LAI Mission Accomplishments
Facilitate Enterprise Transformations
AFMC Commander’s Intent

- Expeditionary mindset and culture
- Innovative, adaptive, and responsive
- Easy to do business with
- Effective and efficient

Deliver effects-based capability to the war fighter

Enabled by capable processes shared by government and industry
Air Force Lean Now Initiative
Established in Collaboration with LAI

- **What:** Lean Transformation of Air Force Material Command
- **Why:** Provide On Time, Effects Based Capability to the War Fighter
- **Who:** Lean Aerospace Initiative Consortium Members Teamed with AFMC within the LAI venue
Lean Now Objective…

Enterprise Transformation (Non-Manufacturing)

TRANSFORM THE WAY WE DO BUSINESS IN GREATER ENTERPRISE

- Collectively Accelerate Lean Deployment Within AFMC
- Identify Opportunities For Improvement And Change
- Eliminate Barriers That Impede Progress
- Increase Communication And Understanding
- Win-Win For All: Create Value For All Stakeholders Through Elimination Of Waste
  - Adapt Quickly To New Challenges
  - Get It Faster With Fewer Resources

Collectively Accelerate The Process…
Get Effects Based Capability To The War Fighter
Enabling Capabilities of Lean Enterprise Transformation

**Lean Workshops/Facilitator Training**
- Wave 2 Prototypes Begin
- AEDC Turbine Engine Test
- OO-ALC Procurement Request

**Strategic Engagements Begin**
- AF ALCs/AF Acquisition
- Transition to Lean roadmap
- Executive Leadership Team
- Deployment
- Roadmap
- EVSMA
- Strategic Objectives
- Current/
- Future State

**Wave 2**
- 52+ Events/Projects for F/A-22, GH, F-16 Hosts

**Wave 1**
- Contract Closeout

**Wave 2 Prototypes**
- Deploying Lean (VSM, Kaizens, Internal Coaches, etc...)
- Lean Now Facilitators Course Developed

**Wave 1 Prototypes**
- Alpha
- CTF
- Contracting
- GH
- ISS
- GH
- ICS
- CTF
- Load
- OPF
- Load

**Enterprise Engagement**
- 2002
- 2004/05

**Engagements Begin**
- Engine Request
- Engagements Begin
- Acquisition Transition to Executive Deployment
- Objectives
- Future State

**Maturity of practice and influence**

http://lean.mit.edu

© 2005 Massachusetts Institute of Technology   Presenter/date - 5
Local Results and Behavior Change…
New Capabilities and Skills,

**CTF OFP Load (F/A-22)**
- Selected improvements within processes:
  - Software Install Time Reduced from 97 hours to 46 hours
    - Validated on the F/A-22
  - 50-95% Span Time Reduction
  - 56% reduction in non-value added steps
  - 91% reduction in part traveled distance
- Implemented web based spares ordering system
- Process improvements:
  - Parts purging within CTF compound
  - Dedicated parts research
- CTF deploying lean (VSM, Kaizens, Internal Coaches, etc…)

**Alpha Contracting (Global Hawk)**
- 37% Initial cycle time reduction for Alpha Contracting
- Created Enterprise Level Tier I and Production Tier II VSM’s
- Project Plans Ongoing (10 Major Events Completed):
  - ISS $2M savings per ship set / $49M life cycle savings
  - AICS/GICS $33.8M life cycle savings
  - 38% Production delivery cycle time reduction per BL-10
  - Additional $5M Est. Savings for Producibility Initiatives

© 2005 Massachusetts Institute of Technology  Presenter/date - 6
Global Hawk

- Global Hawk was chosen as one of three AF “Lean Now” prototype programs – Oct/Nov 2002
  - “Lean Now” opened the dialogue between government and industry
- Lean embraced by SPO leadership as vital to evolutionary acquisition—business as usual doesn’t work with spirals
  - Provides deliberate method and structure for change
  - Transforms traditional process to meet demands of spiral acquisition
  - Lean is a keystone of meeting affordability targets
  - Over 35 Lean Events since Dec 2002
- Lean has taken hold and is spreading across the total Global Hawk Enterprise
  - Applied to manufacturing and non-manufacturing processes at SPO and contractors
  - SPO, NG, and most subcontractors have full-time lean change agents
  - Global Hawk Lean Community of Practice formed to bring together enterprise lean practitioners to share information and leverage expertise

http://lean.mit.edu
## Global Hawk "Lean Now" Major Accomplishments

### Supplier Focused Events
- **Raytheon**
  - $49M Savings for ISS Deliveries
  - Increased Units from 3 to 6 per Year
- **L-3 Communications**
  - $33.8M Savings for AICS/GICS Deliveries
- **Aurora**
  - Aft Fuselage 42 Day Cycle Time Gain P3

