



- 1 Program Profile
Lateral Alignment in Complex Systems
- 4 Faces of Research
IMVP and Wharton Launch Global Automotive Program
- 5 **LAI Begins Phase V**
- 6 Reading Matters
Restoring the American Dream
The Resilient Enterprise
Perspectives on Intelligent Transportation Systems
- 7 Staff Snapshot
Meet Susan C. Cass, CTPID's New Communications Manager
- 9 News at the Center
- 12 Back Matter
Ford-MIT Alliance Researcher Honored at White House



Lateral Alignment in Complex Systems

By Susan C. Cass

A new CTPID research project is focused on the challenge of “lateral alignment” within and across stakeholders in the context of aviation and the environment. Project Lead Investigator Joel Cutcher-Gershenfeld, Research Scientist Betty Barrett, and Research Assistant Christopher Lawson are focusing on aviation environmental issues, with the potential for a longer-term focus across a broad range of issues impacting the air transport system. The project is entitled, “Lateral Alignment in Complex Systems: Enabling Integration and Transformation in the U.S. Air Transport System,” and is under the auspices of the Partnership for AiR Transportation Noise and Emission Reduction (PARTNER), a Federal Aviation Administration (FAA)/National Aeronautics and Space Administration (NASA)/Transport Canada (TC)-sponsored Center of Excellence, directed by Ian Waitz in MIT’s Department of Aeronautics and Astronautics.

In addition to fieldwork and data collection on lateral alignment involving the FAA, NASA, and other stakeholders, the project also features a working group of leading scholars engaged in inductive and deductive theory development around this concept of “lateral alignment.” Co-chaired by Joel Cutcher-Gershenfeld, MIT senior research scientist, and Joel Moses, MIT institute professor, the MIT Working Group on Lateral Alignment in Complex Systems serves as a sounding board for this research. “The

focus of the Working Group on Lateral Alignment is on understanding the deep theory associated with the process of establishing and sustaining ongoing alignment among diverse public and private stakeholders — particularly where there is not already an effective supporting architecture,” explains Cutcher-Gershenfeld. (See partial membership list on page 2.)

The current definition of lateral alignment used by the researchers and the working group is, “*the formal and informal patterns of interaction, structures, and systems that serve to orient and connect interdependent stakeholders over time so as to advance both their internal, separate interests and their collective systemwide interests.*” The patterns of interaction, structures, and systems that are at the center of this research result in three distinct levels or types of alignment: behavioral, structural/functional, and architectural/strategic/cultural. The project has found that alignment efforts too often focus solely on behavioral dimensions, such as communications, information flow, and decision making, while not considering structure, systems architecture, and other dimensions. (See Figure 1 on page 3.)

Sample principles of lateral alignment include:

- Alignment involves multiple stakeholders, with common and conflicting interests, who must both identify/pursue common interests *and* surface/address conflicting interests

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- Structures and systems can serve to enable or undercut alignment
- In order to achieve alignment across stakeholders, each needs some degree of internal alignment
- Alignment depends on the effective balancing of cross-functional integration and a within-function depth of expertise
- Alignment is not a one-time event, but rather a series of agreements or understandings that enables the orientation and connections among stakeholders
- Alignment can only be understood in context — taking into account the history, relationships, organizational structure, system architecture, external forces, and other factors
- Once achieved, alignment may or may not be sustainable

Why the focus on *lateral* alignment? During one of the working group's biweekly meetings, Joel Moses explains, "This is a key constraint in many complex, engineered systems. We know more about the alignment that takes place top-down or bottom-up in a single organization. However, we know much less about the alignment across stakeholders and across levels in a system."

Action Research Project

The Lateral Alignment project includes an "action research" component in which the researchers provide technical assistance to the stakeholders in their alignment efforts.¹ This provides tangible value to the parties and enables insights into the dynamics of alignment that might not otherwise be visible. Of course, it requires the careful management of roles and activities.

