LAI Product Highlights

Lean Now SME Conference
January 28, 2004
LAI Knowledge Cycle

Achieving Total Enterprise Value → LAI Goals

Outcomes/Measures

Requirements

Experience and Lessons Learned

LAI Consortium

Research

Consortium Expertise

Knowledge Collection

Knowledge Deployment

LAI Community Implementation

Products/New Knowledge

Web Curriculum Workshops etc.

Data Site Visits Workshops etc.
LAI Products

Strategic Enterprise Tools
- Lean Enterprise Model (LEM)
- Transition-To-Lean (TTL) Roadmap
- Lean Enterprise Self-Assessment Tool (LESAT)
- Enterprise Value Stream Mapping and Analysis (EVSMA)

Tactical/Operational Tools
- Product Development Value Stream Mapping (PDVSM)
- Supplier Networks Toolkit
- Manufacturing Systems Design Framework
- Production Operations TTL

Education/Training Materials
- Lean Now Workshop (1-day)
- Lean Now Facilitator’s training (1-week)
- Lean Academy™ (1-week)
- Lean Enterprise Value Seminars and Simulation (1/2-day to 2 day)
- LESAT Facilitator’s course (1-day)
- On-line Introduction to Lean Enterprise Concepts (3-hour)
Transition-To-Lean Roadmap

**Entry/Re-entry Cycle**

- Adopt Lean Paradigm
  - Build Vision
  - Convey Urgency
  - Foster Lean Learning
  - Make the Commitment
  - Obtain Senior Mgmt.
  - Buy-in

- Decision to Pursue Enterprise Transformation

- Enterprise Strategic Planning
  - Create the Business Case for Lean
  - Focus on Customer Value
  - Include Lean in Strategic Planning
  - Leverage the Extended Enterprise

**Long Term Cycle**

- Focus on the Value Stream
  - Map Value Stream
  - Internalize Vision
  - Set Goals & Metrics
  - Identify & Involve Key Stakeholders

- Develop Lean Structure & Behavior
  - Organize for Lean Implementation
  - Identify & Empower Change Agents
  - Align Incentives
  - Adapt Structure & Systems

- Focus on Continuous Improvement
  - Monitor Lean Progress
  - Nurture the Process
  - Refine the Plan
  - Capture & Adopt New Knowledge

- Implement Lean Initiatives
  - Develop Detailed Plans
  - Implement Lean Activities

- Outcomes on Enterprise Metrics

- Environmental Corrective Action Indicators

- Detailed Corrective Action Indicators

- Lean Transformation Framework

- Create & Refine Transformation Plan
  - Identify & Prioritize Activities
  - Commit Resources
  - Provide Education & Training

- Enterprise Level Transformation Plan
EVSMA
Enterprise Value Stream Is…

A portrayal of the relationships of the enterprise with its external environment and the general ordering and integration of high-level internal enterprise processes
Product VSM and EVSMA

**Traditional Value Stream Mapping**
- Focuses on delivering value to the customer
- Addresses product lifecycle processes
- Addresses one program or line of business

**Enterprise Value Stream Mapping and Analysis**
- Focuses on delivering value to all stakeholders
- Addresses lifecycle, enabling, and leadership processes
- Addresses multiple organizations, multiple programs, or business units
Goal and Resources Required

- Create a vision of a lean enterprise two to three years in the future which optimizes the enterprise value stream
- Executed by a small team including:
  - Enterprise leader as champion or sponsor
  - Team lead, one of the enterprise leader’s direct reports
  - Facilitator, with background in lean and EVSMA method
  - Enterprise process owners on an ad hoc basis as needed to provide information

"EVSMA provided our management team with several insights about how our enterprise actually functions. It also provided a way to identify improvement activities that support our total enterprise strategic objectives and optimize functional integration in the value stream."

- Site Director
EVSMA Methodology

Coherent method for analyzing and improving enterprise performance:
- strategic objective
- stakeholder interests
- process performance

1: Define Enterprise
2: Identify Stakeholder Value Exchange
3: Characterize Strategic Objectives
4: Analyze Enterprise Processes
5: Analyze Enterprise Interactions
6: Synthesize Current State
7: Envision Future State
8: Develop Improvement Plan
LESAT
Government LESAT
What Is LESAT?