### Cycle Time Reductions
- **Alpha Contracting**
  - 28% Initial Reduction of 99 M-days
- **Change Process**
  - 63% Reduction from 95 to 35 Days
- **Production Delivery Cycle**
  - 38% Reduction per Schedule BL-10
- **Supplier Delivery Reductions Documented**

### Enterprise Value Stream Mapping
- Completed Tier I Enterprise VSM – Feb. 03
- Updated Tier II Production VSM – May 03
- Supplier VSM’s for Raytheon, L-3, Aurora
- Eng. Development VSM – Aug. 03
- Process Level Value Stream Maps
  - Alpha Contracting
  - Change Process

### Significant Goals Achieved
- Completed 10 Major Events
- Enterprise Collaboration SPO/NG/Suppliers
- Continuous Improvement VSM’s In Place
- 97% Award Fee Customer Rating for Affordability Supported by Lean Now Events
- Additional $5M Opportunity Savings for Identified Production Productibility Initiatives
- Joint SPO / NG LESAT Completed

http://lean.mit.edu
Alpha Contracting Event II

• **Objective:** Reduce time from RFP to formal proposal
  - Faster contract time brings capability to warfighter quicker

• Initial Alpha Contracting event held in Feb 2003
  - Reduced contracting time from 351 M-days to 252 M-days (initial 28% reduction)

• Alpha Contracting Event II held 3-6 May 2004
  - Objective of further reducing contracting time to support spiral acquisition
  - Involved SPO, NG, Raytheon, L-3 Comm, Vought, DCMA, DCAA

• Findings
  - Three types of contracts identified (Development, Production, Engineering/Contract Changes)
  - Each contract type should requires different approaches
  - Earlier subcontractor involvement reduces rework and reduces time
  - Better method of developing requirements and estimates between SPO and NG defined
Alpha Contracting II Initial Results

- **Results**
  - Alpha Contracting Guide being revised to address the difference in contract types
  - First blush cycle time reductions:
    - Development Contracts: 218 M-days (37% reduction of original process)
    - Production Contracts: 212 M-days (40% reduction of original process)
    - ECP/CCP Contracts: 92 M-days (73% reduction of original process)
  - Further refinement and maturation of processes will lead to expected further reduction
Global Hawk Lean Alpha Contracting

Outcomes & Benefits

Cycle Time Reduction of Contracting / Proposal Process

Further Cycle Time Reductions Expected as New Processes Mature
Global Hawk Integrated Sensor Suite
Lean Manufacturing Now In Place

Outcomes & Benefits

Projected 37% Cost Savings on Basic ISS’s from LRIP Lot 1 to Lot 3

Lean Lowers ISS Cost and Production Cycle Time
Big Safari Programs Compass Call
VSM Project Status

September 30, 2005
LEAN OPERATION STRATEGIC PLAN

**Timeline:**

- Lean Now Workshop Feb 05
- LAI LEV Simulation Feb 05
- LAI VSM Mar 05
- EC-130 Current State VS Mar 05
- L-3 Lean VSM Experts Engaged Mar-Jul 05
- Supervisor Lean Specialist Training And Certification Oct 05
- EC-130 Future State VS

**Projects Identified:**

- 30 Projects Identified
- 10 “Just Do It” Projects
- 5 “Kaizen”
- 15 Short/Long Term Projects

http://lean.mit.edu
Projects Producing Measurable Cycle Time Improvement

- Analyze Quality Processes and Procedures
  - Kaizen completed - 30 days of measured performance
    - Reduced backlog of work tasks waiting for inspection by 75%
    - Cycle time improved from 11 days to 2 days for first two aircraft implemented