The action research component reaches back to November 4, 2004, when a group

of more than 60 stakeholders from 38 public- and private-sector organizations reached a national consensus vision on aviation and the environment. This shared vision centered on addressing, in a balanced way, the environmental implications of a projected threefold increase in demand on the U.S. air transportation system. Included in the vision was the unprecedented goal of reducing, in absolute terms, the health and welfare impacts of noise and local air-quality emissions, as well as more fully understanding and addressing the implications for global climate change. This vision was the product of an intensive nine-month process of research and consensus building led by Ian Waitz and involving process facilitation by Joel Cutcher-Gershenfeld and others.²

For Carl Bureson, director of the Office of Environment and Energy; Lourdes Maurice, chief scientist for Environment and Energy; and other stakeholders, implementing the vision would require resources, scientific advances, and the ability to work together in ways that had never before been achieved. The report, which will be forwarded to Congress in the near future, specifically called for a substantially greater capability to communicate and coordinate across stakeholders. Yet, experience working together on aviation and the environment varied among the federal agencies (i.e., the Department of Defense, the Environmental Protection Agency, the FAA, NASA, and others), as well as among key industry associations, such as the Air Transportation Association (ATA), the Aerospace Industries Association (AIA), and numerous local, regional, national, and international nongovernmental organizations. As a result, the

Research Group on Lateral Alignment

Joel Cutcher-Gershenfeld
Betty Barrett
Christopher Lawson
Susan C. Cass

Working Group on Lateral Alignment

Joel Cutcher-Gershenfeld, Co-Chair;
Joel Moses, Co-Chair; Betty Barrett (CTPID);
Thomas Allen (Sloan/ESD); Jason Bartolomei (ESD);
Yishai Boasson (ESD); John Carroll (Sloan/ESD);
John Hansman (Aero-Astro/ESD);
Thomas A. Kochan (Sloan/ESD);
Christopher Lawson (ESD); Donald Lessard (Sloan);
Nancy Leveson (Aero-Astro/ESD);
Chris Magee (Mechanical/ESD);
Karen Marais (Aero-Astro); Robert McKersie (Sloan);
Aleksandra L. Mozdzanowska (ESD);
George Roth (CTPID); Ian Waitz (Aero-Astro);
Annalisa Weigel (Aero-Astro/ESD); as well as others.

¹ The concept of "action research" was pioneered in the literature by Kurt Lewin in the 1940s and further advanced by Chris Argyris, Don Schön, Anselm Strauss, Edgar Schein, and others.

² Ian Waitz, Jessica Townsend, Joel Cutcher-Gershenfeld, Edward Greitzer, and Jack Kerrebrock, *Report to Congress, Aviation and the Environment: A National Vision Statement, Goals, and Recommended Actions*, FAA/NASA (2004).

FAA and NASA reached out to MIT to serve in a combined research and technical assistance role.

At the time, the recently established Joint Planning and Development Office (JPDO) held promise as a vehicle to build alignment among these many stakeholders, although fears also surfaced around how it could end up undercutting progress. A series of Integrated Product Teams (IPTs) was established in the JPDO, bringing together representatives from the FAA, EPA, DoD, Department of Commerce, Council on Environmental Quality, Department of the Interior, Office of the Secretary of Transportation, and NASA; industry stakeholders (i.e., manufacturers, airlines, and airports); local, regional, and state governments; local community/airport organizations; and others.

Part of the action research includes learning from the development of shared visions and charters for the IPT and its associated committees and panels. The researchers are also tracking patterns of interaction over time within these groups as both a feedback mechanism for the IPT and as data for research.

The research team is producing targeted case studies of current and past alignment efforts designed with three uses in mind. First, they serve as research cases – documenting aspects of internal alignment within one part of the FAA that are relevant to the emerging theory framework for lateral alignment. Second, they are part of the technical assistance being provided to the FAA – as vehicles for feedback and learning. Third, they can be used as teaching cases for students of stakeholder alignment in complex, socio-technical systems.

The first case study, “Building the Internal Organization to Support Lateral Alignment: A Case Study of the Office of Environment and Energy, Federal Aviation Administration” by Cutcher-Gershenfeld, Barrett, and Lawson, is now complete. It serves as a baseline, documenting the current state for internal realignment considerations in the FAA Office of Environment and Energy. It will enable the project to track emerging efforts relative to this initial portrait.

In preparing this case study, the team conducted over a dozen individual interviews with leadership and staff in the Office of Environment and Energy (AEE)³, as well as many additional interviews with external stakeholders. Concurrently, the researchers facilitated selected Environment IPT meetings, while observing the interactions and proceedings at the meetings.

A second case study is under way on alignment associated with a Continuous Descent Approach (CDA) pilot project in Louisville, Kentucky. CDA, the method of landing aircraft in a rapid horizontal drop pattern rather than a slow descent, is being studied for its effect on noise, pollution, the efficient use of runways, as well as other considerations.

