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16.660 / 16.853 / ESD.62J Introduction to Lean Six Sigma Methods
January (IAP) 2008

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Implementing Lean

Change?, Ha!

“I’ve learned three things about new programs:

- Never oppose them; if you do you will get fired.**
- Never do any work on them.**
- In three months you will never hear about them again.**

I’ve been here 23 years, and I’ve seen 23 of these things come and 23 of them go.”

(Auto Supplier Supervisor)

Learning Objectives

At the end of this module, you will be able to:

- **Describe important steps of implementing Lean principles and practices.**
- **List the barriers to implementation of Lean principles and practices**
- **Apply basic planning tools for implementing a Lean improvement project**

Success Requirements for a Journey

Leadership



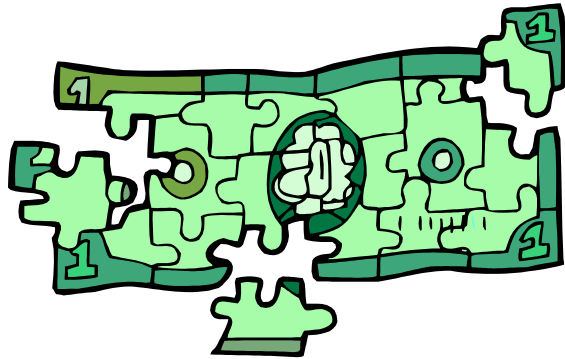
Commitment

The challenges of implementation:

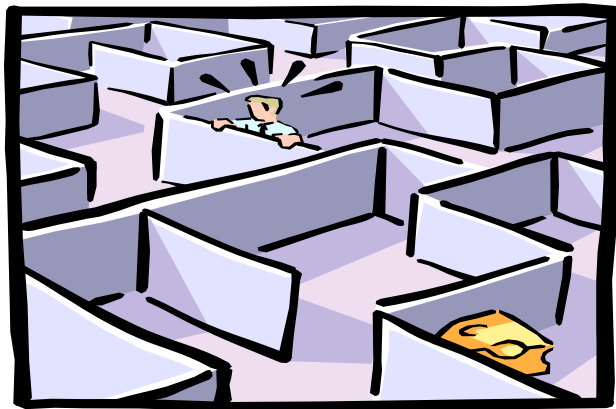
- Lean principles are simple - “a focused application of common sense¹”
- The challenge is implementing them - and sustaining the transformation
- Transforming thinking into behavior and action is complex
- Every journey is unique

¹ Dave Driscoll, Sikorsky

Big Question ?



How do you implement and sustain transformational change initiated by your lean activities?



Implementing Lean : A Short Class Discussion

- **How would you answer some of the questions about implementing lean:**
 - **Where should we start?**
 - **What tools and techniques are available?**
 - **How will progress be measured?**
 - **What will be the biggest challenges?**

Transition to Lean Roadmap

Entry/Re-entry Cycle

Adopt Lean Paradigm

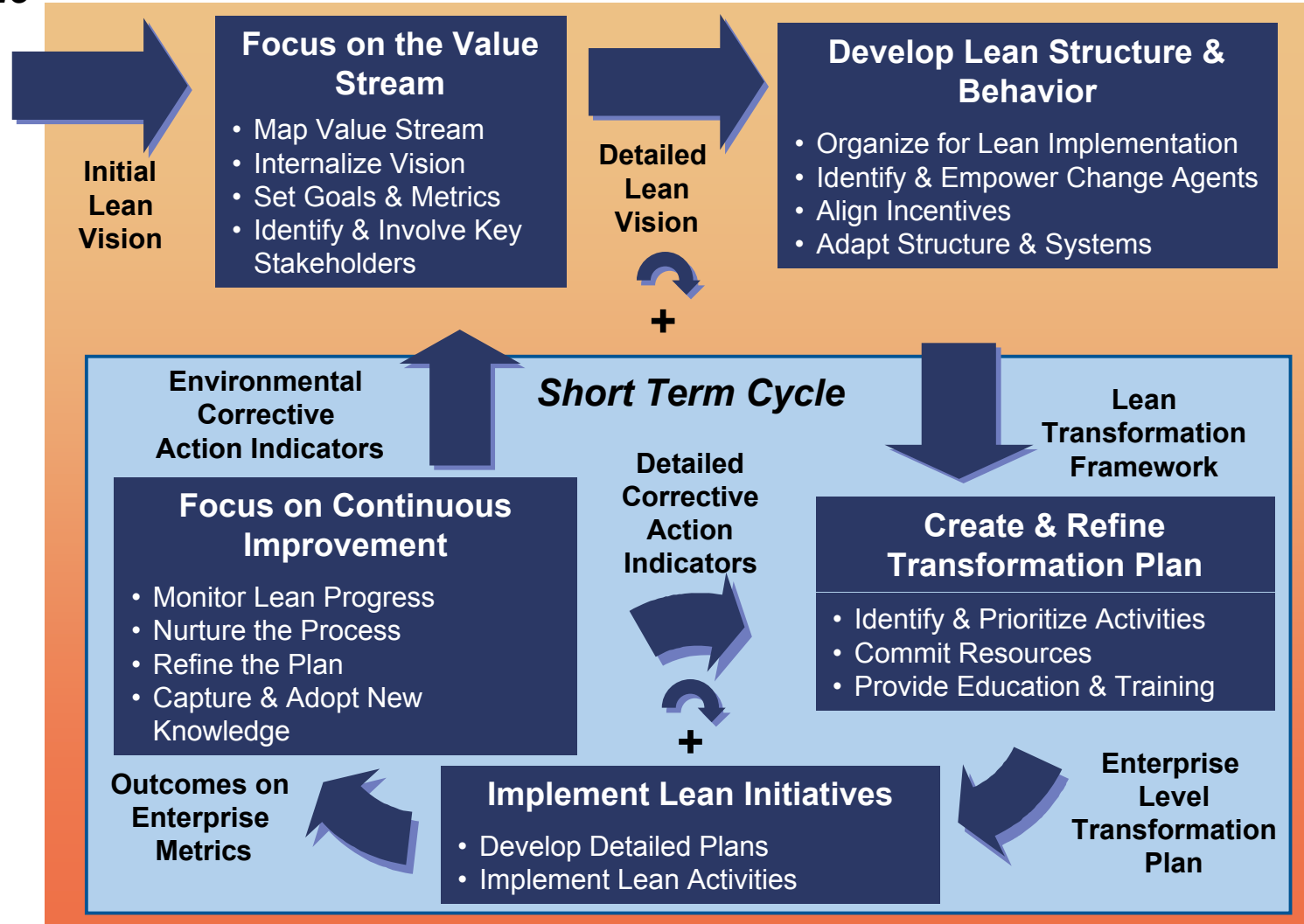
- Build Vision
- Convey Urgency
- Foster Lean Learning
- Make the Commitment
- Obtain Senior Mgmt. Buy-in

