Growing the Lean Community
An LAI Plenary Conference

PD VS Analysis and Mapping Tools
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1. **Explore** Value Stream Analysis and Mapping practices within the aerospace industry,
2. **Identify** standards or best-practices,
3. **Characterize** and/or advance methods and tools

**Definitions/Background**

**Research Data**

**Context-Tool Sophistication Preliminary Results**

**Proposed Improvement Scheme**
Lean Aerospace Initiative

Product Development Framework

PRODUCT DEVELOPMENT

PRODUCT DEFINITION

VIRTUAL EXISTENCE of PRODUCT

- model (what)
- manufacture plan (how)
- analytical support (risk reduction)

SUPPLIERS

- performance
- cost
- schedule

SUPPLIERS

Requirement / Product Definition / Manufacture / Support

time
Value Stream Analysis (VSA) is the method by which managers and engineers analyze, plan, and coordinate their company’s Product Development efforts.

- Performed to increase the understanding of a process

Value Stream Mapping (VSM) is a method by which the outcomes of Value Stream Analysis are visually depicted or illustrated.

- Serves for data collection, communication, and derivation of improvement measures
State of Lean-based VSA/VSM in the industry

- Successful initial results in PD: 30-90% reduction in cycle time, cost, resources required
- Not yet matured, no standard method or tool
- What this means: passing buzzword or potential competitive advantage

Specific benefit of insight into PD process

Absolute definition of process improvement not yet established
Research Design

➢ Research data taken January to August 2000
  - 9 sites, 31 interviews, 48 contributors, 1 weeklong Lean PD improvement exercise
  - Semi-structured interview, self-assessment format

➢ Data Collected
  1. Value Stream Mapping/Process mapping tools used
  2. Lean context
  3. Motivation and success of VSA/VSM improvement efforts
Scheduling tool highlighting precedence and concurrency
Process mapping tool highlighting product flow and geography
System Dynamics

➢ System analysis tool highlighting inputs/outputs and quantified dependencies
System mapping tool highlighting concurrency and general resources

- Proposal
- Concept Design
- Analysis
- Specifications Interface/Function
- Concept Structure
- Concept Properties
- Prelim. Design
- Development Tests
- Facility
- Long Lead Materials
- Tooling Drawings Material
- Make
- Verification Test
- Time, Schedule

Resources

➢ System mapping tool highlighting concurrency and general resources
Product flow tool highlighting iteration, feedback, and precedence

Customer Requirements

System Level Parameters

Wheel Torque

Piston—Front Size

Piston—Rear Size

Pedal Mechanical Advantage

Rear Lining Coeff. of Friction

Front Lining Coeff. of Friction

Booster Reaction Ratio

Rotor Diameter

Booster—Max. Stroke

Caliper Compliance

ABS Modulator Display

Design Structure Matrix (DSM)
Process mapping tool highlighting flow, precedence, and metrics
Tool characterization matrix

- Map attributes: tasks, information flow, iteration, precedence, start/stop times, milestones ...

VSM Tool

Representative (concurrency)

Supports Analysis (flow)

What to do (value)

How to do it (optimization)
Preliminary assessment of the analytic capability of VSM tools as seen used at the sites

- Scale does not account for representative capability or full potential of the tool

- Often tools used in conjunction/combination
Does VSM tool sophistication equate to VSA/VSM success?
Context characterization showed three groupings

- **Group A**: Traditional business methods
- **Group B**: Fractional Lean integration
- **Group C**: Developing comprehensive Lean environment
- Ratings based on education/training, general resource allocation, leadership involvement, organizational Lean integration, Lean vision/goal
Context of analysis drives the use of the tool and contributes to tool selection

- Data collection, constraints, and requirements
- Observations, themes, trends seen in the data
Preliminary Conclusions

1. VSA/VSM tool sophistication and use contributes to improvement success
   - Tool capability characterized as representative or analytic, which focus on what or how domains

2. Lean context in part drives tool use
   - Improvement efforts in a more Lean environment will require/observe different analysis than those in a less Lean environment
Suggested Tool… (for now)

1. High-level representative tool
   - Gantt, Ward/LEI
   - Definition of Value Stream elements, “big picture”

2. Detail-level process map
   - Determination of value, *what to do* in process

3. Detail-level DSM
   - Optimization, *how to do* process
   - Process structure, groupings, teams, concurrency
**Proposed Improvement Scheme**

1. Assemble and train VSA/VSM Team
2. Choose VS (opportunity vs. risk plot)
3. Define VS (bounds, owner, product, customer)
4. Analyze and map Current State (tasks, information flow, value, time, Real flow)
5a. Analyze and map Future State (simplification/standardization, flow continuity, transfers, review, communication, IPPD, concurrency)
5b. Analyze and map Ideal State (PD framework)
6. Implement
➢ Improvement of work process, product, VSA/VSM

➢ VSA is critical: VSM alone is ineffectual

➢ Ideal state process: vision within context of Lean PD and Lean enterprise
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