Lean Production Transition—
Value Stream Analysis at Aerojet

Presentation to

Lean Aerospace Initiative Plenary Session

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Aerojet

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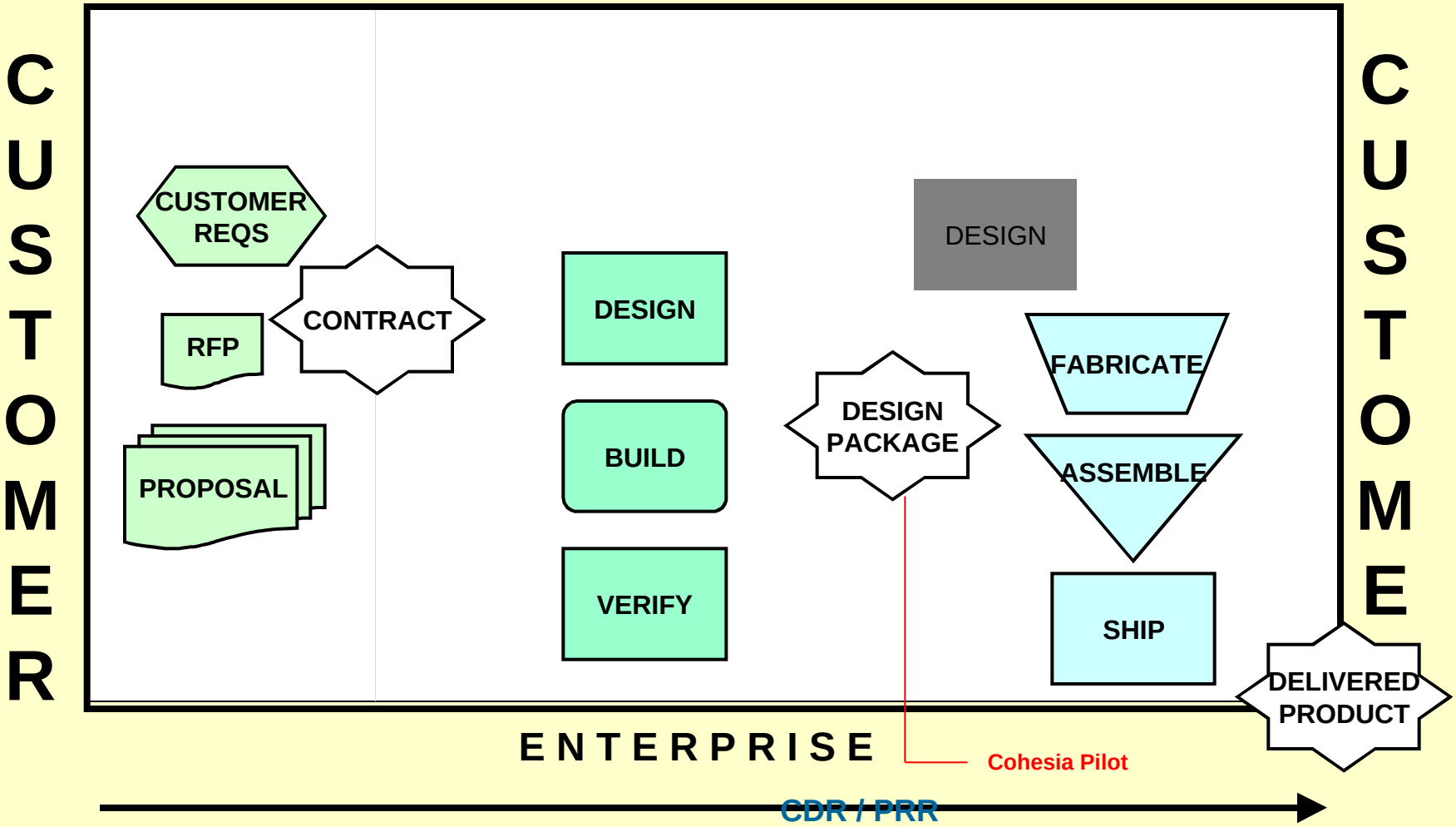
Value Stream Analysis
Applied to the Product Development Process