Working Toward the Vision of Lateral Alignment

For the AEE, this is a strategic crossroads. In seeking alignment within other parts of the FAA, with other federal agencies, and across other stakeholders, new ways of addressing aviation and the environment are being forged. There are not only inevitable tensions in the process, but also early signs of what is possible, as well as cautious engagement of a growing array of stakeholders in

working toward the vision. Because the challenges are complex and multi-dimensional, there will not be a single-point solution. In systematically working through these challenges, however, AEE will be learning valuable lessons for other stakeholders associated with aviation and the environment, all of whom will also have to build internal alignment in various ways. Further, there will be lessons around the internal alignment needed for other aspects of the U.S. aviation system and for stakeholders in a broad range of complex, engineered systems. CTPID’s director, Fred Moavenzadeh, notes, “This project is very much in keeping with the mission of CTPID. The action research component intersects technology and policy, involves both the public and private sectors, and is multidisciplinary. It has tremendous potential and will contribute to our thinking of stakeholder alignment in complex systems.” ✚

Figure 1 : Lateral Alignment in Complex Systems: A Preliminary Framework



³ At the FAA, all acronyms for offices begin with “A” for Aviation.

2006 LAI PLENARY CONFERENCE

The annual LAI Plenary Conference will be held from April 18 to 20, 2006, at the Hyatt Regency Hill Country Resort and Spa just outside of San Antonio, Texas.

LAI's research, transformation projects, networking, and feedback have shown that true and lasting lean enterprise transformation requires leadership from all levels of the organization, what is known as "distributed leadership." Executive leadership is key, but equally as important, if not more so, is the leadership of those throughout the organization: the SMEs, black belts, network entrepreneurs, and everyone who dares to dream, innovate, inspire, and persuade. Therefore, the theme for this year's LAI plenary is: *Leading the Lean Enterprise: The Dynamics of Distributed Leadership*.

For more information, please contact william_mc_daniel@sbcglobal.net or visit <http://lean.mit.edu>.

IMVP and Wharton Launch Global Automotive Program

In April 2005, IMVP and Wharton Executive Education launched the Wharton-IMVP Global Automotive Program (GAP), a one-week executive education program emphasizing strategy, competitive dynamics, and leadership development topics for current and future leaders of global automakers and suppliers.

The inaugural GAP was tailored for a group of executives from Mercedes-Benz USA (MB USA) after they expressed strong interest in the program concept. GAP offered a unique mix of Wharton faculty leading sessions on management and leadership topics combined with IMVP faculty drawing on their research to provide sessions focused on the automotive industry. The program provided an opportunity for the MB USA executives to step out of the operational demands of their positions and consider the long-term strategic issues facing their company and the global industry as a whole.

In developing the content for the program, GAP Academic Director John Paul MacDuffie drew upon his experience with the Toyota Executive Development Program. In addition to his roles as associate professor of management at Wharton and co-director of IMVP, MacDuffie has been academic director of the Toyota program since he first developed and launched

it in 1999. Each year, the program brings together Toyota mid-to-upper-level managers, who have been nominated by senior executives and are based worldwide, for one week in both Philadelphia, PA, and Mikkabi, Japan.

Other IMVP faculty in the April 2005 GAP included Michael Cusumano, MIT Sloan and IMVP co-director; Charlie Fine, MIT Sloan and former IMVP director; and Frits Pil, associate professor and research scientist, University of Pittsburgh. Cusumano explored how companies in the software industry have positioned themselves as providers of products rather than as providers of services, and then contrasted this dynamic with the automotive industry. Fine discussed business and supply chain strategy, contrasting fast-clockspeed industries (e.g., information technology) with slower-clockspeed industries (e.g., automobiles). Pil drew upon research from the book, *The Second Century* to suggest that automotive companies need to reconnect the industry value chain with end customers.

The next offering of GAP is scheduled from February 13 to 17, 2006. For more information, please visit www.whartonglobalauto.com. ✚



Executives from Mercedes-Benz USA participate in the Wharton-IMVP Global Automotive Program in Philadelphia, PA April 18–22, 2005.

