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, logistics, transportation education, and research. The center's research programs directly involve more than 80 faculty and research staff from a wide range of academic disciplines, as well as researchers in various affiliate organizations around the world. MIT is consistently ranked first among graduate business programs in logistics and supply chain management.

Accomplishments and Awards

- The MIT Supply Chain Management Masters Program was ranked as the world's number one graduate business program in supply chain and logistics by EdUniversal for the fourth consecutive year.

- Chris Caplice was promoted to senior research scientist.

- The Humanitarian Supply Chain Lab won the American Logistics Aid Network Director's Partnership Award at the Council of Supply Chain Management Professionals annual conference in October 2018, and the Decision Analysis Practice Award at the INFORMS annual meeting in November 2018.

- The second class of Supply Chain Management "blended" students arrived at, and graduated from, MIT.

- Fourty-four eligible Supply Chain MicroMasters students attended the second annual MIT SCx Supply Chain Bootcamp.

- Center for Transportation and Logistics researchers published more than 40 articles in various mainstream and industry publications.

- CTL published weekly blog posts that were re-published by other blogs and publications as well as a monthly article based on a supply chain management 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 stands at 46.

- More than 1,200 people attended CTL Supply Chain Exchange events in FY2019.

Education

MIT Supply Chain Management Residential Program

The MIT Supply Chain Management Residential (SCMr) Program, now in its 21st year, attracted a diverse group of talented and motivated students from across the globe. The SCMr program receives four to five times as many applications as there are available slots in the program. SCMr collaboration with other MIT Gobal SCALE programs (Malaysia, Latin America, Spain, Luxembourg, and China) continues to increase with cross-center teams and international travel. All SCALE students meet at MIT in January for an intense month of team projects, lectures, workshops, and presentations.

The SCMr program has established the MIT Supply Chain Excellence Award (MIT SCExA) at eight undergraduate programs at eight leading US universities and at the Monterrey Institute of Technology and Higher Education in Mexico. The award is given annually to the most outstanding graduating supply chain or industrial engineering major in each school. This year, a total of $710,000 was awarded to 20 SCExA winners and honorable mentions. Winners ($25,000) and honorable mentions ($10,000) receive a partial scholarship to attend the SCMr after they have worked for two to five years. SCM master's students complete a capstone project in conjunction with one of CTL's corporate partners as a requirement for graduation. All CTL research centers advise student capstone projects, of which there were 45 in AY2019.

Class of 2019

In spring 2018, 41 students (12 women and 29 men) were selected to join the SCMr program. Students came from 17 countries and had an average age of 31 and six years of professional experience. More than 50 companies recruited SCMr students in academic year 2019. Within a month of graduation, 92% of students had accepted a job offer or were pursuing a graduate degree. Of those employed, 91% had secured employment in the United States. Their median/average base compensation was $130,000 to $126,000, and the range was $78,000 to $165,000. Seventy percent of employed students secured their position through SCM/MIT–facilitated activities including, but not limited to, on-campus recruiting, faculty/staff/ alumni referrals, and career fairs.

MIT Supply Chain Management Blended Program

The MIT Supply Chain Management Blended (SCMb) Program, which just concluded its second year, combines an MITx online learning model and a five-month on-campus term to complete a master's degree from MIT. This blended model of education reaches a wider network of students, for example those who may not have considered traditional pathways to a master's degree, or for whom such a choice did not seem like an option.

SCMb applicants come from a diverse pool of MITx MicroMasters credential holders. 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. This 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.

Class of 2019

In spring 2018, 36 students (8 women and 28 men) were selected to join the SCMb Class of 2019. Students came from 17 countries, had an average age of 33, and had had averaged 11 years of work experience. The second blended graduating class in June 2019 achieved a noticeable improvement in employment outcomes. Fifty-six percent of students were either sponsored by a previous employer (44%), attending graduate school (6%) or postponing their job search (6%). Of the remaining students, 25% had accepted positions with new employers by mid-July and 19% were seeking employment. Graduates who secured new employment in the United States will be working in supply chain roles for Google, Wayfair, and Adidas, among others.

MicroMasters Credential in Supply Chain Management

During FY2019, CTL ran 10 SCx massive open online courses (MOOCs). After revisiting the contents of five SCx courses, adding more recitations, interviewing experts, and hosting live events to interact with the SCx online learners, CTL decided to create and develop at least 30 live events. In September 2018 and February 2019, the third and fourth Comprehensive Final Exams (CFx) were administered for those learners who qualified by passing all five courses. The exam was proctored online.
CTL also worked to create new materials and update the SCx courses.

