberization Effects on Freight Procurement
- Improving Shipping Contracts with the Use of Blockchains
- Evaluation of Different Delivery Policies in the Cement Industry
- Forecasting Short-Term Trucking Rates

The management of freight transportation is becoming increasingly complex. Overseas outsourcing of manufacturing, constraints on infrastructure capacity, and a wider range of modal options are just some of the more recent trends leading to this complexity. This research initiative focuses on improving all aspects of freight transportation: design, procurement, management, systems, and execution. Recent projects have included forecasting short-term spot rates, exploring the linkage between strategic planning and operational execution, quantifying the cost of design complexity, and quantifying carrier responses to combinatorial auctions. Underlying all these projects is the challenge of identifying and managing the uncertainty that is inherent in freight transportation networks.

### **New England University Transportation Center**

MIT was awarded the US Department of Transportation's Regional University Transportation Center grant. The consortium of universities includes MIT (as the leading institution), the universities of Connecticut, Maine, and Massachusetts, and Harvard University.

The grant will support students, researchers, and faculty in further development of a living laboratory in Cambridge, the Massachusetts Avenue Area Living Laboratory, which includes urban landscape from Harvard Square to Memorial Drive. A new grant beginning 2017 for four years was announced in spring 2016.

## AgeLab

AgeLab is a multidisciplinary research program that works with businesses, government, and nongovernmental organizations to improve the quality of life of older people and those who care for them. AgeLab enjoys sponsorship from corporations in a number of industry sectors that address the needs of an aging society (e.g., property and casualty insurance, retail, automobile, financial services, pharmacy, consumer electronics, and consumer products). Some of the companies involved are AARP, the Bank of America, CVS, Google, Panasonic, The Hartford, Transamerica, Liberty Mutual, car manufacturers, and others.

AgeLab conducted experiments and fieldwork that engaged more than 1,000 subjects on campus and nearly 10,000 in field trials of hardware, surveys, focus groups, and in-depth interviews in a number of countries. AgeLab researchers published in 23 peer-reviewed journals, wrote three book chapters, and had many student poster sessions and peer-reviewed paper presentations as well as publications in the business press, e.g., in the *Wall Street Journal*, *MarketWatch*, and so on. Five events were convened that engaged more than 600 participants, including the CEOs of major companies and AARP as well as the US secretary of transportation and the administrator of the National Highway Traffic Safety Administration. Event topics included the future of home services, the future of autonomous vehicles and older adults' mobility, the future of advice seeking in retirement, the internet of things, and aging in place.

AgeLab is recognized worldwide as an innovator in understanding the demands of the evolving longevity economy and its impact on various complex systems, including transportation, health, finance, and community development. AgeLab collaborates with many departments and laboratories at MIT, including the Media Lab (livable communities), the Department of Urban Studies and Planning (future of real estate), and the departments of Brain and Cognitive Sciences (Aging Brain Initiative), Civil Engineering (transportation), and Mechanical Engineering, and well as the Computer Science and Artificial Intelligence Lab (ubiquitous computing and autonomous systems). AgeLab is staking out new ground in thinking about retirement, information presentation and design, autonomous vehicle systems, and home services that offer both convenience and care across the lifespan.

## MIT GeneSys: Supply Chain Management for Micro and Small Firms in Developing Countries

Micro and small firms represent more than 95% of the businesses operating in developing countries. They account for the majority of jobs in most Organization for Economic Co-operation and Development countries, and many of them represent a substantial share of the suppliers and customers of large firms. Micro and small firms have their own specific set of strength and weaknesses compared with large firms, and these attributes require specific measures for business growth. Practices that suit large firms cannot be straightforwardly translated into the context of small firms, which requires a different approach. Because of a lack of understanding of the main challenges and opportunities, only a fraction of these small firms survives and develops into a high-growth firm.



This knowledge gap is being addressed by the [MIT GeneSys](#) Lab research project at CTL. The project is designed to contribute to the survival and growth of small businesses in developing countries by improving their operations and SCM decisions. The idea is to provide a framework of managerial insights intended to improve the productivity and survival rate of small firms.

During 2017–2018, the MIT GeneSys Lab developed a comprehensive analytical method that can be applied through a mobile app. The analysis provides a detailed assessment of a small firm’s potential for survival. The lab also continued to conduct workshops with the owners of small firms to help them understand their challenges and opportunities better, and to train them in the fundamentals of business and SCM. There have been more than 15 workshops in Latin America (i.e., Mexico, Bolivia, Colombia, Peru, and Uruguay). The MIT GeneSys Lab also started to design a field study in collaboration with 15 universities in eight Latin American countries.