- A tool for self-assessing the present state of “leanness” of an enterprise and its readiness to change
- Comprised of:
  - Capability maturity model for enterprise leadership, life cycle and enabling processes
  - Supporting materials: (Facilitator’s Guide, Glossary, etc.)
Maturity Level Definitions Simplified

World Class

Level 5: Recognized Best Practice → Transformer

Level 4: Continuous Improvement → Reformer

Level 3: Systematic Approach → Performer

Level 2: General Awareness → Adopter

Level 1: Minimal Awareness → Traditional

Lean Maturation

Least Capable
Lean Now Training
Lean Now Workshop

1-day lean leadership training
- Lean awareness for leadership and project teams (industry and government)
- Focuses on Value Stream Mapping
- Includes case study application of lean concepts
- Provides introduction to enterprise-level lean and leading transformation

Developed from the “best of the best” of industry and MIT!

Taught over 10 times with over 350 people trained
Lean Now Facilitator’s Course

- 1-week training for new Air Force facilitators
  - Provides introduction of lean and quality tools
  - Includes simulation to apply learning
  - Includes “soft skills”: communication, team dynamics, roles and responsibilities, project management

- Piloted in September 2003 with 23 students at Ogden ALC

- Developed from the “best of the best” of industry and MIT and reviewed by DAU, AF ACE, AFIT
Lean Academy™
Lean Academy

**Audience:**
- Undergraduate students and faculty working with LAI member organizations, particularly through member summer internship programs (also appropriate for co-op students and new hires)

**Objectives:**
- Provide students with lean training and a well scoped company mentored project during an internship employment experience
- Provide faculty with case study/research opportunity
- Provide companies with recommended students and prospective recruits trained in lean
Lean Enterprise Value
Seminars and Simulation
Lean Enterprise Value Simulation Game

- A simulation of a complex aerospace enterprise
- Philosophy draws heavily on LAI research and the recent book *Lean Enterprise Value*
- Content and cases based on LAI member experience
- Three modular simulations (manufacturing, product development, supplier network) can be used separately or combined to teach enterprise principles
- Integrated with lecture material to provide intellectual basis, tools, and experiential learning

Evolving development (to date):
- Lean Enterprise Value short course
- Lean engineering training and improvement
- Lean/Six-Sigma expert training course
- Student/intern introduction to lean principles

web.mit.edu/lean
Back Ups
Tool Development Process

Integrate research and consortium knowledge

Develop

Test

Release tool to the consortium for “off the shelf” use

Results and experiences converge

Closely facilitated by LAI research staff and working group members

Significant updates made

- Alpha
  - Test methodology and approach
- Beta
  - Test usability and clarity
- Version 1.0
  - Consortium release
LEM Overarching Practices
Address People and Process

**People Practices**

- Promote lean leadership at all levels
- Relationships based on mutual trust and commitment
- Make decisions at lowest appropriate level
- Optimize capability and utilization of people
- Continuous focus on the customer
- Nurture a learning environment

**Process Practices**

- Assure seamless information flow
- Implement integrated product and process development (IPPD)
- Ensure process capability and maturation
- Maintain challenges of existing processes
- Identify and optimize enterprise flow
- Maintain stability in changing environment
Lean Enterprise Model

- Internet accessed database available at http://web.mit.edu/lean under “Products”
- Contains over 500 links to data sheets from LAI research and external sources
- Categorized by practice and metric
LESAT
Government LESAT
Some awareness of this practice; sporadic improvement activities may be underway in a few areas.

General awareness; informal approach deployed in a few areas with varying degrees of effectiveness and sustainment.

A systematic approach/methodology deployed in varying stages across most areas; facilitated with metrics; good sustainment.

On-going refinement and continuous improvement across the enterprise; improvement gains are sustained.