LAI Begins Phase V

LAI began Phase V on September 1, 2005, with a planned \$24.4 million, five-year extension underscoring the maturation of the lean transformation process within enterprises, as well as its requisite need for appropriate tools and leadership. Phase V is based on understanding the needed stakeholder value and on supporting the overarching strategy of accelerating the transformation of the greater U.S. aerospace enterprise. The goals are:

- Provide value to all consortium stakeholders
- Sustain the LAI consortium as a learning community among industry,

government, the workforce, and academia to address enterprise excellence and to take collective action for continuous improvement

- Facilitate enterprise transformations within and between industry and government
- Expand and diffuse enterprise transformation knowledge

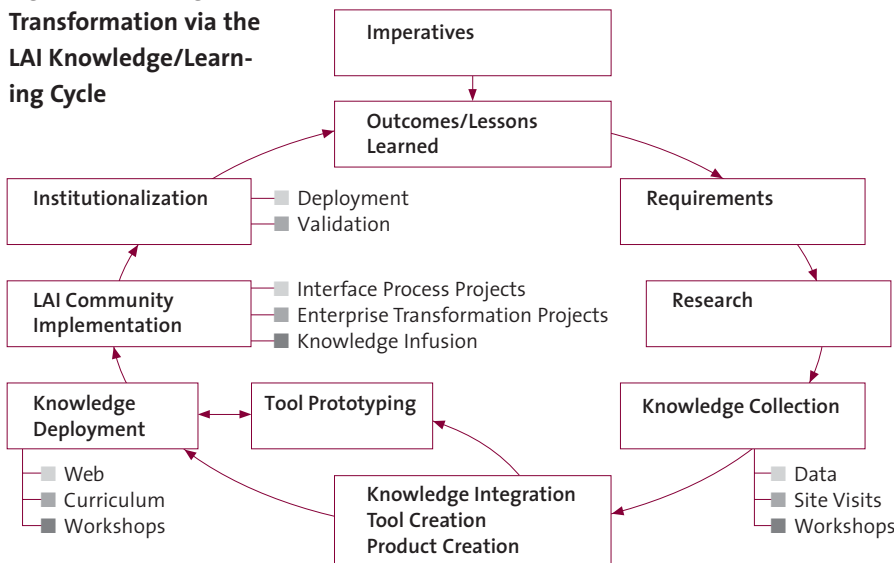
To accomplish these imperatives, LAI participates in a number of activities. These can be characterized as: (1) engaging in product/tool/process development; (2) fostering transformation; (3) expanding knowledge; (4) promoting education and learning; (5) sharing knowledge; (6) facilitating communications; (7) overseeing governance; and (8) supporting collaborative activities.

In all these activities, it is important for the consortium members to receive value from their activities and for this value to be evenly distributed among the different stakeholder groups within the

consortium. This desire guides how the consortium is organized and how it uses the processes. (See Figure 2 below.)

During its previous phase, the Enterprise Value Phase, LAI engaged in transforming aerospace entities into total lean enterprises and in delivering more value to all stakeholders than is possible through conventional approaches. Government and industry stakeholders united with LAI researchers to map the enterprise value streams of Textron’s Sensor Fused Weapons Programs and of several United States Air Force Air Logistics Centers; and stakeholders implemented many LAI products, such as the *Lean Enterprise Value Simulation and Product Development Value Stream Manual*. Look to future issues of Impact for news on LAI’s Phase V. ✚

Figure 2: Effecting Transformation via the LAI Knowledge/Learning Cycle



RECENT CASE STUDIES FROM LAI

Cohen, Jessica, “Warner Robins and the Buy Purchase Request Process.” Case Study, May 2005.

Hemann, Justin, “The Paveway” Program Transformation.” Case Study, March 2005.

Roth, George, “Lean Enterprise Change at Warner Robins.” A collection of Case Studies, May 2005.

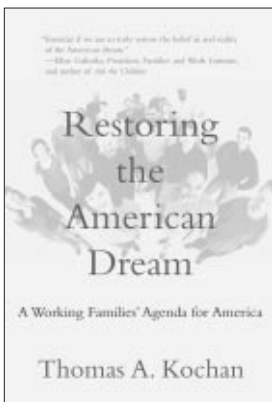
Roth, George, “The Raytheon Paveway.” Case Study, March 2005.