- Create HDL Specialty Teams
  - Develop dedicated SWAT teams for large critical path tasks
    - Teams formed were proofed on Aircraft 1580 (Preservation, Landing Gear, Flight Controls, Assessment, Paint, Fuel Tanks, Engines, Electrical Test and Ring-out)
    - Condition Assessment Process – Team formed was proofed on Aircraft 1590, last aircraft completed had cycle time improvement of more than 40% compared to aircraft before Assessment Team developed

http://lean.mit.edu
Number of days from A/C arrival to Condition Assessment Complete

Condition Assessment Team Established
Projects Producing Measurable Cycle Time Improvement

- Issue parts direct from Mfg to A/C – eliminated warehousing steps for handling all L-3 fabricated material for Aircraft
  - Cycle time reduced more than 90% - From 24 hours to 2 hours
- Warehouse staffing for L-3 Project Stock in 7801- moved material handling process to appropriate warehouse process
  - Decreased delivery turn around from 42 hrs to 6 hrs

These two types of material represent more than 50% of material required by each aircraft
Overall Inspection Cycle Time Improved by 70%

Priority inspections Cycle time reduced to 1.5 days. All other inspections reduced to 4 days.
Lean Now Provided the Catalyst for Large Scale Transformation

Lean Now Wave 1
- Alpha Contracting – Global Hawk
- Combined Test Force – F/A-22
- Inactive Contract Closeout – F-16

Lean Now Wave 2
- Turbine Engine Test – AEDC**
- Procurement Request Process – Ogden ALC

Large Scale Enterprise Engagements
- Ogden ALC
- Oklahoma City ALC
- C-17 Program
- Robins ALC
- AF Acquisition
- Lean Now Wave 3

** Arnold Engineering Development Center

Future Engagements?
Combined ALCs
AFMC
Other Services

http://lean.mit.edu

© 2003 Massachusetts Institute of Technology / Presenter/date - 19
LAI Mission Accomplishments
Facilitate Enterprise Transformations
C-17
C-17 Systems Group

Delivering and sustaining a quality C-17 fleet

CONTINUOUS IMPROVEMENT SUCCESS
STORIES
11 JUL 05
Proposal Process Action Team

Wright Patterson AFB: C17SG Proposal
Cycle Time Reduction

- Employed IPT-Pricing concepts - Increased teaming with Contractor and DCMA
- Improved quality of ROM/Basis Of Estimate (BOE) development
- Promoted incremental CAR/PAR which allows earlier start of tech evaluations
- Improved requirements definition and reduced proposal iterations

Reduced Cycle Time
- From: Average Cycle Time- 19.6 Calendar Months
- To: Average Cycle Time – 10.4 Calendar Months
Industry (Boeing) \textit{Outcomes & Benefits}

- More than 450 AIWs held since 1998
  - ROI Average > 8.1
- Multiple Initiatives/Multiple Results, i.e.,
  - Kitting Standard Items Initiative
    - 34\% Reduction in Non Value Added Time
  - Single Line Initiative – Long Beach
    - 20\% Cycle Time Reduction
    - Entire Bay Recovered (150K+ square feet)
  - Ergonomics Initiative
    - Driving Down Injuries by 50\%
LAI Strategic Support

MIT ➔ LAI ➔ Implementation Projects Deployment

- History with PW
- History with USAF Leadership
- Academic Arm
- Industry Benchmarking
- Government

DOD SE
- Systems Engineering Process
- Improved Requirements Flowdown

AEDC
- Systems Validation Process
- Faster / Cheaper Config Changes

AF Acquisition Team
- EVSMA
- Cycle Time, Credibility
- Enterprise Operating Expense

OC-ALC
- Systems Support Process (s)
- Optimize Availability to War fighter

FA22 RLT
- Raptor Lean Team
- Optimizing Mgmt Process - Affordability

Depot Transformation
- Optimize Overhaul Maintenance Processes
- Introduce new Lena practices/Principles

UTC Quality Council
- PW, PWC, Sikorsky, HS, PW Rocketdyne, UTC
- Share LAI Activities

http://lean.mit.edu

- P&W Cannot Be World Class Unless Our Customers Are World Class
- Supporting Air Force Transformation to Enable Expeditionary War Fighter With Cost Effective Sustainment
- Sharing of Best Practices (ACE)
  - Research
  - Knowledge Integration
  - Tool Creation
  - Deployment
  - Reduced Inventory
  - Reduced Cycle Time
  - Increased Reliability
  - Reduced Total Cost
**LAI and P&W Benefits**