Exceptional, well-defined, innovative approach is fully deployed across the extended enterprise (across internal and external value streams); recognized as best practice.
LESAT: Where We Stand

- Majority of LAI industry members are using or are planning to use LESAT
- Government LESAT developed and currently in Alpha testing
- Exploratory work to address enterprise interfaces using LESAT and Government LESAT in a program context
- LESAT is creating a common framework for “Enterprise” thinking
- LESAT is providing a common language for Lean permeation throughout the enterprise
- Linking LESAT to business strategy prioritizes key areas for lean focus
Benefits of EVSMA

- Provides a cohesive method for diagnosing an enterprise in order to expose sources of waste and to identify barriers to value delivery

- Identifies process interfaces, disconnects and delays

- Identifies and prioritizes improvement opportunities that will benefit the entire enterprise
Product Development
Value Stream Mapping
Practical Guide to PD
Value Stream Mapping

• A “Rother and Shook” for Product Development
  • More details necessary for the complexities of PD
  • Details and background for lean experts
  • Practical advice for in-the-field use

• Repository of LAI knowledge
  • Four+ years of PD team experience
  • References and attributions
  • Not an academic product

• Member Best Practices
  • Suggested “cookbook”
  • Options and resources
  • Running examples and other aids
Focus: Door to Door PD Process

Individual Task

Your Process

Product Development Value Stream

Enterprise Value Stream

PDVSM
PDVSM Manual Outline

1. Introduction: Lean Engineering Process Improvement
2. Getting Started
3. Mapping the Current State Value Stream
4. Identifying and Eliminating Waste
5. Improving the Process
6. Striving for Perfection

Also Includes:
- On-going example
- Metrics and other aids
- Appendices
  A. Methods and Effectiveness
  B. Sample Data Collection Form
  C. Second Example
  D. PDVSM Checklist
- Notes and References
Supplier Networks Toolkit
Supplier Networks Toolset

• **Transformation Roadmap**
  • “How-to” implementation guide defining major building blocks & specific action steps -- sequences & relationships
  • Maps out process template -- inputs, outputs, barriers, enablers, metrics, tools & methods, “how-to” discussions, and references

• **Supplier Management Self-Assessment Tool**
  • EXCEL-based self-scoring tool for gauging enterprise’s progress in evolving lean supply chain management practices
  • Links up with Lean Enterprise Self-Assessment Tool (LESAT)
  • Based on capability maturity model (5 capability levels)
  • Defines (8) overarching and (30) enabling practices
  • Provides diagnostic questions, lean indicators, and metrics

• **Reference Guide**
  • Basics of Lean and Six Sigma
  • Key concepts and principles for building lean supplier networks
  • Glossary
Transformation Roadmap: Major Building Blocks

1.0 Define Vision

2.0 Develop Supplier Network Strategic Plan

3.0 Establish Lean Culture and Infrastructure

4.0 Create and Refine Lean Implementation Plan

5.0 Implement Lean Initiatives

6.0 Strive for Continuous Improvement

© MIT - PD Workshop - Stanke - 8 Oct 2003
Assessment Tool: Defines a Set of Major Lean Supply Chain Management Practices

1. Design supplier network architecture
2. Develop complementary supplier capabilities
3. Create flow and pull throughout supplier network
4. Establish cooperative relationships and effective coordination mechanisms
5. Maximize flexibility and responsiveness
6. Pursue supplier-integrated product and process development
7. Integrate knowledge and foster innovation
8. Demonstrate continuous improvement
Manufacturing Systems Tools
Manufacturing Systems Tools

- Production Operations Transition-To-Lean Roadmap
  - Supports both a grass root and top-down transformation
  - Links with the Enterprise Transition-to-Lean
  - Manual explaining each phase part of tool

- Manufacturing System Design Framework
  - Addresses the holistic integration between strategy and functions
  - Addresses both the infrastructure and structure of manufacturing system design
  - Provides framework for manufacturing system design
  - Manual explaining framework and design tools part of tool
Production Operations Transition-To-Lean Roadmap

**Phase 0: Adopt Lean Paradigm**
- Build vision
- Establish need
- Foster lean learning
- Make the commitment
- Obtain Sr. Mgmt. buy-in