Three-year (Oct. 1999 - Sep. 2002) Air Force-Mantech sponsored program to develop tools and methodologies for the Aerospace industry

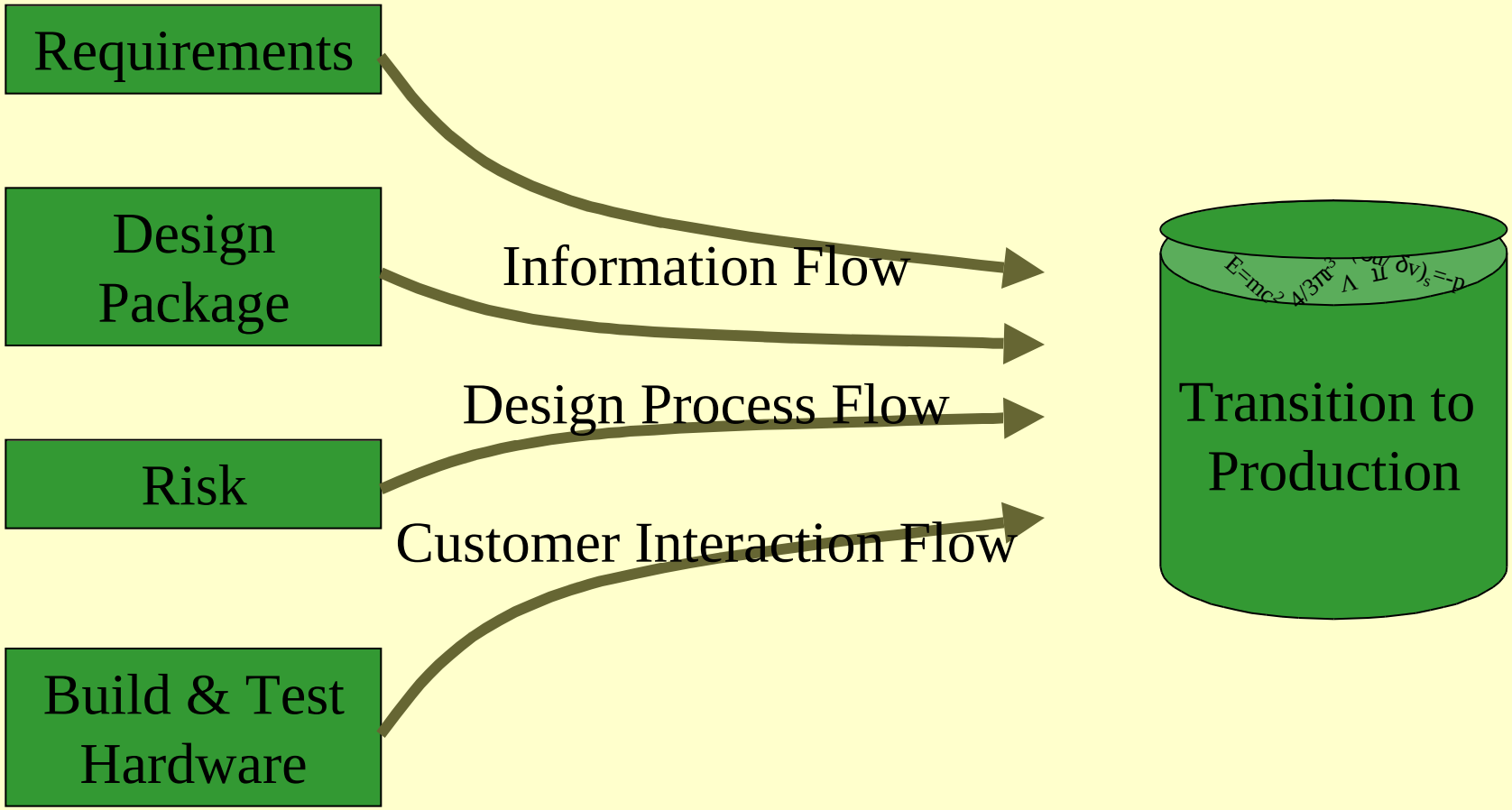
Identify, select, and develop effective tools and approaches for applying Value Stream Analysis methodology to the Defense/Aerospace product development process.

