Goals for the Summit

• Convene researchers, member representatives, and others interested in enterprise transformation
• Describe current projects, innovative ideas, and new approaches
• Illustrate the diversity of LAI research
• Convey how research creates knowledge that leads to deployment and transformation
• Show how engagement in research adds value to participants and LAI
• Gather feedback, suggestions, and ideas
• Stimulate support for and engagement in research
Introduction to Research at LAI

1. LAI’s special enterprise focus
2. Role of research at LAI
3. LAI research agenda
4. Research accomplishments and plans
5. Modes of research – engaging with LAI
1. The Challenges of Complex Enterprises Requires a Systems Approach

- New **strategic systems** perspective
- Enterprises as **holistic** and **highly networked** systems
- Integrating **leadership** processes, **lifecycle** processes and enabling **infrastructure** systems
- Beyond shopfloor and waste reduction to **value creation**
- Balancing needs of multiple **stakeholders** working across boundaries

MOVING FROM THE PAST
(hierarchical) enterprise

TOWARD THE FUTURE
(networked) enterprise
LAI - Expanding Enterprise Focus

Increasing Total Enterprise Effectiveness

EVOLUTION OF LEAN ENTERPRISE THINKING

1993

Successes through interaction between functions
- Manufacturing
- Supplier Networks

“Islands” of Success

Success through enterprise integration & application to Product Dev
- Lean applied to enabling processes
- HR
- IT, etc.

Transition from waste minimization to value creation

Success through total enterprise integration of all stakeholders
- Industry
- Government
- Suppliers
- Employees

Success through networked enterprises

Expanding the lean boundaries
- Suppliers
- Customers
- Partners

NOW

http://lean.mit.edu

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Creating a Holistic Approach to Enterprise Transformation

Implementation Issue

How do I motivate and sustain enterprise transformation?

How do I transform my enterprise to lean?

What analytical tools can I use to support my decision making?

Enterprise Tools

7 Principles of Lean Enterprise Thinking

Enterprise Transformation Transformation Roadmap

Enterprise Architecting Framework

Enterprise Strategic Analysis and Transformation (ESAT)
7 Principles of Lean Enterprise Thinking

1. Adopt a holistic approach to enterprise transformation.
2. Identify relevant stakeholders and determine their value propositions.
3. Focus on enterprise effectiveness before efficiency.
4. Address internal and external enterprise interdependencies.
5. Ensure stability and flow within and across the enterprise.
6. Cultivate leadership to support and drive enterprise behaviors.

Source: D. Nightingale and J.K Srihvasan, MIT 2008
Enterprise Architecting Framework

Policy / External Factors

Process

Organization

Knowledge

Information Technology

Products / Services

Strategy
Enterprise Strategic Analysis for Transformation (ESAT)

Strategic Objectives

ESAT

Enterprise Capabilities

Enterprise Identification

Enterprise Analysis

Process Interaction Analysis

Enterprise Alignment Analysis

Future State Analysis

Future State Vision

Actionable Transformation Plan

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Our Place At The Leading Edge

- Involvement and influence in professional associations
  - NAE, INCOSE, Academy of Management, IIE, AIAA, ASME, IEEE
  - Lean SE working group created in INCOSE
  - International keynotes (Ireland, UK, Portugal, Mexico)
  - Award-winning papers
  - Conference program committees (e.g., Conference on Systems Engineering research, COCOMO forum on cost modeling)
  - Systems Engineering & Architecting doctoral student network

- Leverage other projects at MIT: MITRE, Portugal, IMVP, healthcare, etc.

- Interface with leaders in academia, including other parts of MIT and other universities

- Recognition and requests for help from industry, government, consulting, and educational institutions who recognize LAI as leaders in lean enterprise transformation and complex systems research
2. Role of Research at LAI

- Develop and Deploy Products & Tools to Support Transformation
- Inform Education e.g., EdNet
- Build and Disseminate Knowledge Base e.g., KEEs
Enable Transformation Through Research and Products/Tools

Meeting Transformation Imperative

Research Process
- Identify gaps in knowledge, both short-term and long-term
- Create requisite knowledge

Product Development Process
- Identify limitations in existing tools
- Transform research-based findings into usable tools

Needs Identification

Gaps in Knowledge
Gaps in Products/Tools

Research

Products/Tools

Generates
Interrelated
Feedback
3. “Grand Questions” Derived From the Transformation Imperative

1. How can I understand how my organization/enterprise currently operates within its larger context?

2. How can I define and evaluate the future possibilities for a more efficient and effective enterprise?

3. What are the most effective strategies and tactics to achieve these future possibilities for my enterprise?

4. How can I best manage the enterprise change process?
## Research Groups

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### Faculty Lead
- ECM: John Carroll
- ET/EA: Debbie Nightingale & Joe Sussman
- ESE: Warren Seering & Dan Hastings
- LEPD: Warren Seering

### Research Lead
- ECM: George Roth
- ET/EA: Donna Rhodes
- ESE: Eric Rebentisch
- LEPD: Sheryl Pennisi

### Additional Team Members: Research
- ECM: Kirk Bozdogan, JK Srinivasan, Ricardo Valerdi
- ET/EA: Ricardo Valerdi
- ESE: JK Srinivasan, Hugh McManus
- LEPD: Sheryl Pennisi

### Products & Tools
- ECM: Enterprise Change Fieldbook
- ET/EA: Transformation Roadmap/ ESAT/LESAT/ 7 Principles
- ESE: SE Leading Indicators Guide
- LEPD: PDVSM / LEPD/PDTTL
LAI Research Agenda: Groups Address Grand Questions

1. How can I understand the way my organization currently operates within its larger context?
2. How can I define and evaluate the future possibilities for a more efficient and effective enterprise?
3. What are the most effective strategies and tactics to achieve these future possibilities for my enterprise?
4. How can I best manage the enterprise change process?