- CTL conducted expert interviews with 12 industry leaders that were included as part of the supplemental materials for SC3x, Supply Chain Dynamics, and SC4x, Supply Chain Technology and Systems.

- CTL created two new virtual field trips to bring real-life projects to the SCx courses, in particular to SC4x.

- CTL is on track to continue thanks to an MITili Learning Effectiveness Research Grant awarded in September 2018 to design, develop, and implement interventions to reduce the number of learners dropping out of MOOCs.

As of May 2019, over 305,000 learners from 196 countries across the globe have enrolled in at least one MicroMasters course. A total of 29,993 individual verified course certificates have been issued to 12,802 learners and 1,592 MicroMasters credentials in Supply Chain Management have been granted. The MicroMasters team is currently preparing the next run of the Comprehensive Final Exam for September 2019 and is running four SCx courses this summer. A new intake of SC0x learners begins on July 10, 2019.

CTL participated in several conferences and academic events to share updates and results from the MicroMasters program, including at the Product Operations Management Society (POMS), MIT CTL Partners Meeting, MIT XTalks: Digital Discourses, and other academic and industry events.

MIT Global Supply Chain and Logistics Excellence Network

The MIT Global SCALE Network, conceived by CTL, is an international alliance of leading research and education centers dedicated to supply chain and logistics excellence through innovation. Its mission is to create the next generation of supply chain management professionals who have a system-wide and global perspective, strong analytical problem-solving skills, a grasp of the latest and emerging technologies, and practical change leadership capabilities. Each local center contributes resources to conduct joint research, administer educational programs, and work with corporate sponsors. In addition to the MIT Center for Transportation and Logistics, the network includes:

- Zaragoza Logistics Center (ZLC), Zaragoza, Spain, established 2003

- Center for Latin American Logistics Innovation (CLI), Bogotá, Colombia, established 2008

- Malaysia Institute for Supply Chain Innovation (MISI), Shah Alam, Malaysia, established 2011

- Luxembourg Centre for Logistics, Luxembourg City (LCL), Luxembourg, established 2015
- Ningbo Supply Chain Innovation Institute China (NSCIIC), Ningbo, China, established 2016

Collectively, the six SCALE centers offer 12 graduate-level and executive education programs (online, residential, and blended formats) and have more than 80 researchers and faculty, 150 corporate and over 100 academic partners, nearly 50 administrative staff, and more than 1,200 alumni working worldwide.

Education Highlights

The MIT SCALE 10-month residential SCM master's program has been ranked the number one global supply chain management master's program in the world by Paris-based EdUniversal for four consecutive years (2016–2019). Additionally, ZLC's Master of Engineering in Logistics and Supply Chain Management has been ranked number one in the field of logistics in the "250 Best Masters in Spain" rankings by the newspaper *El Mundo* for nine consecutive years.

In addition to the 10-month master's degree, three centers (CTL, ZLC, and MISI) now offer a blended or accelerated master's program option. Open exclusively to SCM MicroMasters credential holders, the blended programs provide alternative pathways for non-traditional students to earn a full master's degree with less time in residence on campus (five months at CTL and ZLC and eight months at MISI).

At NSCIIC, the 10-month SCM curriculum is incorporated into a two-year MBA offered by Ningbo University. The first cohort of seven students completed the NSCIIC program in 2019. In all, 153 students earning master's degrees through CTL, ZLC, MISI, LCL, and NSCIIC in 2019 were presented with MIT SCALE certificates of program completion in May and June.

The CLI program offers the Graduate Certificate in Logistics and Supply Chain Management (GCLOG), an elite hybrid program combining online study with two three-week residencies on the MIT campus open to students pursuing graduate degrees at CLI's 30 Latin American partner universities. A cohort of 28 students completed the GCLOG program in 2019 and were awarded completion certificates at MIT on February 1.

Research and Outreach Highlights

ZLC continues to lead the European market in research and development projects in the area of logistics and supply chain management, with 19 ongoing projects funded by the European Union, private companies, and the government of Aragón. In FY2019, research at ZLC resulted in three articles in peer-reviewed journals, two SCOPUS (a bibliographic database containing abstracts and citations) articles, and five book chapters. ZLC faculty and research staff presented their research findings in key national and international conferences.