- **Program Goals:**
  - **Reduce Product Development Costs**
  - **Reduce Product Delivery Cycle Time**
- **Industry Benefits:**
  - **Maintain competitive edge (time to market)**
  - **Optimize resource effectiveness and utilization**
  - **Minimize costs**
  - **Program Outputs**
  - **Learning to Develop™ Methodology Workbook**

What is Product Development?



Components of Product Development



TOOLS SUPPORTING LEAN PRODUCT DEVELOPMENT

TOOLS- Cycle Time

PD Questionnaire
Company Databases
QFD
Risk Analysis
Work Cells
5S
Team Essential Disciplines
Spaghetti Charts
Handshake Charts
VIPS
Value Stream Mapping Tools
Waste Questionnaire
Simulation
Kaizen

TOOLS- Drawing, Production Package Quality

Concurrent Engineering
Company Databases
Design for Excellence Checklists
Six Sigma Scorecards
Process Failure Modes Effects Analysis
Lessons Learned Database
MASS

Aerojet Engineering
Value Stream Analysis
Kaizen Event
October 17, 2002

Aerojet Engineering VSM Event Summary

Event Description:
Conduct Value Stream Mapping (VSM) and Analysis of the Design Planning to Drawing Release Process and develop an improvement plan

Preliminary Objectives:
1. Review, analyze and identify improvement opportunities for Design Release Process (Design Release plan to Released drawing) and Create a future improvement Plan
2. Identify opportunities for reduction of Design Escapes for Meeting KRA Objectives
3. Provide mechanism for meeting Engineering objectives for Key Aerojet programs

Customer Requirements (TAKT Time):

Current State Process Information:

Event Dates: 10/14 – 17, 2002

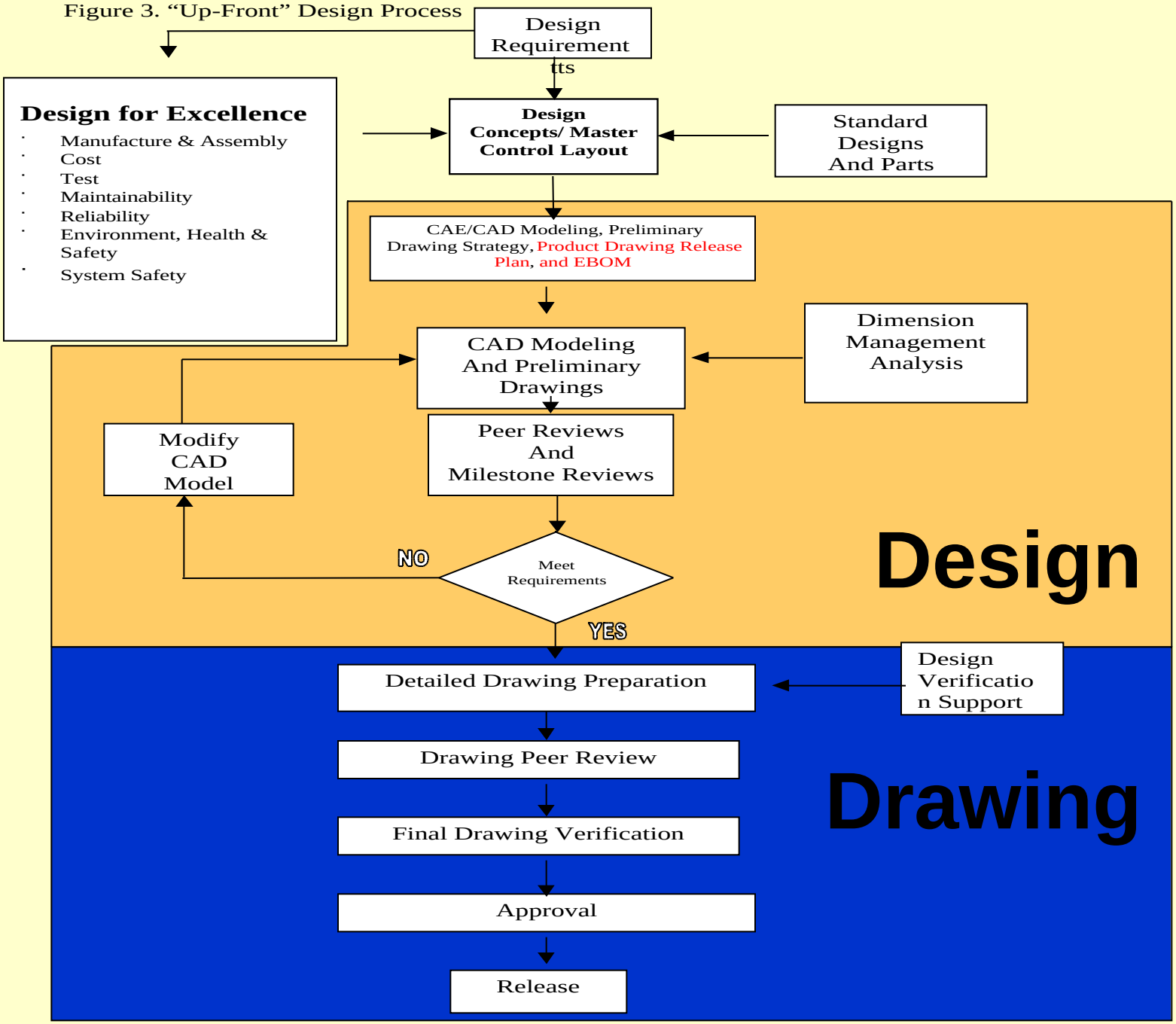
Facilitators: Adi Choudri, Ed Peterson, Andrew Parris (LMA)
Team Lead: Marvin young

Process Champion:
Marvin Young

Team Members From:
CM
CE/PE
DE
Analyst
Mfg.
Chk
Quality
Program
CAD
Master Schedule
Procurement

Current Situation:
Opportunity to be proactive and Design release to be Lean for all Aerojet Programs

Figure 3. "Up-Front" Design Process



Value Stream Analysis in 10 Steps

Step 1: Define The Boundaries

Step 2: Define The Value

Step 3: Define The Outcome

Step 4: Walk The Product/Service Flow

Prepare

Step 5: Observe And Gather Data

Step 6: Map The Value Stream

- Customer
- Product Flow
- Information Flow
- Other Data (Inventory, Takt, Etc.)

Current Conditions

Vision

Step 7: Analyze Current Conditions

Step 8: Develop Ideal State

Plans

Step 9: Develop Future State Map

Step 10: Develop Action Plans And Tracking

DEFINE THE VALUE

The Value to the End Customer IS:

Accurate Drawing

(Meeting all Requirements)

Timely/Span

Interfaces (ICD)

Producible/Cost Effective

Inspectible/Testable

A GOOD Drawing on time

Cost

The Value Added by this Area IS

Modeling & Drawing

with Basic Datum's & other times

All Information

(Customer Dependent)