**FOCUS of RESEARCH**
- Enterprise Value Analysis
- Enterprise Architecting
- IT as Enterprise Enabler
- Enterprise Cost and Metrics
- Enterprise Modeling

**FOCUS of RESEARCH**
- Lean Product Development
- Lean Systems Engineering
- Lean Software

**FOCUS of RESEARCH**
- ESE Approaches
- SE Effectiveness Indicators
- Studies of ESE Practices (with MITRE)

**FOCUS of RESEARCH**
- Change Management
- Enterprise Change Philosophy
- Studies of Successful Change
- Distributed Leadership
LAI Operating Model

Transformation Events

Knowledge Exchange Events

Educational Network

Enterprise Change Cases

SE Leading Indicators

ESAT

LEV&LEPD Simulations

Robust Research Agenda Products and Tools Publications

Lean PD Benchmarking

Create collaborative value for customers

Create

collaborative
value for
customers

DEPLOYMENT

RELATIONSHIPS

KNOWLEDGE CREATION

Leveraging Deployment

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LAI Research Summit 01/21/09-18
Vigorous Research Agenda (with limited resources)

• 4.8 FTE Researchers (6 people)
• 3.9 FTE Students paid by LAI
  • 20 students part of LAI team
  • 12 affiliated students
  • 5 students funded (at some percentage)
• In 2008
  • 7 graduates with full or partial support
  • 13 new research studies added to LAI web site
  • 38 conference papers; 8 journal papers published
• Adding to total LAI body of knowledge
  • 25 case studies
  • 170 theses
  • 18 working papers/white papers
  • 42 reports
  • 122 conference papers

- Case studies of enterprise transformation (UTC ACE, Rockwell Collins), collaborative systems thinking (12 cases), visual metrics (Raytheon), cost model development (BAE), lean software enterprises (3 cases)
- Leading Indicators Version 2.0 developed and several workshops to transfer knowledge
- Enhanced ESAT process to provide greater insights into enterprise transformation
- 5 Knowledge Exchange Events on various topics (held at Pratt & Whitney, Lockheed Martin, Raytheon, US Army, MIT)
- Lean PD benchmarking events at Boeing and Raytheon
- 2nd annual joint MIT-MITRE conference on enterprise modeling
- Presentations at conferences (Boeing/Rocketdyne, DoD CPI,...)
- Collaborations, e.g., INCOSE Lean Enablers for SE working group, MIT-MITRE Enterprise Dynamic Modeling
Research Plans for 2009+

• Case studies (UTC Internal Audit, Homogeneous Metals, ACE OS, TMC Engineering; Deficiency Reporting cross-organizational in USAF, DCMA, Pratt&Whitney; Rockwell Collins; system of systems PD management at US Army)

• Collect data on ESAT delivery and use at US Army and elsewhere

• Update LESAT to include new enterprise transformation concepts

• Leading Indicators 2.0 to be published

• Develop roadmap to enable rapid certification of aerospace software (with Boeing Phantom Works)

• Portfolio risk management (USAF)
Research Plans for 2009+, cont.

- Joint Test & Evaluation project (White Sands)
- Enterprise Dashboard (Raytheon)
- Workshop on system level defects (with Raytheon and LM)
- Explore new research opportunities (US Army, LM21 culture change, Raytheon Common Lean Diagnostic)
- Journal of Enterprise Transformation begins with Debbie and Ricardo as Editors
- Papers, books, student theses in process
- Collaborations (e.g., McKinsey and high-performance PD practices)
Lean Enterprise Thinking: Driving Enterprise Transformation

D. Nightingale
J.K. Srinivasan
J.Mize

Introduces holistic approach to enterprise design and evaluation of alternative architectures

Architecting The Future Enterprise

D. Nightingale
D. Rhodes

Five Capabilities for Enterprise Change

G. Roth

Through case studies of successful transformations, develops a change theory for sets of organizations (to be followed by a tools, methods, and examples field book for enterprise change)

Complex Enterprise Systems Engineering for Operational Excellence

Bozdogan, Hoffman (MITRE)
Sussman, Wojcik (MITRE)

Provides concepts, models and applications for managing enterprise complexity and dynamics

Systems Engineering Cost Estimation With COSYSMO

R. Valerdi
Publisher: Wiley & Sons

Models, methods and cases for performing program cost analyses

Incorporates lean enterprise principles, cases, and transformation methodologies (TTL, EVSMA, LESAT)
2009 Knowledge Exchange Events

• LAI Annual Meeting: Achieving Enterprise Excellence (3/31 - 4/2, Baltimore Hilton)
• Using LESAT for Transformation (5/14, MIT)
• Architecting the Future Enterprise (6/8-9, MIT)
• LAI Lean Academy® Course (7/13-15, MIT)
• LAI Lean Academy® Seminar: Engineering (7/16-17, MIT)
• Sharing Lean Change Stories Through the Lens of Enterprise Change Capabilities (10/28-30, tba)
• Metrics (11/4, tba)
• Visit http://lean.mit.edu for more information
5. Modes of Research

The core Summit presentations are organized by “modes” of enterprise research:

• Developing and Deploying Models into Practice
• Creating Powerful Partnerships
  • Supporting enterprise architecting and transformation
• Competency and Collaboration Models
• Learning from Case Studies
  • Studying informative examples
• Addressing Enterprise Processes
• Learning from Communities of Practice and Benchmarking