MISI has established three research centers of excellence: (1) in sustainable value networks, (2) in retail supply chains and e-commerce, and (3) in future mobility systems. The Center for Sustainable Value Networks has received a four-year research grant from Procter and Gamble to develop and implement solutions for sustainable palm-oil farming for independent small holder farmers. The Center for Retail Supply Chains and E-Commerce held its second annual conference in 2019, attracting over 100 industry participants. In the past year, MISI faculty have published over a dozen research papers in peer-reviewed journals, including *Sloan Management Review,* and have delivered keynote addresses at several conferences throughout the Asia-Pacific region.

LCL faculty and researchers presented at a number of industry conferences in AY2019, including INFORMS, Manufacturing and Service Operations Management, Information Technology for European Advancement (ITEA) Paris, Green Shipping, ATRS, and the Conference on Computational Management Science, the Lecture Series of the Research Institute for Supply Chain Management, and various symposia including the International Symposium on Mathematical Programming and the Commodity and Energy Markets Annual Meeting.

LCL hosted its third annual eXplore conference in March 2019, which featured high-profile speakers from industry and academia giving insights into the sustainability of supply chains.

CLI currently has 13 corporate partners with whom it develops a wide range of executive and collaborative research projects in seven research areas, and it has completed over 140 collaborative projects with industry.

NSCIIC faculty researchers Bo Li and Lima Zhao were appointed to the Supply Chain Innovation and Application Expert Committee of Ningbo, joining experts from top-rated universities, leading enterprises, and research institutions. The committee will provide consulting services and conduct research on major problems facing the city and port of Ningbo.

Research

MIT Megacity Logistics Lab

The MIT Megacity Logistics Lab (MLL) focuses on understanding and transforming how supply chain organizations approach the provision of cities with goods and services in light of rapid global urbanization. As cities grow in size and density and get increasingly congested, last-mile delivery operations are becoming increasingly critical for the success of companies in reaching urban markets. Since its founding in 2012, MLL has grown into one of CTL's most active research groups, attracting significant amounts of external funding from major private- and public-sector research partners. Among the sponsors of the lab are United Parcel Service, Walmart, FEMSA Coca-Cola, Anheuser-Busch InBev, Adidas, the World Bank Group, and others.

The lab has engaged a large number of graduate and undergraduate students from all over the world and has started to offer a graduate course on urban last-mile logistics at MIT in spring 2019 that is cross-listed with MIT's Supply Chain Management program as

well as the Departments of Civil and Environmental Engineering and Urban Studies and Planning. Further, the lab collaborates with a dense network of international researchers on topics of common interest.

Computational and Visual Education Lab

The CTL Computational and Visual Education Lab is a research and education initiative started in 2017 around the use of interactive visualization to improve supply chain and logistics data visibility, advanced data analytics, and data-driven supply chain decision making. Leveraging a specifically created physical lab space at CTL that is equipped with state-of-the-art visualization technology, the lab is working on developing interactive visual interfaces for data and analytical tools addressing complex supply chain and logistics problems.

The lab 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 and also allows for an in-depth analysis of behavioral aspects of data-driven supply chain and logistics decision making.

Humanitarian Supply Chain Lab

The mission of the 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 lab has a diverse portfolio of supply chain initiatives to improve emergency response during a crisis and to strengthen markets in vulnerable communities.

The Humanitarian Lab entered the final year of its four-year project with the the United States Agency for International Development (USAID) mission in Uganda. In collaboration with George Washington University, the team developed a methodology for mapping and measuring market systems. The mission put this methodology into practice by designing activities that incorporate a market systems approach and by identifying leverage points in market systems for funding.

The Humanitarian Lab concluded work in 2018 with a New England University Transportation Center grant, having developed an inventory prepositioning model to advise emergency response organizations how much inventory to store in advance of potential disasters. This research led directly to a new 2019 engagement with the USAID Office of Foreign Disaster Assistance to evaluate the office's capabilities to respond to global environmental and human-made crises and support potential redesign decisions.

In spring 2019, the Humanitarian Lab teamed up with John Snow, Inc. and the Bill and Melinda Gates Foundation to deliver a blended course, Introduction to Supply Chain Analytics, at Addis Ababa University's School of Pharmacy in Ethiopia. The course consisted of 12 online sections with videos, practice problems, and advanced digital learning materials. In addition, we traveled to Ethiopia and delivered in-person labs applying the methods to solve real-life global health problems.