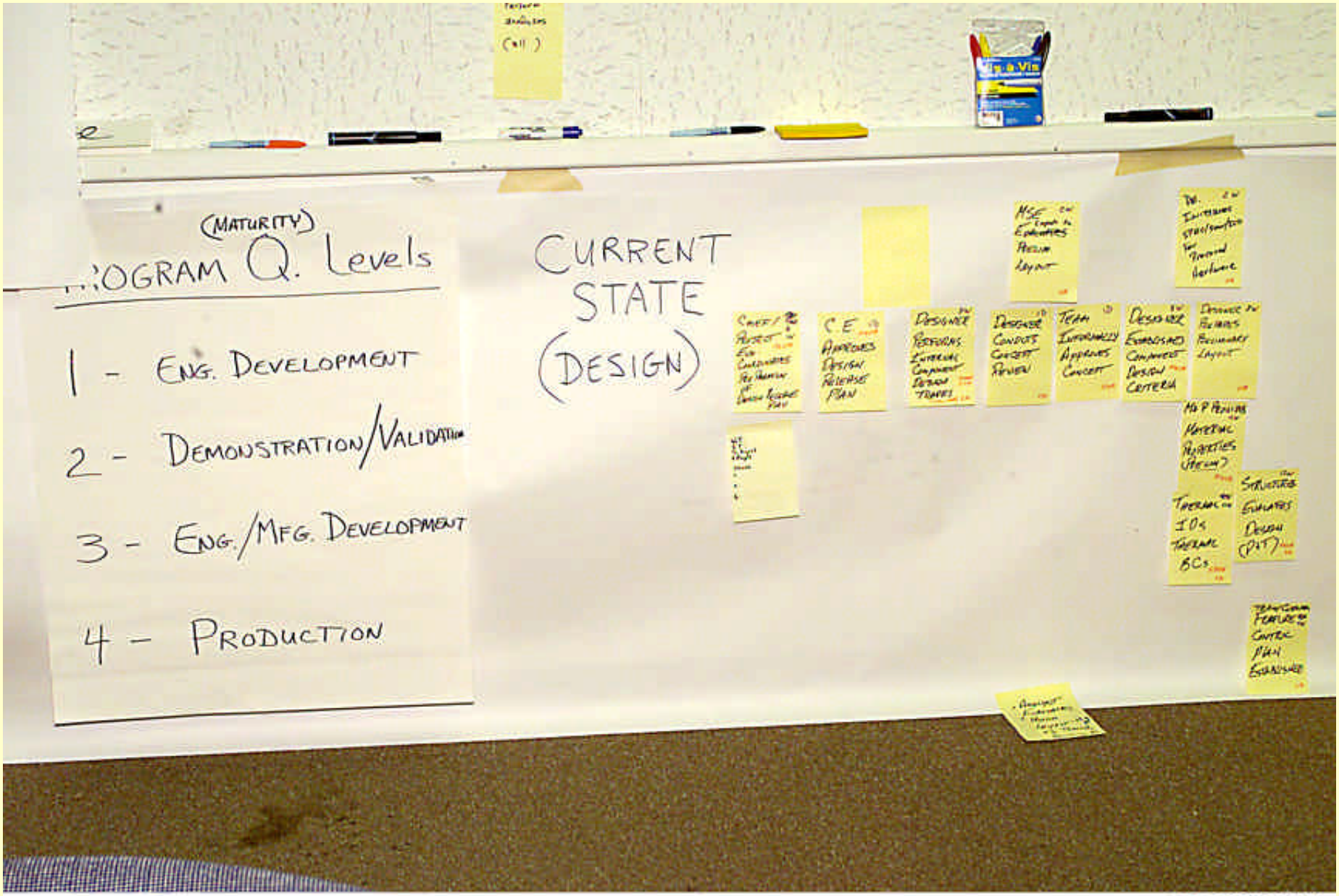
Key Measurements

- ***Rework (COPQ)/First Pass Yield***
- Performance to Schedule (SPI)
- Cycle Time
- ***Drawing/Model Quality***
- Hours/Drawing
- # of Class 1 Changes
- ***Customer Satisfaction***
- % Complete/Milestones