### Project

**AEDC**

**Turbine Engine Test & Evaluation**

- Test defect databases – 15 to 7
- Paperwork reduction – base entry
- Reduce C Plant Pre-Op Time by 43%
- Test program schedules
- Engine installation time cut by 50%

### Tool Application

**LESAT**

**EVSMA**

- ACE Council
- DCMA/Internal Teams
- Business unit assessments

### System Engineering

**Systems Engineering Revitalization**

- Superior products for Government & Airline Customers – concept to sustainment
- Knowledge and learning for better products and services

### Research

**Student Projects**

- Systems Thinking
- High Performing Teams

---

*http://lean.mit.edu*

© 2005 Massachusetts Institute of Technology   Presenter/date - 25
LAI Mission Accomplishments
Facilitate Enterprise Transformations
Air Logistics Centers
Air Logistic Centers

- Conducted large enterprise transformations at Ogden, Oklahoma City, & Warner-Robins Air Logistic Centers:
  - Value steam mapping of ALC enterprises
  - Engaged senior leadership teams
  - Analyses and defined vision of future state
  - Improvement plans in-place for key enterprise results areas
  - Culture change spread to other Air Force processes
Ogden Air Logistics Center

OO-ALC
Transformation Journey

29 September 2005

Maj Gen Kevin Sullivan
Commander OO-ALC
2002 -- Where We Started

- Mar 2002: Benchmarking, 6S, Kaizen Events - Not Structured
- AUG 2002: Transformation Office Opened
  - Manpower: 6 Instructor-Facilitators
- 2002 LEAN Efforts: Landing Gear and Commodities

Rolling Start – Focus on Shop Floor
2002 -- Where We Started (cont)

• Jan - Dec 2003: Accelerated Shop Floor Events
• Apr - Nov 2003: Expanded Events Above & Beyond Shop Floor
  • Point of Use Supply
  • Landing Gear “Factory” Study
  • Purchase Request Process
  • Civilian Personnel Staffing
  • Orderly Room Process

Picking Up Speed - Widening the Focus
2004 – The Epiphany
Enterprise Transformation Strategy

Tactical Cycle

Focus on Continuous Improvement
- Balanced Score Card
- Knowledge Management
- Review/Capture/Update

Create & Refine Transformation Capability
- Improvement Plans
- Training
- ID Team Resources

We Were Here

Implement Lean Initiatives
- Targeted Improvements
- PR
- Mainstream, etc…
2004 – The Epiphany
Enterprise Transformation Strategy

**O G D E N A I R L O G I S T I C S C E N T E R**

### Strategic Cycle

- **Adopt Lean Paradigm**
  - Create ELT

- **Focus on the Value Stream**
  - EVSMA
  - Productivity Targets/Strategy

- **Develop Lean Infrastructure**
  - Training
  - Incentives
  - Identify Change Agents

### Tactical Cycle

- **Focus on Continuous Improvement**
  - Balanced Score Card
  - Knowledge Management
  - Review/Capture/Update

- **Implement Lean Initiatives**
  - Targeted Improvements
  - PR
  - Mainstream, etc...

- **Create & Refine Transformation Capability**
  - Improvement Plans
  - Training
  - ID Team Resources

**Enterprise Strategic Planning**
Be a Valued Team Member...

**Balanced Scorecard**

- Improve Weapon System Avail to 90%+
- Support Readiness @ 100%
- Reduce Flow Time 50%
- Reduce Cost 25%

**Exceed warfighters expectations for system avail & expeditionary sprt**

- Effective & efficient business practices; we anticipate demand and deliver products on time and on cost

- An enduring culture of training, education, mentoring and CPI

**Continuous Process Improvement**
Challenges Met

OGDEN AIR LOGISTICS CENTER

- Jan - Nov 2004: ELT Completed EVSMA
  - Validated Vision – Be America’s Best
  - Established 10 yr BHAG and Initial Initiatives
  - First Cadre of Center Lean Experts Trained
  - Transitioned ELT to EEC
- Jan 2004: F-16 Improved Aircraft Availability Initiative
- Dec 2004: Defined Center Governance
- Jan 2005: Defined Strategy Deployment Model
- Jun 2005: Senior Leader Lean Event Participation
- Aug 2005: Completed Center Balanced Score Card
- Sep 2005: Two Public Sector Shingo Award Winners