Lab engagement with the Federal Emergency Management Agency (FEMA) continued this academic year. The second and final year of the Alternatives for FEMA Disaster-Related Housing Assistance project saw the completion of a comprehensive analysis of the speed and success of FEMA's large-scale housing missions. The lab identified information gaps, data quality issues, and opportunities to improve processes for more successful housing missions, and developed the first holistic market-wide look at residential construction and rebuilding in post-disaster settings. During the 2018 hurricane season, the Humanitarian Lab joined the response effort, operating from FEMA headquarters in Washington, DC, to support supply chain decision making across public and private sectors.

In May 2019, the Humanitarian Lab finished its contributions to the National Academy of Sciences, Engineering, and Medicine consensus study on Post-Hurricane Supply Chain Adaptability. As part of that study, the lab analyzed private-sector supply chain capabilities for critical commodities such as food, fuel, water, pharmaceutical suppliers, and medical equipment. The lab also studied how data gathering, analysis communication, and prioritization can be improved.

The Humanitarian Lab again co-organized the annual Health and Humanitarian Logistics Conference, now in its tenth year, held July 10–11, 2018, in Kigali, Rwanda.

Sustainable Supply Chains

Supply chains are a powerful mechanism for connecting people and products, providing a ready venue for industry and stakeholders to collaboratively advance sustainable development goals. CTL launched Sustainable Supply Chains (SSC) in 2018 as an umbrella program that brings together our sustainability research, education, and outreach. SSC has its own staff of researchers as well as engaging researchers from CTL's other labs and initiatives. Sustainable Supply Chains is continuing the work of the former Responsible Supply Chain :ab and the Sustainable Logistics Initiative in exploring reducing CO_2 emissions.

CTL offers an on-campus course called Sustainable Supply Chains and is developing an edX MOOC on the same topic. Outreach has included webinars, speaking engagements, conference presentations, and industry roundtables. For example, SSC coordinated an executive roundtable at Intel headquarters on the future of responsible supply chains.

Numerous research projects around sustainability took place last year. CTL's research covers a broad range of topics such as seafood and palm oil traceability, customer willingness to pay for fair-trade and organic products, closed-loop plastic supply chains, and carbon emissions accounting and reduction strategies. This work has been featured on BBC, CNN, CNBC, and in *Supply Chain Management Review, Supply Chain Digest, Industry Week, Sloan Management Review,* and GreenBiz.

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.

The management of freight transportation is becoming increasingly complex. Outsourcing of manufacturing overseas, 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 carrier responses to combinatorial auctions. Underlying all of these projects is the challenge of identifying and managing the uncertainty that is inherent in freight transportation networks.

In academic year 2019, research was focused on PhD and master's theses and capstone project work. These included:

- Using machine learning to forecast short-term spot rates

- Measuring reciprocity between shippers and carriers under changing market conditions

- Measuring individual driver efficiency using ELD (electronic logging devices) data

- Root cause analysis and impact of unplanned procurement on truckload transportation costs

- Impact of special events on the freight spot market

- Alternate pricing model for transportation contracts

AgeLab

The AgeLab is a multidisciplinary research program that works with businesses, government, and NGOs to improve the quality of life of older people and those who care for them. The AgeLab enjoys sponsorship from corporations in multiple industry sectors addressing the needs of an aging society (e.g., property casualty insurance retail, auto, financial services, pharmaceutical, consumer electronics, and consumer products). Sponsors include AARP, Bank of America, Google, Panasonic, The Hartford Financial Services Group, Transamerica, the United Services Automobile Association, Humana, Stanley Black and Decker, and multiple car manufacturers.

The AgeLab conducted experiments and fieldwork that engaged over 80 research participants in multiple visits on campus and over 5,000 research participants across in-field trials of hardware, surveys, focus groups, and in-depth interviews. AgeLab researchers authored 18 peer-reviewed journal publications, participated in numerous academic conferences, and wrote for and appeared in national media outlets. The AgeLab hosted two symposia of experts in the fields of financial advice and consumer technology and collaborated with the Massachusetts Office of the Governor on an international entrepreneurial competition to address social isolation among older adults.