Ideal Goal

- ***1st Pass (Defect Free)***
- When Needed (On Schedule)
- W/I Budget
- No Formal Checks
- All CAD Models (No Paper)
- Up Front CAE/CAD Standardize Process
- 1 CAD System
- PC Based System
- Collaboration Capability
  - Supplier → Customers

Step 7: Current State Map



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Design Process—Ideal & Future State Vision

- Systems Engineering
  - Operates with standard System Engineering Tools, detailed command media, and trained SE's who understand roles & responsibilities—with defined metrics
- Standard Work
  - Team focused on value added innovation
  - Uses standard tools, criteria, designs, documents, and processes
- Improved Processes
  - Develop model-centered processes (CAE and others)
  - ***Gates and metrics to ensure appropriate design maturity at milestones***
- Training
  - IPT members trained in current design development process
  - Designers and analysts trained in use of CAE tools

Design Process—Recommended Improvement

	JDI
	Kaizen
X	Project
	Training

L Impact H		
		X
	L Effort H	

Estimated Event Dates/Duration/Resources:
Unknown

Process Owner:

Potential Team Members:

Implementation Cost:

Savings:

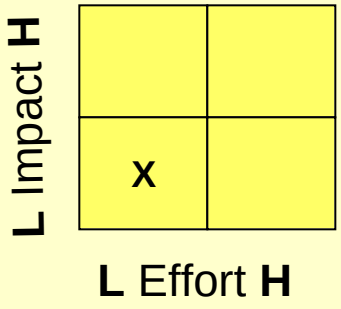
Event Title: Derive synopses of key requirements from major gov't specs. (1A)

Event Description:
Using the specifications required, extract or summarize the critical points into a standardized format or checklist.

Reason for Event :
Would save labor hours currently used to review each specification and streamline the current system.

Recommended Improvement

- [ ] JDI
- [ ] Kaizen
- [ ] Project
- [x] Training



Event Title: Program Maturity Level Understanding / Training. (3D)

Event Description:
Engineering (& others) need to become familiar with where a program fits with respect to its particular maturity.

Reason for Event :
The procedure which identifies and describes the maturity (or quality) level of a program was revised recently and there is a misunderstanding within Engineering as to where a program fits and why.