Enterprise-wide Involvement – Bigger Production Targets
Challenges Yet

- Continue maturation of our Transformation “Home Office”
- Continue Balanced Score Card development at Wing and Functional levels
- Establish Wing CPI Implementation Plans
- Continue lean infrastructure development
- Integrate dealt initiatives (PSCM, PSC, DMT etc)
- CPI Contract
- Customer expectations management
- Cultural change, acceptance & advocacy

Institutionalize Continuous Process Improvement Foundation
Enterprise 2005+
OGDEN AIR LOGISTICS CENTER

2005-2007—
*Air Force Enterprise*
- Other ALCs
- Product Ctrs
- Customers
- AF Stakeholders
- Partners
- Suppliers

2007-2014—
*Aerospace Enterprise*
- Other Services
- Other Federal
- Educational Instit
- All Stakeholders
- International Partners

The Ogden ALC Enterprise 2004
OC-ALC

War-Winning Capabilities … On Time, On Cost

Enterprise Transformation
“Where We Are Today”

US Air Force

Integrity - Service - Excellence

http://lean.mit.edu
Big Hairy Audacious Goal (BHAG)

Be the undisputed best at performance based logistics and integrated sustainment

Develop a world class workforce, each person with the right credentials, training and experience

Make Tinker the partner of choice

Modernize the workplace with state-of-the-art tools, equipment and facilities

Lean key processes to increase equipment availability by 20% with 10% cost reduction over FYDP

Best value to force providers 24/7

America’s Air Logistics Center - the World’s Leader in Sustaining Combat Capability
Enterprise Strategy TODAY

“A valued team member…”

“America’s Air Logistics Center – The World’s Leader in Sustaining Combat Capability…On-Time, On-Cost”

THEME EFFECTS

Provide a Mission Ready & Expeditionary Focused Workforce

Provide First Class Customer Service Making Tinker the Desired Place to Work, Play, and Live

Operate as a Single Integrated Enterprise – Ever Faster, Better, and More Cost Effectively

Deliver War Winning Capability to the Warfighter Through On-Time, On-Cost Quality Products

Value Streams:
- Aircraft
- Engines
- Commodities
- Software
- Fleet Support

CENTER PROCESSES

Depot Maintenance

Product Support

Purchasing & Supply Chain Mgmt

Mission Support

Enabling Processes

Engineering - Finance - Personnel - Information Technology - Plans & Programs - Contracting

INSTALLATION CAPABILITIES
Closing the Gaps
Improvement Plans

Strategic Objectives

- Deliver War-Winning Capability
  On-Time, On-Cost
- Operate as an Integrated Enterprise
- Provide Mission Ready Workforce
- Provide First-Class Customer Service
- Make Tinker the Desired Place to
  Work, Play and Live

Performance Assessment

Initiative
Prioritization Criteria

- Strategic Focus
- Time to Completion
- Expected Return on
  Investment
- Financial Resource
  Availability
- Time to 75% of
  Expected Benefits
- Interdependencies
- People & Skills

http://lean.mit.edu

© 2005 Massachusetts Institute of Technology   Presenter/date - 40
Summary

• Transformation Underway
  • Changing our Culture
    • Marching to the Warfighter’s Beat

• Integration Across Entire Value Stream

• Delivering Capability On-Time, On-Cost

Guiding Principle
Focused Transformation of our Core Processes to Improve Reliability, Timeliness, Cost and Quality of the Capability We Provide in Support of the Combatant Commander
EVSMA Role in Transforming the ALC
Transforming the ALC: The Challenge

Transform:

• The Focus
• The Structure
• The Processes
• The Culture

...enterprise wide
...within existing resources
...without putting our people at risk

While Fighting – and Winning The War!

http://lean.mit.edu

© 2005 Massachusetts Institute of Technology  Presenter/date - 43
Transforming the ALC: The Context

Air Force Combat Transformation

Means:
- Global Strike CONOPS
- Global Mobility CONOPS
- Global Persistent Attack CONOPS
- Space & C4ISR CONOPS
- Homeland Security CONOPS
- Nuclear Response CONOPS