Reading Matters

New books and publications by the faculty and research staff

Restoring the American Dream: A Working Families' Agenda for America

By Thomas A. Kochan, MIT Sloan School and LARA Co-Director
MIT Press, September 2005



Discussion of the American Dream is back in fashion, judging from recent articles in the *New York Times*, *The Wall Street Journal*, *The Economist*, and *BusinessWeek*. But to date, these accounts focus more on describing the problems facing working families than on the solutions, says Thomas Kochan, professor of management and LARA co-director. He believes that we can take action to restore the American Dream, but it will take creative thinking and an innovative coalition of community, labor, business, and government leaders. Most of all, notes Kochan, it will require workers and families to insist that they be given the necessary tools for contributing to and prospering in today's knowledge-based economy and for meeting their family and community responsibilities.

In *Restoring the American Dream*, Kochan outlines a plan of action. He uses his experiences of growing up in an era during which the common belief was: If you worked hard in school, you had a very good chance of achieving the American Dream — attaining a higher standard of living for your family than you experienced growing up. Kochan also draws on the lessons learned from working with many of America's best labor, business, and government leaders to improve our nation's economic performance and the quality of work and family life.

The Resilient Enterprise: Overcoming Vulnerability for Competitive Advantage

By Yossi Sheffi, Civil and Environmental Engineering, Engineering Systems and Director, Center for Transportation and Logistics
MIT Press, September 2005



Yossi Sheffi's new book has earned a top-ten spot on a business bestsellers'

list and is garnering praise from leaders in business, government and academia alike.

In the book, Sheffi, professor of engineering systems, argues that a company's survival and prosperity depend more on what it does before an unpredictable disruption occurs than on the actions it takes as the event unfolds. He explores high-impact/low-probability disruptions such as natural disasters, terror attacks, supplier failures, and labor strikes — focusing not only on security but also on corporate resilience — the ability to bounce back from such disruptions — and how resilience investments can be turned into competitive advantage.

Perspectives on Intelligent Transportation Systems

By Joseph M. Sussman, Civil and Environmental Engineering, CTPID, and ESD
Springer, April 2005



Staff Snapshot



MEET SUSAN C. CASS, CTPID'S NEW COMMUNICATIONS MANAGER

On August 1, 2005, Susan Cass joined CTPID as communications manager. She is responsible for overseeing this newsletter, other publications, and CTPID's website, as well as for planning special programs, seminars, and outreach activities. She is hungry for your news and plans to add a recent news item or an upcoming event every two to three weeks to the CTPID homepage *Spotlight* section [<http://web.mit.edu/ctpid/www/>]. Please check the site often for updates and email your news and ideas to scass@mit.edu or call her directly at 617-253-8973.

Cass is not a newcomer to CTPID or MIT. Since 1999, she has served as the program manager for CTPID's Labor Aerospace Research Agenda; and since 1990, she has worked at MIT's Sloan School of Management, most recently as program manager for the MIT Workplace Center.

While preparing for her new role, Cass read past newsletters and discovered that this is CTPID's 20th anniversary! For more information on how we will be celebrating this milestone, visit our website and future issues of this newsletter. ✚

In his new book, Joseph Sussman, JR East Professor, Department of Civil and Environmental Engineering, is clearly optimistic about the potential that intelligent transportation systems (ITS) have for improving urban and regional traffic.

He explains, "ITS combines high technology and improvements in information systems, communications, sensors, and advanced mathematical methods with the conventional world of surface transportation infrastructure." In commuters' terms, this means electronic toll collection systems (like Fast Lane and E-Z Pass), high-occupancy vehicle (HOV) lanes, and higher-speed traffic lanes that charge higher fees. Sussman notes that information technology can add efficiency to a regional traffic pattern by the means cited above and by providing traffic-congestion information to drivers while they are commuting.

But for such systems to be effective, "We need to go beyond the technology and understand ITS within political, social, institutional, organizational, and economic dimensions as well," he writes. Sussman predicts "transitions" in transportation planning, from urban to regional scale and from economic development to sustainable development, among many others.

NEW PUBLICATIONS

Communications Futures Program (CFP)

Lehr, William H., Marvin A. Sirbu, and Sharon E. Gillett, "Wireless is Changing the Policy Calculus for Municipal Broadband," forthcoming in *Government Information Quarterly*, 2005.

Neto, Isabel, Michael L. Best, and Sharon E. Gillett, "License-Exempt Wireless Policy: Results of an African Survey," *Information Technologies and International Development*, Vol. 2, No. 3, Spring 2005, pp. 73-90.

