MIT Industrial Liaison Program Faculty Knowledgebase Report

2021 MIT Digital Technology and Strategy Conference

October 13, 2021 - October 14, 2021

Day 1: October 13 (Wednesday)

8:00 AM - 9:00 AM	Registration with Light Breakfast
9:00 AM - 9:05 AM	Welcome and Introduction
9:05 AM - 9:20 AM	MIT Innovation Ecosystem Karl Koster Executive Director, MIT Corporate Relations Director, Alliance Management MIT Office of Strategic Alliances & Technology Transfer

Karl Koster
Executive Director, MIT Corporate Relations
Director, Alliance Management
MIT Office of Strategic Alliances & Technology Transfer

Karl Koster is the Executive Director of MIT Corporate Relations. MIT Corporate Relations includes the MIT Industrial Liaison Program and MIT Startup Exchange.

In that capacity, Koster and his staff work with the leadership of MIT and senior corporate executives to design and implement strategies for fostering corporate partnerships with the Institute. Koster and his team have also worked to identify and design a number of major international programs for MIT, which have been characterized by the establishment of strong, programmatic linkages among universities, industry, and governments. Most recently these efforts have been extended to engage the surrounding innovation ecosystem, including its vibrant startup and small company community, into MIT's global corporate and university networks.

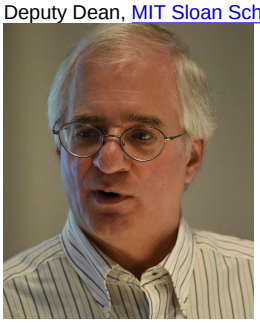
Koster is also the Director of Alliance Management in the Office of Strategic Alliances and Technology Transfer (OSATT). OSATT was launched in Fall 2019 as part of a plan to reinvent MIT's research administration infrastructure. OSATT develops agreements that facilitate MIT projects, programs and consortia with industrial, nonprofit, and international sponsors, partners and collaborators.

He is past chairman of the University-Industry Demonstration Partnership (UIDP), an organization that seeks to enhance the value of collaborative partnerships between universities and corporations.

He graduated from Brown University with a BA in geology and economics, and received an MS from MIT Sloan School of Management. Prior to returning to MIT, Koster worked as a management consultant in Europe, Latin America, and the United States on projects for private and public sector organizations.

9:20 AM - 10:00 AM

Digital Platforms: Looking at the Past and their Future
Michael Cusumano
SMR Distinguished Professor of Management
Deputy Dean, MIT Sloan School of Management



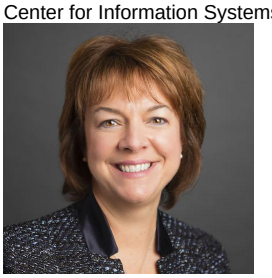
Michael Cusumano
SMR Distinguished Professor of Management
Deputy Dean
MIT Sloan School of Management

Cusumano specializes in strategy, product development, and entrepreneurship in software, automobiles, and consumer electronics. He is a graduate of Princeton (A.B.) and Harvard (Ph.D.) as well as comnpleted two Fulbright Fellowships and a Japan Foundation Fellowship for research in Japan and a two-year postdoctoral fellowship in Production and Operations Management at Harvard Business School. He has been a Special Vice President and Dean at Tokyo University of Science, where he founded the Tokyo Entrepreneurship & Innovation Center. At MIT Sloan, he has recently taught classes on Platform Strategy & Entrepreneurship as well as Strategy and the CEO. He has published 14 books and more than 120 articles. His latest books are *The Business of Platforms: Strategy in the Age of Digital Competition, Innovation, and Power* (2019, with A. Gawer and D. Yoffie) and *Strategy Rules: Five Timeless Lessons from Bill Gates, Andy Grove, and Steve Jobs* (2015, with D. Yoffie, translated into 18 languages).

This talk will review and extend key findings from a recent book, **The Business of Platforms: Strategy in the Age of Digital Competition, Innovation, and Power** (Harper Business, 2019) by Michael A. Cusumano, Annabelle Gawer, and David B. Yoffie. Digital platforms are businesses that connect two or more market actors, with supply or demand driven at least in part by network effects. They are at the core of the most valuable technology companies in the world. The talk will explain how these digital platforms differ from conventional product or service businesses, how they differ among themselves, and why some markets produce spectacular winner-take-all-or-most outcomes while others result in financial losses. We will also consider emerging platforms powered by new enabling technologies such as artificial intelligence and machine learning, gene editing, and quantum computing.