As part of the Genesys Lab project, faculty members advised five master’s degree students in the class of 2018 (three from SCMr and two from SCMb) on three master’s theses. One result is a framework that focuses on small firms’ growth and provides business and SCM priorities that improve productivity and survival.

The GeneSys Lab will continue to work on validating the framework with the collaboration of partner institutions. In addition, the lab will host at the GeneSys Lab for the 2018 summer period three undergraduate students from Mexico’s Monterrey Institute of Technology and Higher Education to work on the project.

### **Measuring and Investing in Resilience**

This research project extends the work done on resilience at CTL to identifying how to make the case for making investments in resilience and overall risk management for a business. Given the increasing frequency of disruptions that have affected supply chains over recent years, companies now recognize the importance of being able to manage supply chain response to disruptions actively. Clearly, disruptions can have a big impact on the entire enterprise. This warrants making investments in resilience to protect the franchise and the ability to continue serving customers despite disruptions. Supply chain leaders are therefore charged with making the case to invest in supply chain resilience. But there are no precise ways to answer the host of questions that managers must address in order to make investment decisions. This project will study how firms go about making risk management and resilience investment decisions, and solicit companies to participate by sharing their practices in order to identify the frontier of practice in making these kind of investments. Subsequent phases of study intend to develop methods for making the financial investment case for resilience.

### **Blockchain in the Supply Chain**

Blockchain has drawn the attention of many industry practitioners, and CTL has convened a group of researchers to begin exploring the potential application of this technology in the transportation, logistics, and supply chain domains. Early work included convening a roundtable of Supply Chain Exchange partners along with invited guests and researchers. The group is focusing on several applications to understand how



blockchain could change or improve business processes, in addition to perhaps enabling new capabilities. The group will launch a research project in the summer of 2018 to explore how companies are developing blockchain technology applications in SCM.

### **Omnichannel Distribution Strategies**

Omnichannel retailing brings a number of challenges, including the need for more coordination between trading partners. It also involves more complex urban logistics networks that support multiple distribution channels and delivery models, as well as increasingly high consumer expectations regarding the convenience and reliability of delivery services.

CTL's research proposes a model that helps retailers to design urban last-mile distribution networks that support omnichannel strategies. Although most of the existing research in this area has focused on the sales side of the omnichannel movement, this work focuses on appropriate design of the physical network of urban goods transportation that would form the backbone of any such strategy. A real-world case study based on a major fast-fashion retailer shows both how such a model can be applied and which important lessons for retailers can be drawn from it.

In response to the growth of e-commerce and changes in consumer buying behavior, more retailers are developing multichannel sales and distribution strategies. It is an essential part of the omnichannel retail experience that online buyers be given many different options for receiving and returning the products they buy. Researchers are currently examining how to help retailers quantify customer pick-up preferences in an omnichannel environment. The work involves the analysis of different levels of integration of last-mile delivery across various distribution channels. A fully integrated omnichannel network configuration may be able to reduce the cost of network operation by some 50%. Researchers are also modeling and analyzing the economic and environmental impacts of various pick-up points on e-commerce's last-mile distribution in urban areas.

### **Food and Retail Operations Lab**

The world's market growth is projected to reach an average of 3.5%, with increasing competition among store formats, channels, and stakeholders. High-performance operations are expected to provide a competitive advantage to certain retailers, especially to the smallest ones, which account for 57% of the world's market share. These millions of small, family-operated retailers (so-called nanostores) are the main source of consumer packaged goods in the neighborhoods of large cities across the developing world. They serve 67% of the world population who live on less than US\$5 per day. The mission of the Food and Retail Operations Lab is to create effective operations and strategies for supply chain stakeholders, considering their evolving efforts to meet consumer needs fairly.

On the one hand, this project aims to generate productive supply chain solutions across various stakeholders (i.e., suppliers, logistics-service providers, manufacturers, and consumers), considering operations and collaboration schemes among diverse retailers from big-box chain stores to nanostores. On the other hand, this project aims to analyze the contribution of a retailer's assortment, proximity, price, and expiration date of goods

to undesired effects of food supply chains such as inaccessibility, malnutrition, presence of food deserts, and so on.