Sirbu, Marvin A., William H. Lehr, and Sharon E. Gillett, "Evolving Wireless Access Technologies for Municipal Broadband," forthcoming in *Government Information Quarterly*, 2005.

International Motor Vehicle Program

Shimokawa, Koichi, *The Business History of the Global Automotive Industry*, Cambridge University Press, forthcoming 2005.

Kim, Ki-Chan, "Measurement and Tracking the Evolution Vectors of Japan and Korea on Double Helix with Three Business Architectures," *The Korean Small Business Review*, Vol. 25, No. 3, September 2005.

MIT Information Quality Program (MITIQ)

Chung, Woo Young, Craig Fisher, and Richard Y. Wang, "Redefining the Scope and Focus of Information-Quality Work:

A General Systems Theory Perspective,” pp. 230–248, in *Information Quality*, pp. 37–51, 2005, M.E. Sharpe, Advances in Management Information Systems, Vladimir Zwass Series Editor.

Fisher, Craig, Eitel Lauria, Shobha Chengalur-Smith, and Richard Y. Wang, “Introduction to Information,” *MIT Information Quality Program Publication*, forthcoming 2005.

Madnick, Stuart, Richard Y. Wang et al., “Exemplifying Business Opportunities for Improving Data Quality from Corporate Household Research,” pp. 181–196, in *Information Quality*, pp. 37–51, 2005, M.E. Sharpe, Advances in Management Information Systems, Vladimir Zwass Series Editor.

Pioino, Leo, Richard Y. Wang, David Kopcsó, and William Rybolt, “Developing Measurement Scales for Data-Quality Dimensions,” in *Information Quality*, pp. 37–51, 2005, M.E. Sharpe, Advances in Management Information Systems, Vladimir Zwass Series Editor.

Wang, Richard Y., Elizabeth Pierce, Stuart Madnick, and Craig Fisher, *Information Quality*, 2005, M.E. Sharpe,

Advances in Management Information Systems, Vladimir Zwass Series Editor.

Technology and Law Program

Ashford, Nicholas A., “Government and Environmental Innovation in Europe and North America” in *Towards Environmental Innovation Systems*, Matthias Weber and Jens Hemmelskamp (eds.), Springer, Heidelberg, 2005.

Ashford, Nicholas A., “Implementing the Precautionary Principle: Incorporating Science, Technology, Fairness, and Accountability in Environmental, Health, and Safety Decisions.” *International Journal of Risk Assessment and Management*, Vol. 5, Nos. 2/3/4, 2005.

Ashford, Nicholas A., “Pathways to Sustainability: Evolution or Revolution?” in *Innovation and Regional Development and Conditions for Innovation in the Network Society*, Marina van Geenhuizen, David V. Gibson, and Manuel V. Heitor (eds.), Purdue University Press, 2005.

Ashford, Nicholas A., “Scientific, Ethical, and Legal Challenges in Work-Related Genetic Testing in the United States,” *European Journal of Oncology Library*, 2005.

Ashford, Nicholas A. and Charles C. Caldart, “Government Regulation of Occupational and Environmental Health and Safety” in *Occupational and Environmental Health: Recognizing and Preventing Disease and Injury*, 5th ed. Barry S. Levy and David H. Wegman (eds.), Lippincott Williams & Wilkins, Philadelphia, 2005, in press.

Ashford, Nicholas A. and Charles C. Caldart, “Negotiated Regulation, Implementation, and Compliance in the United States.” *The Handbook of Environmental Voluntary Agreements*, Eduardo Croci (ed.), Kluwer Academic Publisher — Environmental and Policy Series, 2005. †

News at the Center



IMVP researchers listen to a colleagues' presentation at the IMVP Annual Researchers Meeting.

ESD Strategic Plan

The strategic plan for ESD was designed by the ESD faculty and senior staff. Currently, ESD Director Daniel Hastings is holding meetings with faculty, students, and staff to discuss the implementation of the plan, which will take place during 2005–06. The strategic plan focuses on Engineering Systems fundamentals, applications, and education, and is available via the ESD homepage at <http://esd.mit.edu/>. Click on the link in the right-hand navigation bar under “ESD Spotlight.”