The 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. In collaboration with multiple departments, including the Media Lab (Livable Communities), the Departments of Urban Studies and Planning (Future of Real Estate), Brain and Cognitive Sciences (Aging Brain Initiative), Civil and Environmental Engineering (Transportation), Mechanical Engineering, and the Computer Science and Artifical Intelligence Laboratory (Ubiquitous Computing and Autonomous Systems), the AgeLab is laying 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.

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 Organisation for Economic Co-operation and Development (OECD) countries, and many of them represent a substantial share of the suppliers and customers of large firms. However, only a fraction of these firms survive and develop into a high-growth firm, mainly because they fail to identify their main challenges and opportunities.

The purpose of the GeneSys project is to contribute to the survival and growth of small businesses, specifically in developing countries, by improving their operations and supply chain management decisions. The objective is to provide a framework of managerial insights aimed at improving the productivity and survival rate of small firms.

In FY2019, we advanced our partnership with 17 universities in eight countries in Latin America, including adding a new partnership with Pontifical Catholic University of Rio de Janeiro. MIT GeneSys has partnered with Monterrey Institute of Technology and Higher Education (Mexico), Panamerican University (Mexico), Aguascalientes Institute of Technology (Mexico), University of La Sabana (Colombia), EAFIT University (Colombia), Pontifical Bolivarian University (Colombia), St. Francis University of Quito (Ecuador), University of Piura (Peru), University of the Pacific (Peru), University of Engineering and Technology (Peru), Pontifical Catholic University of Peru, Pontifical Catholic University of Rio de Janeiro (Brazil), Federal University of Santa Catarina (Brazil), Catholic University of Bolivia, Higher University of San Andrés (Bolivia), University of Montevideo (Uruguay), and National University of Córdoba (Argentina).

More than 500 undergraduate students from these universities collected data from 250 companies applying the GeneSys methodology, which includes the use of the MIT GeneSys mobile application. This year, a framework was developed that provides a set of business and supply chain management priorities to improve productivity and increase survival potential. The new version of this application includes several features that will enhance the user experience as well as the quality of the data. It will be available in August 2019.

The GeneSys project has conduct workshops for the owners of small firms, totaling more than 20 workshops for about 600 participants from five countries in Latin America. In these workshops, we share supply chain management expertise, including the importance of monitoring key performance indicators, demand and inventory planning,

and so on. CTL also trains participants in managerial quality and effective leadership. These sessions provide insights on the main challenges and opportunities these firms face. They also allow us to gain managers' trust in our project and to foster their engagement with us.

This past year we advised several students from our various academic programs in the development of their capstone projects. As part of the collaboration with universities in Latin America, we invited three students for summer research internships at the GeneSys lab for the second consecutive year.

Measuring and Investing in Resilience

This project extends 10 years of research on resilience at CTL, focusing on identifying how to justify investments in resilience and overall risk management for a business. Considering the increasing frequency of disruptions that have affected supply chains over the past 17 years or more, companies now recognize the importance of being able to actively manage supply chain response to disruptions. They also recognize the importance of making investments in resilience to protect the franchise and the business's ability to continue serving customers. But there are no precise ways to answer the host of questions that managers must address in order to make investment decisions. This project studies how firms go about making risK-management and resilience-investment decisions. The project also solicits companies to participate through sharing their practices. Subsequent phases of the study intend to develop methods for making the financial investment case for resilience.

Work on resilience to date has generated a novel approach for assessing investments in supply chain resilience by innovating in three areas: process integration, data visualization, and investment value calculation. Moving forward, the project will work with organizations to test actual data, with the intent of soliciting feedback to generate iterative improvements from an implementation perspective. This work has the potential to create an accepted, standardized approach that organizations can use to justify investments and supply chain resilience.

Blockchain in the Supply Chain

Blockchain has drawn the attention of many industry practitioners. In FY2018 and FY2019, CTL convened a group of researchers to probe the potential application of this technology in the transportation, logistics, and supply chain domains. Early work included convening two roundtable discussions of Supply Chain Exchange partners and other invited guests and researchers. The group is currently exploring the potential of blockchain technology to enable visibility and automation in the following areas:

- Traceability in the food industry

- Dispute resolution in transportation

- Supply chain finance solutions

- Procurement processes

- Supply chain sustainablity

Omnichannel Distribution Strategies

While most of the existing research in this area has focused on the sales side of the omnichannel movement, CTL's work focuses on appropriately designing the physical network of urban goods transportation that would form the backbone of any omnichannel strategy. CTL proposes a model that helps retailers design urban last-mile distribution networks that support omnichannel strategies.