Estimated Event Dates/Duration/Resources:
1 person, time TBD

Process Owner:
Terry Pearson

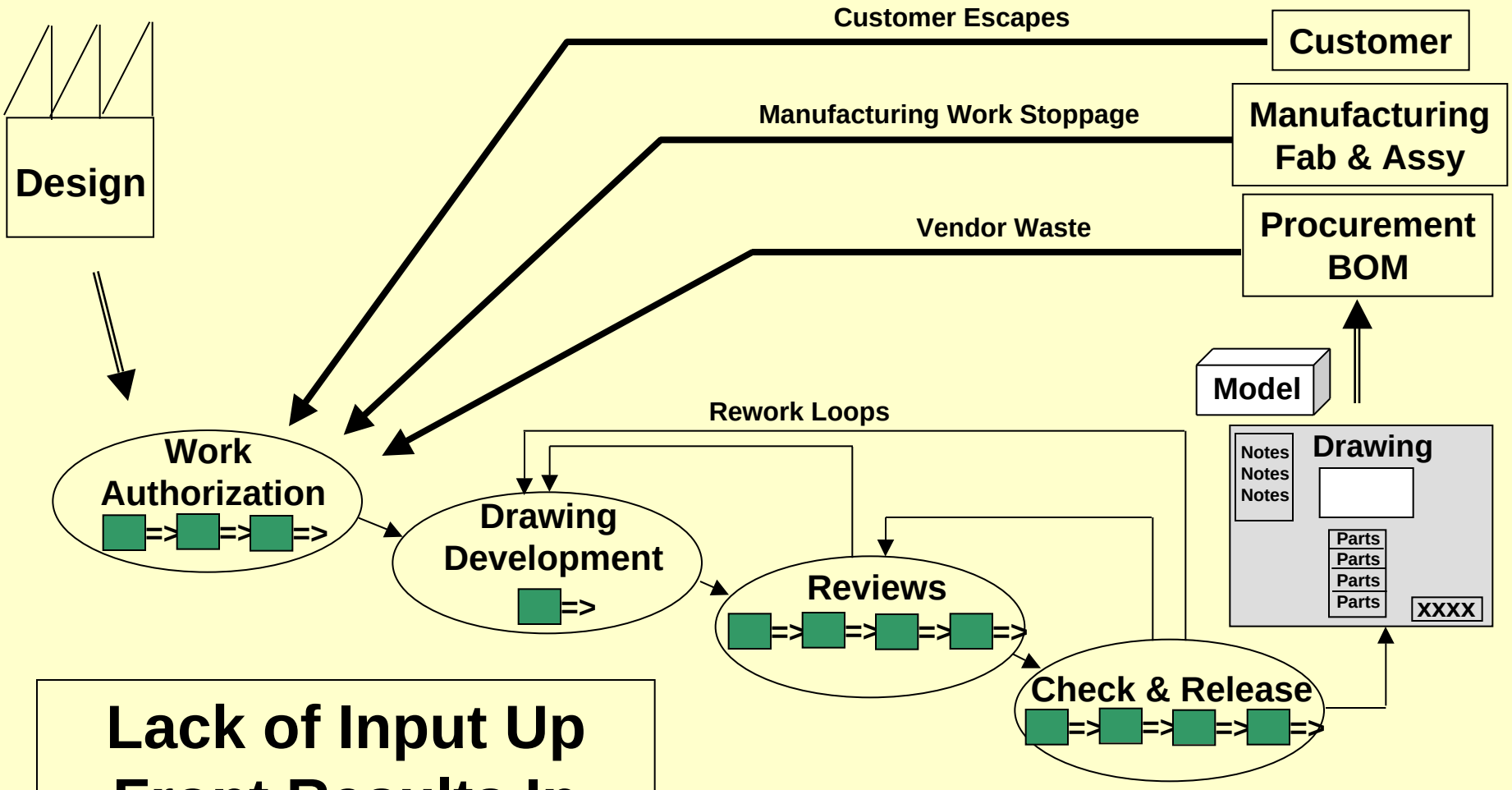
Potential Team Members:

Implementation Cost:

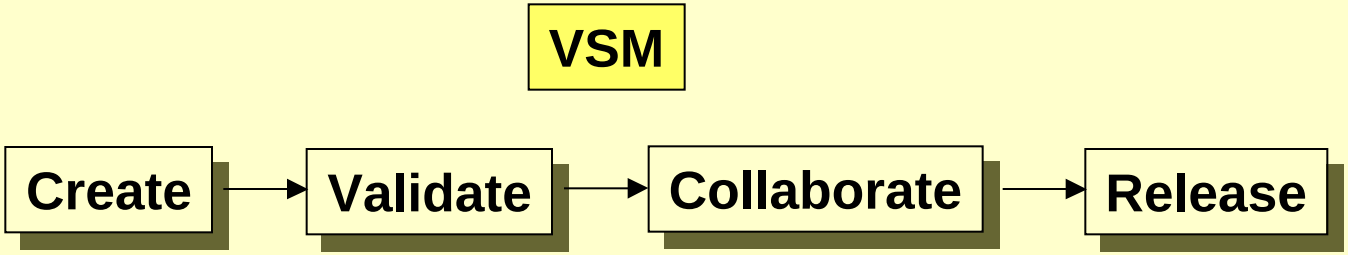
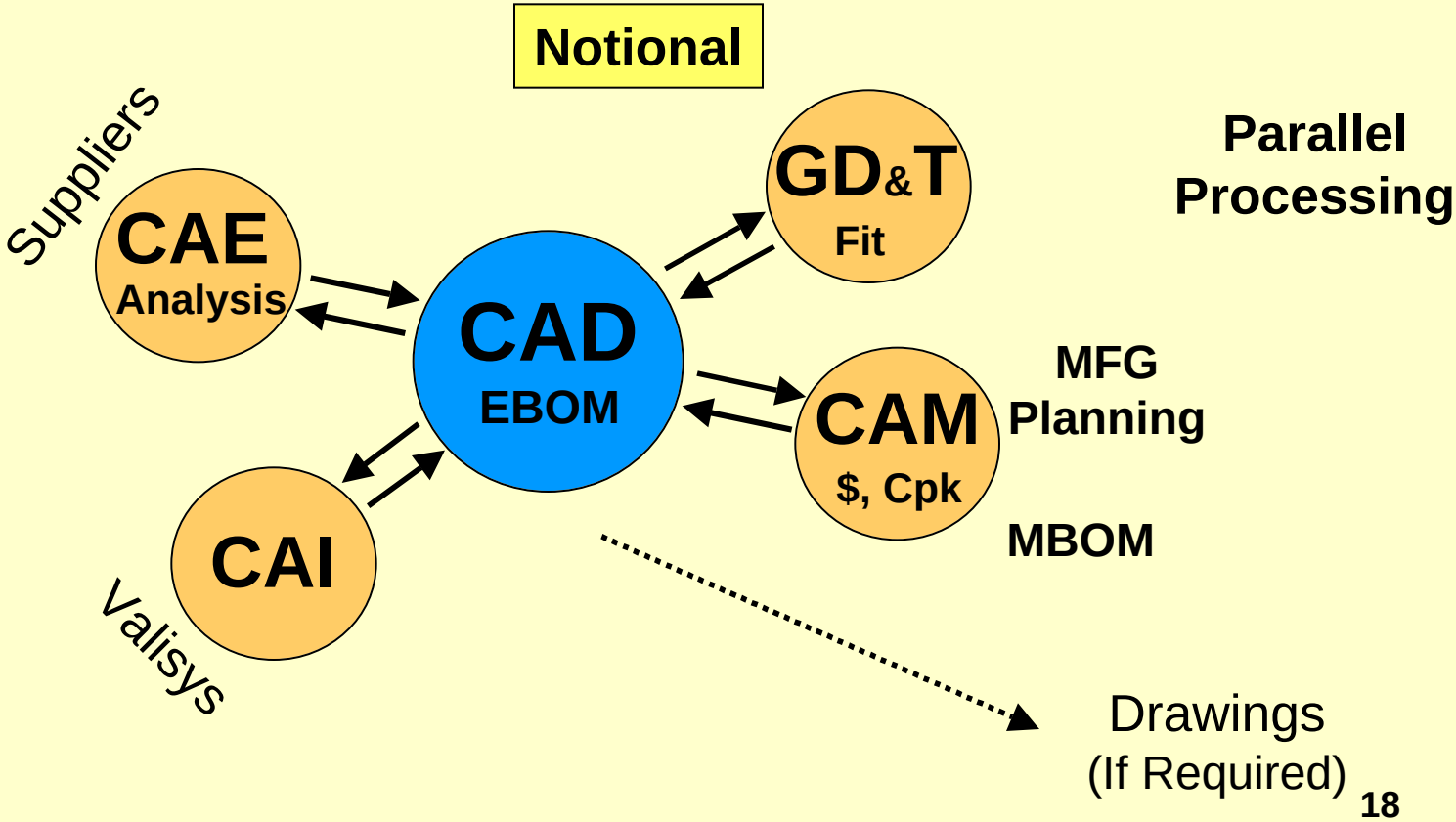
Savings:

Drawing Process

Current State: Too Much Rework



Lack of Input Up Front Results In Too Much Rework

Rework = Waste

Step 8: Develop Ideal State