New Center for Engineering Systems Fundamentals

Effective September 2005, Richard Larson is the director of the new Center for Engineering Systems Fundamentals (CESF) within ESD. The center will be responsible for the following:

- Creating a climate for discussing Engineering Systems fundamentals
- Developing and deepening relations with the Operations Research Center
- Working with faculty to acquire the necessary resources for CESF
- Sponsoring a book series
- Instituting a biannual international symposium on Engineering Systems fundamentals

The need for such a center was identified in the ESD Strategic Plan and was endorsed by the ESD faculty. In considering how the new center will relate to CTPID, the overall goal is to maximize the possibilities for intellectual exchange and growth among all the diverse activities associated with ESD.

On September 20, 2005, Larson delivered a presentation entitled, “The Center for Engineering Systems Fundamentals: The Beginnings.” To view it, please visit http://esd.mit.edu/HeadLine/cesf_the_beginnings/cesf092005.ppt.

IMVP Annual Researchers Meeting

The Wharton School at the University of Pennsylvania hosted the International Motor Vehicle Program (IMVP) Annual Researchers Meeting from June 1 to 3, 2005, in Philadelphia. More than 30 professors and graduate students shared their research findings on an array of topics related to the global automotive industry. The participants were based at universities in China, France, Germany, Japan, South Korea, the United Kingdom, and the United States.

IMVP Researcher Wins Best Paper Prize

Ki-Chan Kim, associate dean of student affairs at Catholic University of Korea and IMVP researcher, was awarded the best paper prize at the 2005 conference of the Korean Academic Society of Business Administration. Kim’s paper, “Measurement and Tracking the Evolution Vectors of Japan and Korea on Double Helix with Three Business Architectures,” was selected as the best among the 300 papers presented.

LARA Forms New Institutional Initiative

The Labor Aerospace Research Agenda (LARA) team has helped to lead a new institutional initiative, the Aerospace Industry Council, a forum for industry-level dialogue on labor and employment issues under the auspices of the Labor and Employment Relations Association (LERA). The council leadership includes Joel Cutcher-Gershenfeld, Academic Co-Chair (LARA); Susan Cass, Administration Co-Chair (LARA); Stephen Sleigh, IAM Labor Co-Chair; and Jerry Calhoun, Boeing Commercial Airplanes, Management Co-Chair. For more information, please visit: http://www.lera.uiuc.edu/industry_councils/aerospace/index.html.



IMVP Researcher Francisco Veloso, Carnegie Mellon University, discusses his work on automotive emissions control technology at the IMVP Annual Researchers Meeting.

LAI Welcomes New Staff Members

Terence “Terry” Bryan, former Lean Aerospace Initiative (LAI) stakeholder co-director (2002–04) and recent Raytheon retiree, has accepted a position as LAI’s first official transformation director.

As a member of the LAI leadership team and Steering Council, Bryan will help make strategic decisions regarding what transformation projects should be initiated for the benefit of all stakeholders, and will ensure that these projects are undertaken in an efficient and expeditious manner.

Jacqueline P. Candido, an MIT research affiliate, has been named Program Director of the educational programs for the Lean Aerospace Initiative, including EdNet and the LAI Lean Academy™.

Candido spent more than 16 years with Hewlett-Packard in various positions, including as systems engineer, technical consultant, learning technology specialist, and education program manager. She has managed complex global programs, such as instructional design and delivery, in Asia, Europe, and the United States. Plus, she has created educational curricula for industry, government, and academic settings

using a variety of technology, including online distance education.

Ricardo Valerdi is a new member of the LAI research staff. He will work in cost modeling on the refinement of COSYSMO, a model for estimating systems engineering effort, which has been calibrated with data provided by several major corporations.

In addition to his work at LAI, Valerdi is a visiting associate at the Center for Software Engineering at the University of Southern California.

LAI Researcher Receives INCOSE Founders Award

Donna Rhodes, principal research associate, received the prestigious INCOSE (International Council on Systems Engineering) Founders Award for her 15 years of distinguished contributions to the council, including serving as its technical board chair, fellow, director of strategic planning, and president.

More than 1,000 people attended the 2005 INCOSE Symposium, which was held from July 10 to 14, 2005, in Rochester, New York. INCOSE, the leading international professional society for systems engineering, has more

than 6,800 individual members and 53 corporate members worldwide.