CTL is conducting research to help retailers quantify customer preferences in an omnichannel environment where different pickup options are offered to online consumers. CTL analyzes different levels of integration of last-mile delivery across various distribution channels and concludes that a fully integrated omnichannel network configuration reduces the cost of network operation by some 50%.

CTL is currently working on the modelling and analyses of the economic and environmental impacts of 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 expected to continue. High-performance operations are expected to provide a competitive advantage to certain retailers, especially for the smallest ones that account for the 57% of the world's market share. These millions of individual, family-operated retailers, known as nanostores, are the main source of consumer-packaged goods in the neighborhoods of large cities across the developing world. They serve 67% of the global population who live on less than $5 per day. Therefore, the mission of the Food And Retail Operations Lab is to create effective operations and strategies for supply chain stakeholders considering their evolving patterns to meet consumer needs fairly.

Outreach

The foundation of CTL's corporate outreach is the Supply Chain Exchange: a large, active, robust corporate membership program in the supply chain management field.

Corporate Relations

During FY2019, CTL dropped four companies from the Exchange: NYSEHX, TJX, Pepsi, and Takeda. Eight companies were added as partners: Xylem, Wayfair, ORR Corporation, Signet, Luxottica, Fruit of the Loom, DP World, and Colgate.

Outreach Events

In FY2019, CTL organized several events.

- CTL hosted the tenth Annual Partners Meeting on April 24, 2019, 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 on April 23, 2019, focused on innovations that are driving revolutionary change in the supply chain world. The conference

featured experts from MIT speaking about the technologies that will likely impact supply chain management in the future.

- CTL held two sessions of its major supply chain management executive education course (January and June), "Supply Chains: Driving Strategic Advantage." The June course was also attended by 24 executive MBA students from the Antwerp Business School and 24 from the Institute of Business Studies, Moscow.

- CTL conducted custom executive education courses at partner locations in the United States and Europe.

- On January 30, 2019, CTL held its ninth annual networking night and poster session. Approximately 180 students from all SCALE Network programs (CTL, ZLC, CLI, and MISI) presented more than 100 thesis projects to over 80 representatives from 50 companies.

- On July 30, CTL hosted the second annual SCx Supply Chain Bootcamp that was attended by more than 40 students.

- CTL also hosted the following events for CTL Supply Chain Exchange partners:

  - Research Fest featuring student thesis final presentations, May 21, 2019

  - Blockchain Applications in Supply Chain Management, October 9–10, 2018

  - Future of Retail Roundtable, November 14–15, 2018

  - AI/Machine Learning in Supply Chain Planning: Current Applications, Future Possibilities, November 27–28, 2018

  - Innovations in Transportation Roundtable: Disrupting the Dominant Design of Procurement and Management, February 12–13, 2019

  - Digital Transformation Roundtable, hosted at Dell, February 26–27, 2019

  - Women in Supply Chain Summit: Achieving Balance in SCM, March 26–27, 2019

Capstone Projects and Research Partners

In the Supply Chain Management Master's Program, 12 companies participated as Supply Chain Exchange capstone/thesis partners. This year's projects are listed below.

A Metaheuristic Approach to Optimizing a Multimodal Truck and Drone Delivery System

Aggregate Production Planning for Engineer-to-Order Products

Alternate Pricing Model for Transportation Contracts

Analytics Driving Supply Chain Segmentation for Lenovo

Assessing Feasibility of the Delivery Drone

Behavioral Management Patterns: Small Firms' Recipe for Growth

Comparative Evaluation of Drone Delivery Systems in Last-Mile Delivery

Comparison and Financial Assessment of Demand Forecasting Methodologies for Seasonal consumer-packaged goods

Cost-Benefit Analysis of a Blockchain-Based Supply Chain Finance Solution

Decoupled Capacity with Powerloop

Demand Forecasting and Inventory Management for Spare Parts

Demand Forecasting for Ebola Responses

E-Commerce and the Environment: Finding the Optimal Location for In-Store Pickup

Economic Sustainability of the Mango Value Chain

Facility Location Optimization for Last-Mile Delivery

Forecasting Model for Sporadic Distributor Based Markets

Gender Impact on Small Firms in Latin America

Horizontal Collaboration in Last-Mile Delivery of Online Grocery Orders

Human-Machine Interaction Design for Freight Planning Systems

Impact of Freight Consolidation on Logistics Cost and Emissions

Improving Inventory Strategies for Consumable Materials in the Aerospace Industry