10:00 AM - 10:40 AM

How to Maximize Returns from Data Monetization
Barbara Wixom
Research Director & Principal Research Scientist,
Center for Information Systems Research



Barbara Wixom
Research Director & Principal Research Scientist,
Center for Information Systems Research

Barbara joined MIT Sloan in June 2013 to serve as a Principal Research Scientist at the MIT Sloan Center for Information Systems Research (CISR). MIT CISR was established in 1974 as a non-profit research group, and it currently is funded by 85 corporate sponsors and patrons. The center undertakes practical research on how firms generate business value from digitization. Barbara's work focuses on how organizations effectively deliver value from their information assets.

Prior to MIT CISR, Barbara was a tenured faculty member at the University of Virginia (UVA) where she taught undergraduate and graduate courses in data management, business analytics, and IT strategy. She is a two-time recipient of the UVA All-University Teaching Award (2002, 2010), which recognizes teaching excellence in professors, particularly those who inspire and motivate students. This honor is especially meaningful to Barbara because she earned her undergraduate degree at the University of Virginia.

Since the mid–90's, Barbara has deeply explored data warehousing, business intelligence, analytics, big data, and AI. Her research ranges from large-scale surveys and meta-analyses to lab experiments and in-depth case studies. Five of her cases have placed in the Society for Information Management Paper Awards competition: First American Corporation (1999), Owens and Minor (2000), Continental Airlines (2004), Sprint (2008), and BBVA (2018). Barbara is a leading academic scholar, publishing in such journals as Information Systems Research; MIT Sloan Management Review; MIS Quarterly; and MIS Quarterly Executive. She presents her work globally to academic and business audiences.

Barbara serves as associate editor of the Business Intelligence Journal, research fellow of The Data Warehousing Institute, and fellow of the Teradata University Network. In 2017, Barbara was awarded the Teradata University Network Hugh J. Watson Award for her contributions to the data and analytics academic community via the Teradata University Network. She is the author of two leading systems analysis and design textbooks, published by John Wiley & Sons, Inc. She is married and blessed with two daughters.

View full bio

Companies today are starting to walk the talk when it comes to treating data like a strategic firm asset—they are hiring chief data officers, and rolling out data literacy programs. Yet, to maximize returns from data monetization companies need their people to engage with and experience data firsthand. In this session, Dr. Wixom will share key insights from her research on data monetization to describe what data capabilities distinguish top performing firms; how they optimize data monetization initiatives; and how they motivate pervasive data use.

Learn more about **Data Monetization Strategy: Creating Value Through Data** online short course from the MIT Sloan School of Management, guided by renowned Faculty Director Dr. Barbara Wixom.

10:40 AM - 10:50 AM

MIT Professional Education
Myriam Joseph
Assistant Director, Marketing and Business Development, MIT Professional Education

10:50 AM - 11:20 AM

Networking Break

11:20 AM - 12:00 PM

Digital Materials
Markus J. Buehler

Jerry McAfee Professor of Engineering, MIT Department of Civil and Environmental Engineering and MIT Department of Mechanical Engineering

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Jerry McAfee Professor of Engineering, MIT Department of Civil and Environmental Engineering and MIT Department of Mechanical Engineering

Dr. Markus J. Buehler, Jerry McAfee Professor of Engineering at MIT, is a leading researcher in computational modeling across domains, from materials to biology to physics. Markus' expertise bridges AI to multi scale materials modeling. He recently co-developed a method that uses artificial intelligence to generate new protein designs with specific strengths, mimicking natural materials like silk. This approach, which uses computer simulations for testing, allows the creation of proteins with desired mechanical properties, such as strength and flexibility, beyond what is naturally available. Markus earned a Ph.D. at the Max Planck Institute for Metals Research at the University of Stuttgart and held post-doctoral appointments at both Caltech and MIT. Buehler has received many awards, including the Feynman Prize, the Drucker Medal, and the Washington Award. He is a member of the National Academy of Engineering.