**Phase 1: Prepare**
- Integrate with Enterprise Level
- Establish an Operations Lean Implementation Team(s)
- Develop implementation strategy
- Develop a plan to address workforce changes
- Address Site Specific Cultural Issues
- Train key people
- Establish target objectives (metrics)

**Phase 2: Define Value**
- Select initial implementation scope
- Define customer
- Define value - Quality, Schedule, and Target Cost

**Phase 3: Identify Value Stream**
- Record current state value stream
- Chart product and information flow
- Chart operator movement
- Chart tool movement
- Collect baseline data

**Phase 4: Design Production System**
- Develop a future state value stream map
- Identify takt time requirements
- Review make/buy decisions
- Plan new layout
- Integrate suppliers
- Design visual control system
- Estimate and justify costs
- Plan TPS system

**Phase 5: Implement Flow**
- Standardize operations
- Mistake proof processes
- Achieve process control
- Implement TPM
- Implement self-inspection
- Eliminate/reduce waste
- Cross train workforce
- Reduce set-up times
- Implement cell layout
- Implement visual controls

**Phase 6: Implement Total System Pull**
- Select appropriate production system control mechanism
- Strive for single item flow
- Level and balance production flow
- Link with suppliers
- Draw down inventories
- Reassign people
- Re-deploy/dispose assets

**Phase 7: Strive for Perfection**
- Team development
- Optimize quality
- Institutionalize 5S
- Institute Kaizen events
- Remove system barriers
- Expand TPM
- Evaluate against target metrics
- Evaluate progress using lean maturity matrices

**Supply Chain/External Environment**
- • Legal
- • Environmental

**Enterprise / Production System Interface**
- • Financial
- • Information
- • Procurement
- • Engineering
- • Quality
- • Safety
- • Government Req'd. Systems (MMAS, EVMS, etc.)
- • Training and Human Resources
- • Workforce/Management Partnership

**Adopt Lean Paradigm**
- Top Leadership
- Commitment

**Expand Internally/Externally**
- Entry
Manufacturing System Design

Stakeholders
- Corporate Level
  [Seek approval]
- Business Unit
  [Interpret]

Product Strategy
- Suppliers
- Product Design
- Manufacturing System Design/Selection
  - DFMA, IPT
  - 3-DCE
  - Concurrent Engineering

Requirements/Considerations/Constraints
- Manufacturing System Design/Selection
  - Miltenburg, - 3P, - 2D plots,
  - MSDD - AMSDD - design Kaizen
- Customer Needs
  - Technical Feasibility
  - Feasible performance guarantees

Marketing

Product Strategy

Make/Buy
Risk-sharing Partnerships

- Analytical Tools,
- Simulation Tools

Customer Needs
- Technical Feasibility
- Feasible performance guarantees

Technical Feasibility

Fine Tune

Evaluate/Validate
- VSM
- Kaizen
- Trial & Error
- Kaikaku

Finalized Product Design

Implement (pilot)

Fine Tune

Evaluate/Validate

Full Rate Production

Finalized Product Design
Lean Academy™
Lean Academy

• Progress:
  • Pilot during Summer 2003 at Rolls-Royce with 25 interns
  • January 2004 Lean Academy for Instructor train-the-trainer session; approx. 20 new instructors trained
  • Second generation curriculum in development
  • Planning for 6 Lean Academies for June 2004

• Participants:
  • Purdue University, Massachusetts Institute of Technology, Rolls-Royce, University of Southern California, Loyola Marymount, Arizona State University, St. Louis University, University of Missouri-Rolla, University of Tennessee, Embry-Riddle, Georgia Tech, Worcester Polytechnic Institute, Boeing, Lockheed Martin, Northrop Grumman, Rockwell Collins
On-Line Introduction to Lean Enterprise Concepts
Introduction to Lean Enterprise Concepts

- 3.5 hour on-line course
- Results of strategic partnership with DAU
- Available to everyone free of charge
- Available through DAU Continuous Learning Center
  http://clc.dau.mil