Requirement:
- Effects-Based Capabilities

Mission:
- Deliver Dominant Effects When & Where Needed

Challenge:
- Continuum of Conflict and Spectrum of Threats

Transforming the ALC:
The Context

Requirement of Threats

When & Where Needed

Effects-Based Capabilities

Deliver Dominant Effects

Continuum of Conflict and Spectrum of Threats

Air Force Combat Transformation
Scope of Lean

- Umbrella for all Continuous Process Improvement (CPI) activities
  - Lean, Benchmarking, Six Sigma, Software CMMI, and Theory of Constraints
- Comprehensive Approach to CPI
  - Orchestrate/integrate at Center level
  - Formal training for CPI experts
  - Standard work for standard processes
  - Measure both process improvement and organizational maturity
  - Lean concepts into Center strategic planning
  - 21 Change Manager, 78 core team facilitators
  - Over 1200 Lean events conducted, Average 30+ per month

Change Agents: Commanders & Directors
Why do EVSMA?

• Robins had been “doing Lean” for six years
  • Reaped “low hanging fruit”
  • Expanded Lean across depot maintenance
  • Achieved some significant breakthroughs (e.g., C-5 PDM)

• But…
  • Lean perceived as good for only industrial processes
  • Events were more ad hoc than integrated
  • Tactical versus strategic approach
  • Every Center “doing their own thing”

Needed an Enterprise Strategy for Lean
Why an EVSM?

Phase I
- Impose / Push / Manage
- Tactical Level
- Activity Based
- Narrow in Scope
- Random Selected Activity
- High Visibility Events/Easy Activity Measures
- Lean Forum

Years 1 to 3

Phase II
- ALC Strategic Focus
- Broad Scope
- Based on Facts and Priorities
- VSM to Achieve Future State
- Integration
- Performance or Output Measures
- Executive Council

Years 4 to 5

World Class
- Strategic Partnerships
- CPI Organization
- Open Communication
- High Performance
- Work Teams
- Supplier of Choice
- Real Time Action
- Data at All Levels
- 90% at Maturity Level 4

Years 6 to 7

We were stuck!

http://lean.mit.edu
What we did…

- Worked with LAI to “Compress” the process
  - Built on previous work
  - Standardized our approach with other ALCs

- Senior Leadership worked Steps 1-5
  - Validated much of previous understanding
  - Created new insights
  - Established strategic framework for Enterprise Transformation Integration

http://lean.mit.edu

© 2005 Massachusetts Institute of Technology
Presenter/date - 48
• Created our “BHAG”
  
  *Be America’s Dominant Air and Space Sustainer*

• Confirmed
  
  • Our Core Values
    
    *Integrity, Service, Excellence*
  
  • Our Core Purpose
    
    Provide capabilities to the war fighter
    
    • To protect our freedom
    • To enable our Airman to securely execute their mission
    • To export freedom to others
EVSMA
The Results

• Validated our goals
  • Create a normalized Air Force culture
  • Provide quality goods & services on time and on cost
  • Operate a quality installation with trained and enabled people

• Established specific action themes to achieve our goals

• Created strategic understanding of our stakeholders and their values
EVSMA

The Results

• Identified and validated enterprise processes and their interaction

• Created alignment
  • Goals tied to values
  • Outputs tied to goals
  • Processes tied to outputs
  • Metrics tied to ALL

• Created vivid future state visions
After EVSMA…
Step 6

- Strategic Alignment and Deployment (SA&D) is used to deploy strategic plans developed during our EVSMA process
- SA&D takes strategic themes to a tactical level

SA&D…
Making our plans a reality
Measuring Success

- **Current Performance Review Measures**
  - 100% Training Attendance
  - 50% Injury Reduction
  - 10% Reduction in Grievances, EEO, MEO
  - DUI Incidents
  - 95% Due Date Performance
  - 20% Increase in Aircraft Availability
  - 10% Reduction in MICAPs, Backorders, CWT
  - Improve Technology Insertion
  - 2% Reduction of Total Cost (DMAG Indirect)
  - 5% or Less Price Change Impact to Net Sales
  - 100% Leadership Training
  - Medical Screenings
  - 100% Training Templates Created
  - Improve Work Environment

More to Come…

Aligned with Balanced Scorecard