Textron Systems
Sensor Fuzed Weapon
VSM Event

*Using LAI Tools to Transform a Program Enterprise*

LAI Plenary
*March 23, 2005*

Hugh McManus
*LAI/Metis Design*

Geoffrey Bentley
*Textron Systems*
Sensor Fuzed Weapon
Confluence of Events

SFW
Program Needs

Unique Event Attributes:
Multiple Stakeholders
Multiple Operations
Enterprise-Level (Interfaces)
Lean Transformation of ongoing Program
Long-Term Cycle Projects to Close the Gap

Textron’s Six Sigma

LESAT and TTL Roadmap

NIST and Mass. MEP

LAI Products and Services:
Lean Now
LEV Business Simulation
Needs and Motivators

• SFW Program Needs
  – Savings needed for Long Term Agreement
  – Perceptions that waste/opportunities were in the “gaps and interfaces”

• Lean Enterprise Self Assessment Tool (LESAT)
  – Value stream mapping capability as a “gap”
  – Low capability but high expectations

• Transition To Lean Roadmap
  – VSM is the entry point into improvement cycles
Transition To Lean – Context for Value Stream Analysis

VSM is Backbone of Continuous Improvement

**Entry/Re-entry Cycle**
- Adopt Lean Paradigm
- Decision to Pursue Enterprise Transformation
- Enterprise Strategic Planning

**Long Term Cycle**
- Focus on the Value Stream
- Develop Lean Structure & Behavior

**Short Term Cycle**
- Focus on Continuous Improvement
- Create & Refine Transformation Plan
- Implement Lean Initiatives

- Longer Term Enterprise Projects
- Short Term Local Projects
Textron’s Six Sigma Program

Long Term Cycle Enterprise Projects

Short Term Cycle Local Projects

- Eliminate Waste
- Reduce Variability
- Grow & Innovate
- Customers Employees Businesses
Tools: MEP and LAI

• NIST Manufacturing Extension Partnership
  – Lean training and simulation for manufacturing and supply chain

• LAI Products and Services
  – Lean Now! VSM and facilitation techniques
  – Product Dev. Value Steam Mapping (PDVSM)
  – Enterprise Value Stream Mapping (EVSM)
  – Lean Enterprise Value Simulation
  – Consortium team focused on simulation - Metis Design and Rockwell Collins
Tools and Products for SFW Event

Context:
Lean Now: Multi-Stakeholder event
LAI TTL (Transition to Lean): Focus on the Value Stream

Tools:
- Mass. MEP Lean 101 w/ TimeWise Sim.
- LAI LEV Simulation Game
- LAI PDVSM
- LAI EVSMA

Results:
- Lean Awareness
- Enterprise Perspective
- Game Value Streams
- SFW Current State VS
- SFW Ideal State VS
- SFW Future State VS

Plans:
- Short Term Local Projects
- Longer Term Enterprise Projects
Broad Based Participation

• 30 Participants
  – Textron Systems and Textron Cessna; multiple disciplines including management, business services, and operations
  – U.S. Air Force SFW SPO
  – SFW Suppliers

• Facilitators and Expeditors
  – MIT/LAI (with Metis Design)
  – Manufacturing Extension Partnership (MEP)
  – Rockwell Collins Black Belts
  – Textron Systems Black Belts
Management Support

From Introduction and Call to Action by President Dick Millman

To Wrap-up and Outbrief to Executive VP Frank Tempesta

SPO, Program Manager, and VPs fully engaged in event
# Event Organization

## 6 Days – 3 Blocks – 3 Weeks

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Block 1 – 1 Day
Lean Awareness and Time Wise
(Lean 101) Mfg. Simulation

Level the Playing Field
Simulation Background

- 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
- Integrated with lecture material to provide intellectual basis, tools, and experiential learning
Simulation Architecture

• Tables of 4-6 people represent major silos
  – Manufacturing
  – Supplier Network
  – Product Development
  – Service and Support

• Each person has his/her own facility, or “Mat”
  – Manufacturing plant
  – Individual 1st or 2nd tier supplier
  – Product Development function, service provider

• Game Goals
  – Build Lego™ aircraft efficiently, make “money”
  – Adapt to changes in supply base and customer need
Simulation Segments and SFW Enterprise Value Streams

• Islands of Success (functional tables isolated)
  – Segment #1  Game Familiarization and Benchmark
    Learn mechanics, collect benchmark data
  – Segment #2  Local Lean  *based on Local Value Stream*
    Identify the constraints and perform targeted local improvements

• Lean Enterprise (one big game)
  – Segment #3  Enterprise
    Work together, in a complex enterprise with unstable environments
  – Segment #4  Lean Enterprise  *based on Enterprise Value Steam*
    Improve the enterprise to achieve both performance beyond that possible with local improvements, and responsiveness to change

• Reality: *Relate Simulation VSMs to SFW Enterprise Value Stream*
  – Groups and Relationships
  – Steady-state (Execution)
  – Dynamic (Response)
Simulation Value Stream Mapping and Improvement

Static and Dynamic Current State Maps

Simulated Reality → Roles and Responsibilities

Future State Map → Simulation Improvement Plan

Simulation Success
Mirrors Real Value Stream Mapping and Improvement

- Static and Dynamic Current State Maps
- Roles and Responsibilities
- Future State Map
- SFW Improvement Plan
- SFW Improvement Success
Block 2 – Day 1
LEV Local Simulation

Lecture, Table Exercises, and Game Playing
Local Game: Practice VSM and Use of Data in Finite Environment

Design InBox

Design \( \alpha \)

Analysis InBox

Analysis \( \gamma \)

Verification InBox

Verification

Wait Time:

Cycle Time:

Utilization:

Pass Rate:

Wait Time:

Cycle Time:

Utilization:

Pass Rate:

Wait Time:

Cycle Time:

Utilization:

Pass Rate:
Block 2 – Day 2
Enterprise Simulation

Lecture, game playing, and working together to map and transform game enterprise
Two Jobs at Enterprise Level

• Waste Minimization – Do the Job Right
  – Be efficient
  – Learn how to be lean in silo play
  – Additional complexity, coupling, but also new opportunities at the enterprise level

• Value Creation – Do the Right Job
  – Be responsive
  – How do you change to be responsive to new challenges/opportunities (like doubling production rate) and not break the bank?