View full bio

Digital materials are designed through an integrated approach of large-scale computational modeling, material informatics, and artificial intelligence/machine learning to optimize and leverage novel smart material manufacturing through the use of nanotechnology and additive manufacturing, and bio-inspired methods. In this talk we show how we fabricate innovative materials from the molecular scale upwards, with built-in intelligence and novel properties, while sourced from sustainable resources, and breaking the barrier between living and non-living systems. This integrated materiomic approach is revolutionizing the way we design and use materials, and has the potential to impact many industries, as we harness data-driven modeling and manufacturing across domains and applications.

12:00 PM - 12:50 PM MIT Startup Exchange Lightning Talks

MIT Startup Exchange actively promotes collaboration and partnerships between over 1,500 MIT-connected startups and over 230 corporates that are members of MIT's Industrial Liaison Program (ILP). We host a robust schedule of events and facilitate networking and introduction opportunities year round. Qualified startups are those founded and/or led by MIT faculty, staff, or alumni, or are based on MIT-licensed technology. MIT Startup Exchange and ILP are integrated programs of MIT Corporate Relations. STEX25 is a startup accelerator within MIT Startup Exchange, featuring 25 "industry-ready" startups that have proven to be exceptional with early use cases, clients, demos, or partnerships, and are poised for significant growth.

1) **Mobi Systems**: Solving seemingly intractable human problems for travel, transport and hospitality

2) **Manus Robotics:**Wearable technologies for empowering independent and functional living

3) **Cerebri AI** : Powering the personalized enterprise from real-time data to insights to actions

4) **Everactive:** Always on sensing, no batteries required

5) **Meter:** Low cost industrial computed tomography

6) **Leela AI:** Machine vision that understands what it sees

7) **Riff Analytics**: AI feedback for conversational & collaborative dynamics

8) **Fathom Data:** Simplifying access to bioprocessing data

9) **Jaxon:** Automating the process of training AI

10) **Prescient Devices**: Low-code edge-to-cloud data solutions

Peng Yu
CTO
Mobi Systems

Faye Wu
CTO and co-founder
Manus Robotics

Alain Briancon
CTO
Cerebri AI

John Greenfield
VP, Business Development and Partnerships
Everactive

Eduardo Torrealba
Co-founder and CEO
Meter

Cyrus Shaoul
Co-founder and CEO
Leela AI

Beth Porter
Cofounder & CEO
Riff Analytics

Elisabeth Maida
Co-founder and CEO
Fathom Data

Scott Cohen
CEO
Jaxon

Pablo Acosta
VP of Engineering
Prescient Devices

12:50 PM - 1:50 PM

Lunch with Startup Exhibit

1) **Mobi Systems**; 2) **Manus Robotics;** 3) **Cerebri AI**; 4) **Everactive;** 5) **Meter;** 6) **Leela AI ;** 7) **Riff Analytics;** **8**) **Fathom Data;** 9) **Jaxon;** 10) **Prescient Devices**

Exhibit Only

11) Kebotix: New chemicals development at unprecedented speed

1:50 PM - 2:30 PM

Machine Learning and Data Science in Process Automation, Beyond Robotics
Brian W Anthony

Principal Research Scientist, Department of Mechanical Engineering
Associate Director, MIT.nano
Director of Technical Operations, Center for Clinical and Translational Research

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Associate Director, MIT.nano
Director of Technical Operations, Center for Clinical and Translational Research

Dr. Brian Anthony is a leading expert in the design of intelligent, or smart, instruments and methodologies for monitoring, measuring, and controlling complex physical systems. His interdisciplinary work spans mechanical, electrical, and optical engineering, seamlessly integrated with computer science and optimization, to deliver innovative solutions across manufacturing, healthcare, and other industries.

At the core of Dr. Anthony's research is computational instrumentation—the development of advanced tools and techniques to observe and manage intricate systems, particularly in manufacturing and medical diagnostics. His contributions include pioneering measurement and imaging technologies that enhance precision and performance in both industrial and clinical settings.

With over 30 years of experience, Dr. Anthony combines deep academic insight with practical industry expertise in technology innovation, product development, and entrepreneurship. He has successfully guided market-driven solutions from concept to commercialization, especially at the intersection of information technology and advanced manufacturing. His achievements include receiving an Emmy Award from the Academy of Television Arts and Sciences for technical innovation in broadcast engineering.

In the classroom, Dr. Anthony is dedicated to teaching the modeling and analysis of large-scale systems to support decision-making in domains such as manufacturing, medicine, and entertainment. He also leads efforts in developing optimization algorithms and software tools for system design and evaluation.