Inbound Incoterm Conversion

Incentivizing No-Rush Delivery in Omnichannel Retail

Increasing Fleet Utilization Through a Heuristic to Determine Optimal Backhaul Routes

Integrating Collection-and-Delivery Points in the Strategic Design of Last-Mile E-Commerce Distribution Networks

Inventory Planning in Engineer-to-Order Steel Industry

Investigation of Potential Added Value of DDMRP in Planning under Uncertainty at Finite Capacity

Joint Replenishment and Base Stock Model for the U.S. Beer Industry

Last-Mile Distribution Network Optimization in Emerging Markets: A Case Study in São Paulo, Brazil

Leveraging E-Commerce Sites to Absorb Retail Stores' Excess Inventories

Light Electric Freight Vehicles for Last-Mile Delivery

Managing Perishables with Stochastic Supply

Modeling Large Scale E-Commerce Distribution Networks

Omnichannel Supply Chain Transformation for Third Party Logistics Providers

Optimal Green Fleet Composition Using Machine Learning

Predicting Shipping Time with Machine Learning

Raw Material Minimum Order Quantity Optimization

Replenishment Policies for Retail Pharmacies in Emerging Markets

RFID & Analytics Driving Agility in Apparel Supply Chain

Root Cause Analysis and Impact of Unplanned Procurement on Truckload Transportation Costs

Simulation Test Bed for Drone-Supported Logistics Systems

The Impact of Product Portfolio Complexity on Fleet Size

The Impact of Special Events on the Freight Spot Market

Transportation Cost and Tariff Optimization in the Specialty Tire and Wheels Industry

U.S. Consumer Preferences for Seafood Traceability

Personnel Changes

In FY2019, new hires and appointments at CTL included Alexa Balmuth, technical associate; Bonnie Borthwick, SCM/SCALE communications and marketing officer; Justin Boutilier, postdoctoral associate; Daniel Brown, research affiliate; Yasel Jose Costa Salas, research affiliate; Emily Yvonne Fagan, administrative assistant ; Seyedeh Maryam Fakhr Hosseini, postdoctoral associate; Pnina Gershon, research scientist; Charles Green, research scientist; Marina Guimaraes Mattos, postdoctoral associate; Gultekin Kuyzu, research affiliate; Steven Landry, research specialist; Anne Lange, research affiliate; Craig Martin, financial assistant; Esteban Ezequiel Mascarino, research affiliate; Melinda Morin, research affiliate; Aishni Parab, robotics software engineer; Aleksandr Patsekin, robotics software engineer; Taylor Patskanick, technical associate ; John Rudnik, technical associate ; Bernarda Serrano Duenas, project manager for sustainable logistics; Michele Simoni, postdoctoral associate; Chris Sultemeier, lecturer; Samantha Varney, communications and marketing coordinator; Andres Munoz Villamizar, postdoctoral associate; and Lima Zhao, research affiliate.

In addition, visitors to CTL included visiting military scholars Lt. Col. Jeremy Abrams, Lt. Col. Aaron King, Lt. Col. Timothy Gallagher, and international visiting scholars Professor Lars Meyer Sanches, Nevin Mutlu, Professor Rita Maria Difrancesco, Monika Petraite, Qin Gao, Hugo Yoshida Yoshizaki, Maria Elena Revilla Gutierrez, and Maximiliano Udenio Castro. Visiting students included Dina Aladawy, Henri Schmidt, Jonas Lehmann, Paloma Santos Vela, Roel Post, Wilder Zuluaga Ospina, Martha Castillo Gomez, Agustin Hermosilla, Jorge Saldivar Renteria, Camilo Mora- Quinones, Susanne Gaube, and Sayda Benitez Villarreal.

Departures from CTL included Christine Adams, Spencer Dodd, Dana Ellis Rose, Ryn Flaherty, Michael Glazer, Aisha Nabiyeva, Ashley Nunes, Colin Parmalee, Benjamin Sawyer, Andrew Sipperley, Jack Terwilliger, and Carley Ward.

Yossi Sheffi
Director