Enterprise Level Change Requires Skill With Both Jobs
Steady State:
Doing the Job Right

FUNCTION

ABC

T1

T2

Schedule

Order

Deliver

Assemble

Fab 2xb

Fab 2xc

Kit

Deliver

Kit

Deliver

0 2 4 6 8 10 12

Time
Dynamic State: Responding to Change (1)

- **T2**: No part
- **T1**: No Delivery
- **Final**: No Delivery
- **PD**: No Delivery
Dynamic State: Responding to Change (2)

Time

T2

T1

ABC

Final

PD

No part

Proposed solution

Inquiry

No Delivery

Inquiry

No Delivery

Inquiry

No Delivery

Inquiry

No Delivery

Inquiry

No Delivery

No Delivery
Dynamic State: Responding to Change (3)

- No Delivery
- Inquiry
- OK?
- Y
- N
- Proposed solution
- Time
Doing the Right Job: Lean, Responsive Enterprise

Current

Future
Block 2 – Day 3
SFW Current State & Local Projects (1)

Transition VSM knowledge from Simulation to SFW Enterprise Level, Current State
Block 2 – Day 3
SFW Current State & Local Projects (2)

Local Projects to improve efficiency
SFW Current State
Block 3 – 2 Days
SFW Future State and Long-Term Improvement Projects (1)

Agreeing on a Future State
Block 3 – 2 Days
SFW Future State and Long-Term Improvement Projects (2)

Brainstorming and Analysis of Projects using LAI Tools
SFW Future State
and Long-Term Improvement Projects
**Workshop Take-Away**

**SFW Current State**

**SFW Future State**

Enterprise Projects (each with Process Owner and Team Members) to Close the Gap

- Project
- Certified Parts
- Design Change Strategy
- Inventory Accuracy
- Lean Thinking & Operations
- Low-Cost Robust Design
- Optimal Supply Base
- Paperless Processes & Systems
- Supplier Consigned Inventory
- Supplier Development
- Test & Inspect Strategy
- Visual Pull System with Suppliers
- Workforce Development

For Each Project, Use Lean Now 9-Block Planning Template
Workshop Wrap-up with Exec VP and Business Line VP

Outbriefs and thank yous
Workshop Outcomes

- Positive Participant Response
- Successful Implementation of Six Projects (to date) and Consummation of Long Term Pricing Agreement with Significant Cost Savings
- Candidate for Textron’s *Chairman’s Award for Innovation*
- Template of Program Enterprise Transformation for LAI Community
A Good Start

Event focused all stakeholders on the value stream to enable the *initiation* of the transformation cycle

*Entry/Re-entry Cycle*

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*Long Term Cycle*

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*Short Term Cycle*

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Backup
“I'm surprised that as a business development guy I would benefit so much from the training, but I definitely did.“

Mark Rafferty, Textron Systems’ Director of Business Development for Surveillance and Strike Weapons

“The workshop provided a unique business partnering opportunity in which the US Air Force, Textron Systems, and Textron's SFW supplier base joined to collectively drive the future affordability of this combat proven weapon through a cutting-edge LAI simulation of lean applied at the enterprise level of this active U.S. Air Force production program.”

Tom Harrington, Textron Systems’ Vice President for Air Launched Weapons

“Many organizations recognize the importance of becoming lean. However, many organizations are doing lean without necessarily becoming lean. These Value Stream workshops provide the foundation for formulation of a lean implementation strategy that is based on data, and linked to customers’ needs and expectations. I like to think of this process as providing us fact-based insight so that we are ‘lean with a purpose’.”

Jeff Picard, Textron Systems’ Vice President for Lean Acceleration
“Good practical application of the ‘lean’ skills.”

“Simulation gave us ‘hands-on’ experience to drive home key points. The inclusion of all elements of the enterprise gave great perspective of interrelationships of steady state and disruptive modes.”
Comments from SFW Suppliers

“Outstanding overall training. Good mix of lecture and simulation. I plan to use these tools to improve efficiencies both with Textron Systems and within our own organization.”

“I believe the facilitators did a great job, and I look forward to future training through Textron Systems. Thanks for having us join you guys.”
“The true power of the simulation lies in its integration. It demonstrates how efficiencies in one functional area do not necessarily translate to improvements to the enterprise. The need for a ‘big picture’ view and coordination among all stakeholders within the enterprise is demonstrated very well during the simulation.”

*Tom Bednar of Rockwell Collins, co-facilitator*

“A special version of the Lean Enterprise Value simulation was created with strong parallels to the current state of the SFW program. This focused learning during the simulation, so that the experience gained in understanding and improving the simulated enterprise could be applied directly to the SFW program. Most significantly, the current and future value stream maps of the simulation had strong parallels with the SFW’s value stream maps, allowing the experience of mapping out the simple, simulated world to be directly applied to the real world exercise that followed.”

*Hugh McManus, co-designer of the Lean Enterprise Value simulation and facilitator for the workshop*