Dr. Anthony's dual roles in academia and industry position him as a bridge between cutting-edge research and real-world application, driving impactful technologies that shape the future of engineering and innovation.

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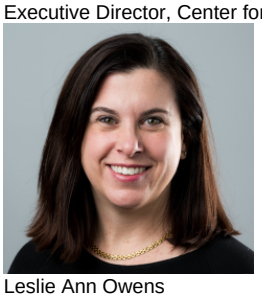
The availability of computation power has triggered a strong emphasis on control methods that utilize machine learning, especially deep reinforcement learning (DRL). We use deep reinforcement learning algorithms to learn models of, and to control, complex manufacturing processes without prior analytical or numerical models of the systems. We describe approaches for retrofitting onto existing systems and for deploying into new applications.

2:30 PM - 3:20 PM

Panel: Academic and Industry Perspectives on the Opportunities and Challenges of Leading Digital Transformation
Leslie Ann Owens
Senior Lecturer, Information Technology
Executive Director, Center for Information Systems Research (CISR)



Leslie Ann Owens
Senior Lecturer, Information Technology
Executive Director, Center for Information Systems Research (CISR)

Leslie Owens is a Senior Lecturer in the Information Technology group and is also the Executive Director of the MIT Center for Information Systems Research (CISR).

Brian W Anthony

Principal Research Scientist, Department of Mechanical Engineering
Associate Director, MIT.nano
Director of Technical Operations, Center for Clinical and Translational Research

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Nipa Basu
Global Leader, Digital Intelligence
GHD Digital

Paola Lucetti
CIO and IT Vice President, Global Grooming Sector
Procter & Gamble

3:20 PM - 3:30 PM

MIT Sloan Executive Education
Eric Bergemann
Senior Director, Executive Programs, MIT Sloan Executive Education

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Senior Director, Executive Programs
MIT Sloan Executive Education

Eric Bergemann is Senior Director of Executive Programs at the MIT Sloan School of Management, where he oversees a portfolio of non-degree executive programs. He has worked with firms in the fields of energy, pharmaceuticals/life science, mobility, high technology, banking/finance, and consumer products. Bergemann is active in business development, and is the Executive Education capability development leader in Program & Instructional Design Methodology and Improvement. In 2009, he received the MIT Sloan Appreciation Team Award.

View full bio

3:30 PM - 4:00 PM

Networking Break

4:00 PM - 4:40 PM

At-Home Touchless Monitoring of Sleep and Vitals Using AI and Radio Signals
Dina Katabi
Thuan and Nicole Pham Professor
MacArthur Fellow
Leader of NETMIT Research Group
Director of the MIT Center for Wireless Networks and Mobile Computing

Dina Katabi
Thuan and Nicole Pham Professor
MacArthur Fellow
Leader of NETMIT Research Group
Director of the MIT Center for Wireless Networks and Mobile Computing

Dina Katabi is the Thuan and Nicole Pham Professor of Electrical Engineering and Computer Science, and the director of MIT's Center for Wireless Networks and Mobile Computing (Wireless@MIT). Katabi is also a MacArthur Fellow and a Member of the National Academy of Engineering. She received her PhD and MS from MIT and her BS from Damascus University. Katabi has received the ACM Grace Murray Hopper Award, the Faculty Research Innovation Fellowship, the Sloan Fellowship, the NBX Career Development chair, and the NSF CAREER award. Katabi's doctoral dissertation won an ACM Honorable Mention award and a Sprowls award for academic excellence. Further, her work was recognized by the IEEE William R. Bennett prize, three ACM SIGCOMM Best Paper awards, an NSDI Best Paper award, the SIGCOMM Test-of-Time award, and a TR10 award for her work on the sparse Fourier transform. Several start-ups have been spun out of Katabi's lab, such as PiCharging and Emerald.

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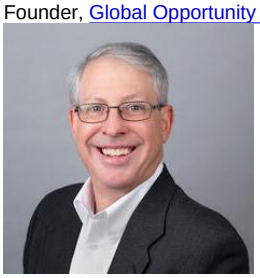
4:40 PM - 5:20 PM	Leading the Next Stage of Digital Transformation George Westerman Senior Lecturer, MIT Sloan School of Management Founder, Global Opportunity Forum, MIT Office of Open Learning



George Westerman
Senior Lecturer, MIT Sloan School of Management
Founder, Global Opportunity Forum, MIT Office of Open Learning

Dr. George Westerman is a Senior Lecturer and Principal Research Scientist at the MIT Sloan School of Management. His research and teaching help executives to understand the transformative potential of new technologies and the steps they can take to build innovation capability in their firms.