Heidi Davidz Awarded Best Doctoral Student Presentation at CSER 2005

MIT doctoral student Heidi Davidz was one of 14 doctoral students presenting their research at the Conference on Systems Engineering Research (CSER) in March. Judged by her peer researchers, Davidz received the best doctoral student presentation award, which was sponsored by the Center for Systems Management. LAI sponsored the research for her paper, “Enablers and Barriers to Systems Thinking Development: Results of a Qualitative and Quantitative Study.” Her committee chair was Deborah Nightingale.

LAI Holds Record Number of Lean Academies

The LAI Lean Academy™ is a one-week course that provides a hands-on introduction to lean fundamentals for undergraduate students, and is taught at the point of use during an internship, co-op, or new-hire assignment. The course also serves as a platform for advancing the capability of university faculty to teach lean, develop lean curricula, stimulate the diffusion of lean principles throughout on-campus

coursework, and build partnerships between industry and academia.

This year's Academies offered a revised curriculum, including substantial improvements in lean engineering, quality and Six Sigma, and supply chain content, as well as an enhanced manufacturing simulation, including a student-run supply chain. Approximately 153 students received certificates for these weeklong courses. Several more Academies are planned for the fall and/or winter.

LAI and AMT Establish Lean Flight Initiative

Aircraft Management Technologies (AMT), a global leader in aircraft information management solutions, and LAI are collaborating to engage industry, airlines, and academic partners to establish the Lean Flight Initiative (LFI).

The purpose of LFI will be to develop and promote lean principles, practices, and tools among aircraft operators and companies involved in facilitating airline operations. Developing lean-based best practices for airline operations is a logical extension to the existing Lean Aerospace Initiative, allowing companies to utilize and

extend best practices in use for aerospace manufacturing in order to benefit a broader audience. By pooling knowledge for the benefit of all members, new technologies can be implemented faster, thereby allowing aircraft operators and airline operations companies to more rapidly realize the benefits of improved operational performance, efficiency, and cost savings.

As a means of increasing efficiency and profitability in the fiercely competitive air transportation sector, LFI aims to extend the use of lean best practices to aircraft operators and companies that support airline operations. These will include providers of technology solutions, line maintenance and dispatch operations, documentation and content management, as well as other frontline processes. LFI plans to create an exceptional independent forum of airline, industry, and academic partners.

MITIQ Program Director Awarded Certificate of Appreciation

In May 2005, the directors of Central Intelligence and of National Intelligence awarded Richard Y. Wang, director of the MIT Information Quality Program, a Certificate of Appreciation for his work related to enterprise architecture

deployment in federal agencies. Wang helped establish a methodology for conducting in-depth case studies based on a conceptual model that links business objectives to enterprise architecture and government, and then to business outcomes. He and his team investigate to what extent positive business outcomes can be attributed to successful enterprise architecture and governance.

New Master's Degree in Information Quality

Richard Wang, MITIQ's director, has accepted a joint appointment as university professor in the Department of Information Science, College of Information Science and Systems Engineering, University of Arkansas at Little Rock (UALR). His role will be to help create and implement a new master's degree in Information Quality, the first of its kind in the nation. Wang plans to bring his MIT expertise and experience to UALR to make the IQ Program world-class and to develop an IQ research institute at UALR. ✚

Ford-MIT Alliance Researcher Honored at White House



On June 13, 2005, Assistant Professor Martin L. Culpepper, in the center of the top row, posed in front of the White House with President Bush and fellow winners of the 2004 Presidential Early Career Awards for Scientists and Engineers.

Photo > Paul Morse, White House

Assistant Professor Martin L. Culpepper received a 2004 Presidential Early Career Award for Scientists and Engineers (PECASE), which was presented by President George W. Bush at the White House on June 13, 2005. The PECASE is the nation's highest honor for young professionals starting their research careers. Each year, eight federal departments and agencies nominate the young scientists and engineers who are expected to broadly advance science and technology that will be of the greatest benefit to those agencies. Culpepper, of the department of Mechanical Engineering, was nominated by the National Science Foundation (NSF). According to the NSF, he is "involved in research to advance the understanding of nanoscale positioning and manipulation, a critical

element toward creating production scale manufacturing and inspection processes and products."

"He gains valuable insights through close collaborations with automakers and photonics manufacturers. His creative education efforts include developing a hands-on undergraduate course in machine dissection and design, precision manipulation, and microelectromechanical system design and fabrication."

Culpepper is also cited for serving as "a mentor to minority students through many activities and organizations."

PECASE awardees receive funding for up to five years to further research in support of critical government missions. ✚

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