The goal is to shape forward-looking, high-performance supply chains for competitive, dynamic retail landscapes around the globe by taking into account multiple trends such as technology, demographics, and macro- and microeconomics. These trends shape how consumer preferences are coupled with the retail landscape and the way in which all retailers adopt and adapt to changing market conditions (such as the entry or exit of a competitor and the evolution of consumer features). Additionally, the project analyzes the way in which the logistics and commercial strategies and operations of each stakeholder (a supplier, farmer, manufacturer, retailer, and consumer) are configured into the retail-based supply chains to improve the performance of the whole food and retail value chains.

## **Outreach**

The foundation of CTL's corporate outreach is the Supply Chain Exchange—believed to be the largest and most active membership program in the SCM field.

## **Corporate Relations**

During FY2017, CTL added 11 new companies as partners to the exchange: ATL Partners, BMW, CMA CGM Group, Converse, Iron Mountain, Lenovo, Microsoft, Nordstrom, NYSHEX, Takeda Pharma, and Trawind. Over the course of the year, 13 companies left the consortium: Cintas, CSX, GE, General Mills, Infor, Inspectorio, MacroPoint, MHI, Nippon Express, OnProcess, Ryder, Schneider National, and Verisk Analytics. This is a normal amount of change for the sponsor program.

## **Outreach Events**

In FY2018, CTL organized eight events ranging from roundtables with a few dozen attendees to conferences with hundreds in attendance. The highlights included these events:

- CTL hosted the ninth annual partners meeting on April 18, 2018, which convened key contacts from CTL's partner companies for a review of research and customer feedback and input sessions.
- This year's CTL Crossroads Conference (April 17, 2018) focused on innovations that are driving another decade of revolutionary change in the supply chain world. The conference featured experts from MIT speaking about the technologies that will likely impact SCM in the future.
- CTL held two sessions of its major SCM executive education course (in January and June), Supply Chain Management: Driving Strategic Advantage. The June session was also attended by 65 executive master's of business administration students from the Antwerp Business School in Belgium.
- CTL conducted custom executive education courses at partners' locations in the US and Europe.

- On January 24, 2018, CTL held its ninth annual networking night/poster session. More than 140 students from all SCALE Network programs (CTL, ZLC, CLI, and MISI) presented more than 80 thesis projects to more than 80 representatives from 50 companies.
- CTL also hosted the following events for CTL Supply Chain Exchange partners:
  - Research Fest of students' final presentations of theses, May 22, 2018
  - Supply Chain Resilience: Restoring Business Operations Following Hurricanes, December 7–8, 2017
  - Blockchain in Supply Chains: Looking Beyond the Hype, October 24–25, 2017

### **Personnel Changes**

In FY2018, new hires and appointments at CTL included Justin Snow as academic administrator; Joselin Sanz as personnel coordinator; Maria Inmaculada Borrella Alonso de la Torre, Karla Gamez Perez, Sina Golar, Milena Janjevic, Nima Kazemi, Mohammad Moshref-Javadi, and Cansu Tayaksi as postdoctoral associates; Joachim Arts, Huan Jin, Spyridon-Damianos Lekkakos, Binyamin Mantin, Chikage Miyoshi, Luca Urciuoli, Susana Val, and Lima Zhao as research affiliates; Michael Windle as research associate; David Correll, Tugba Efendigil, Christopher Mejia Argueta, and Alexander Rothkopf as research scientists; Luca Russo as research support associate; Leonard Morrison as SCM career development and alumni relations officer; Li Ding, Michael Glazer, and Jack Terwilliger as software engineers; and Aisha Nabiyeva as technical associate II.

Visitors to CTL included visiting military scholars Lieutenant Colonels Jeffrey Bilodeau and John David Rhodes; Colonel Krista Hoffman; international visiting scholars Professors Roar Adland, Haiying Jia, and Rosanna Fornasiero; and visiting students Henri Schmidt and Dina Aladawy.

Departures from CTL included Hillary Abraham, Jenik Benedikt, Daniel Brown, Jaya Chimnani, Adriana Gabor, Samuel Matthew Gordon, Kristen Greco, Margaret Calais Harding, Julia Kindelsberger, Desiree Knoppen, Ioannis Lagoudis, John Lyons, Gregory Steinbruner, Ozgu Turgut, Sue Wang, and Lieutenant Colonels Peter Crandall, Kimberly Tschepen, and Charles Weko.

#### **Yossi Sheffi**

**Director, Center for Transportation and Logistics**  
**Professor of Civil and Environmental Engineering**  
**Elisha Gray II Professor, Engineering Systems**