During more than 20 years with the MIT Sloan School of Management, he has been a pioneer in the study of digital transformation. His early research and award-winning book, *Leading Digital: Turning Technology Into Business Transformation,* helped to frame the executive conversation on the topic. His research on workforce transformation and on digital-ready culture provides important insights for how to move from discrete technology projects to continuous innovation capability. And his most recent research, in Harvard Business Review and Sloan Management Review, is helping executives to understand the transformative potential of AI.

George is cochair of the MIT Sloan CIO Leadership Awards and a member of the Digital Strategy Roundtable for the US Library of Congress, and executive advisor to executives in numerous large numerous around the world. At MIT, he teaches the highly regarded MIT executive courses Leadership for the AI Age and Essential IT for Non-IT Executives. Prior to earning a Doctorate in innovation strategy from Harvard Business School, he gained more than a dozen years of experience in product development and technology leadership roles.

View full bio

Companies and researchers have been talking about digital transformation for many years. While not all are good at it yet, most understand the key concepts. But in leading digital transformation, much more is needed than just speaking the language -- or even just choosing and executing digital projects. A new wave of capability and change is now emerging as critical to success for companies and individuals. Drawing on more than ten years researching and working with executives on these topics, digital transformation pioneer George Westerman will share his latest insights on how to prepare your company for success in the coming years.

5:20 PM - 6:20 PM	Networking Reception

Day 2: October 14 (Thursday)

8:30 AM - 9:00 AM	Registration with Light Breakfast
9:00 AM - 9:10 AM	Welcome and Introduction

9:10 AM - 9:50 AM

Quantum Computing
William Oliver
Professor of Electrical Engineering and Computer Science (EECS)
Professor of Physics
MIT Lincoln Laboratory Fellow
Director, MIT Center for Quantum Engineering (CQE)
Associate Director, MIT Research Laboratory of Electronics (RLE)

William Oliver
Professor of Electrical Engineering and Computer Science (EECS)
Professor of Physics
MIT Lincoln Laboratory Fellow
Director, MIT Center for Quantum Engineering (CQE)
Associate Director, MIT Research Laboratory of Electronics (RLE)

William D. Oliver is a Principal Investigator in the Engineering Quantum Systems Group (MIT campus) and the Quantum Information and Integrated Nanosystems Group (MIT Lincoln Laboratory). He provides programmatic and technical leadership targeting the development of quantum and classical high-performance computing technologies. Will's research interests include the materials growth, fabrication, design, and measurement of superconducting qubits, as well as the development of cryogenic packaging and control electronics involving cryogenic CMOS and single-flux quantum digital logic. Will is a Fellow of the American Physical Society; serves on the National Quantum Initiative Advisory Committee and the US Committee for Superconducting Electronics; is an IEEE Applied Superconductivity Conference (ASC) Board Member; and is a member of IEEE, APS, Sigma Xi, Phi Beta Kappa, and Tau Beta Pi.

Will received his PhD in Electrical Engineering from the Stanford University, the SM in Electrical Engineering and Computer Science from MIT, and a BS in Electrical Engineering and BA in Japanese from the University of Rochester (NY).

View full bio

Quantum computers have the potential to solve complex problems in fields such as finance, material science, and pharmaceuticals. The race is on to build a universal fault tolerant quantum computer.

This talk will discuss the different ways you can build quantum computer, the promise, and the challenges facing quantum computing today.

9:50 AM - 10:30 AM

Integrated Technologies for Trapped-Ion Quantum Computing

John Chiaverini
Senior Staff Member in the Quantum Information and Integrated Nanosystems Group
MIT Lincoln Laboratory

Single atomic ions, held and manipulated via electromagnetic fields, form a promising physical implementation of a quantum computer. These trapped ions embody ideal qubits, isolated from the environment such that they exhibit extremely long coherence times. To realize the promise of practical quantum computing, however, improved control technologies must be developed in order to allow low-error quantum logic operations on arrays of many ions. Chip-based trapping structures support the integration of optical and electronic devices that can lead to faster, more robust control of ion arrays. Exploring the interplay of these quantum and classical technologies and tackling the emerging engineering challenges of such systems can potentially enable novel sensing, computing, and scientific capabilities.

10:30 AM - 11:00 AM

Networking Break

11:00 AM - 11:40 AM

The Quest for Embodied Intelligence
Nicholas Roy
Bisplinghoff Professor, Aeronautics & Astronautics
Director of Quest Systems Engineering, MIT Quest for Intelligence

Nicholas Roy
Bisplinghoff Professor, Aeronautics & Astronautics
Director of Quest Systems Engineering, MIT Quest for Intelligence

Nicholas Roy is the Bisplinghoff Professor of Aeronautics & Astronautics and a member of the Computer Science and Artificial Intelligence Laboratory (CSAIL) at the Massachusetts Institute of Technology. He has a B.Sc. in Physics and Cognitive Science an M.Sc. in Computer Science, both from McGill University. He received his Ph. D. in Robotics from Carnegie Mellon University in 2003. He has made research contributions to planning under uncertainty, machine learning, human-computer interaction and aerial robotics. He founded and led Project Wing at Google [X] from 2012-2014. He is currently the Director of Quest Systems Engineering in MIT's Quest for Intelligence.

View full bio

I will give an overview of the Quest for Intelligence, an initiative on campus designed to investigate the science and engineering of intelligence, how brains produce it and how it could be replicated in artificial systems. I will describe a vision of how new scientific hypotheses about the mechanisms of natural intelligence may lead to new state of the art abilities of artificial intelligence. I will do a deeper examination of one of the Quest's recently-started missions in embodied intelligence, and show how structured representations allow autonomous robots to learn to perform complex tasks.

11:40 AM - 12:20 PM

Improving Design Reuse Decisions using formal Models
Olivier de Weck

Professor of Aeronautics and Astronautics and Engineering Systems
Editor-in-Chief of the journal Systems Engineering
Executive Director, MIT Production in the Innovation Economy (PIE) Study
Co-Director, Center for Complex Engineering Systems at KACST and MIT
Secretary and Treasurer, Council of Engineering Systems Universities (CESUN)

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Co-Director, Center for Complex Engineering Systems at KACST and MIT
Secretary and Treasurer, Council of Engineering Systems Universities (CESUN)

Prof. de Weck is an international leader in *Systems Engineering* research. He focuses on how complex man-made systems such as aircraft, spacecraft, automobiles, printers and critical infrastructures are designed, manufactured and operated and how they evolve over time. His main emphasis is on the strategic properties of these systems that have the potential to *maximize lifecycle value*. His group has developed quantitative methods and tools that explicitly consider manufacturability, flexibility, robustness, and sustainability among other characteristics. Significant results include the *Adaptive Weighted Sum* (AWS) method for resolving tradeoffs amongst competing objectives, the *Delta-Design Structure Matrix* (DDSM) for technology infusion analysis, Time-Expanded Decision Networks (TDN) and the *SpaceNet* and *HabNet* simulation environments. These methods have impacted complex systems in space exploration (NASA, JPL), oil and gas exploration (BP) as well as sophisticated electro-mechanical products (e.g. Xerox, Pratt & Whitney, GM, DARPA). He has authored two books and about 250 peer-reviewed papers to date. He is a Fellow of INCOSE and an Associate Fellow of AIAA. Since January 2013 he serves as Editor-in-Chief of the journal *Systems Engineering*. In 2006 he received the Frank E. Perkins Award for Excellence in Graduate Advising followed by the 2010 Marion MacDonald Award for Excellence in Mentoring and Advising and a 2012 AIAA Teaching Award. From 2008-2011 he served as Associate Director of the Engineering Systems Division (ESD) at MIT. From 2011 to 2013 he served as Executive Director of the MIT Production in the Innovation Economy (PIE) project.

View full bio

I will discuss general advantages and challenges of reuse in system design and focus on the new Legacy Design Reuse in MBSE (LDRM) methodology. It is a systematic approach for conducting technical and programmatic analyses for informing legacy reuse decisions in the early design phases of a mission or product development. LDRM incorporates design reuse best practices and process improvements derived from a survey of industry practitioners. The resulting procedure is implemented in a Model-based Systems Engineering (MBSE) environment in order to leverage the integrated, authoritative, and curated data landscape of this new paradigm. Several aerospace case studies will be presented where reuse did and did not make sense, and data will be shown that decision-making performance of study participants with access to LDRM outputs is improved by close to 30% over a control group.