Decision to Pursue Enterprise Transformation

Enterprise Strategic Planning

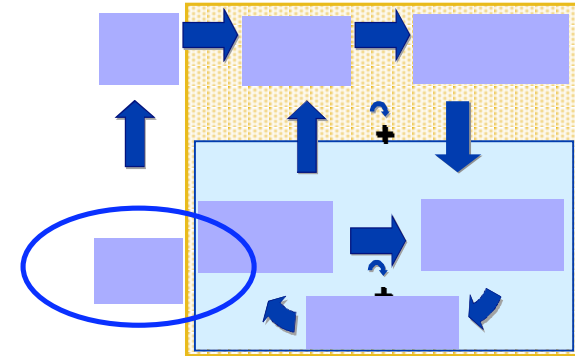
- Create the Business Case for Lean
- Focus on Customer Value
- Include Lean in Strategic Planning
- Leverage the Extended Enterprise

Long Term Cycle



Entry/Reentry Cycle

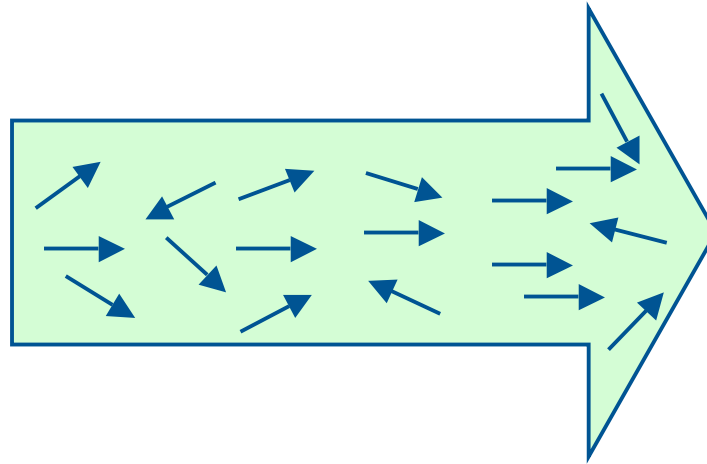
Enterprise Strategic Planning



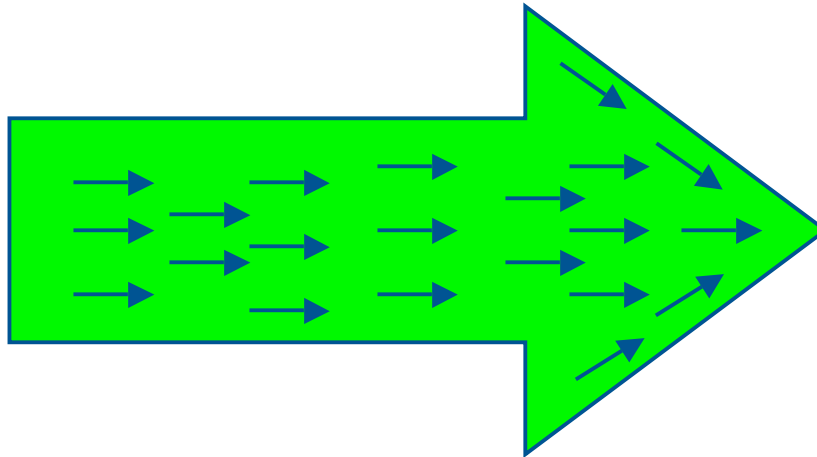
- Create the business case for lean
- Focus on customer value
- Include lean in strategic planning
- Leverage the extended enterprise

Enterprise Leader Establishes and Communicates the Vision

Groups that lack vision

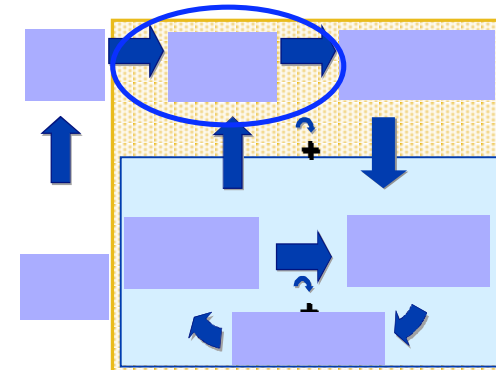


Groups with vision



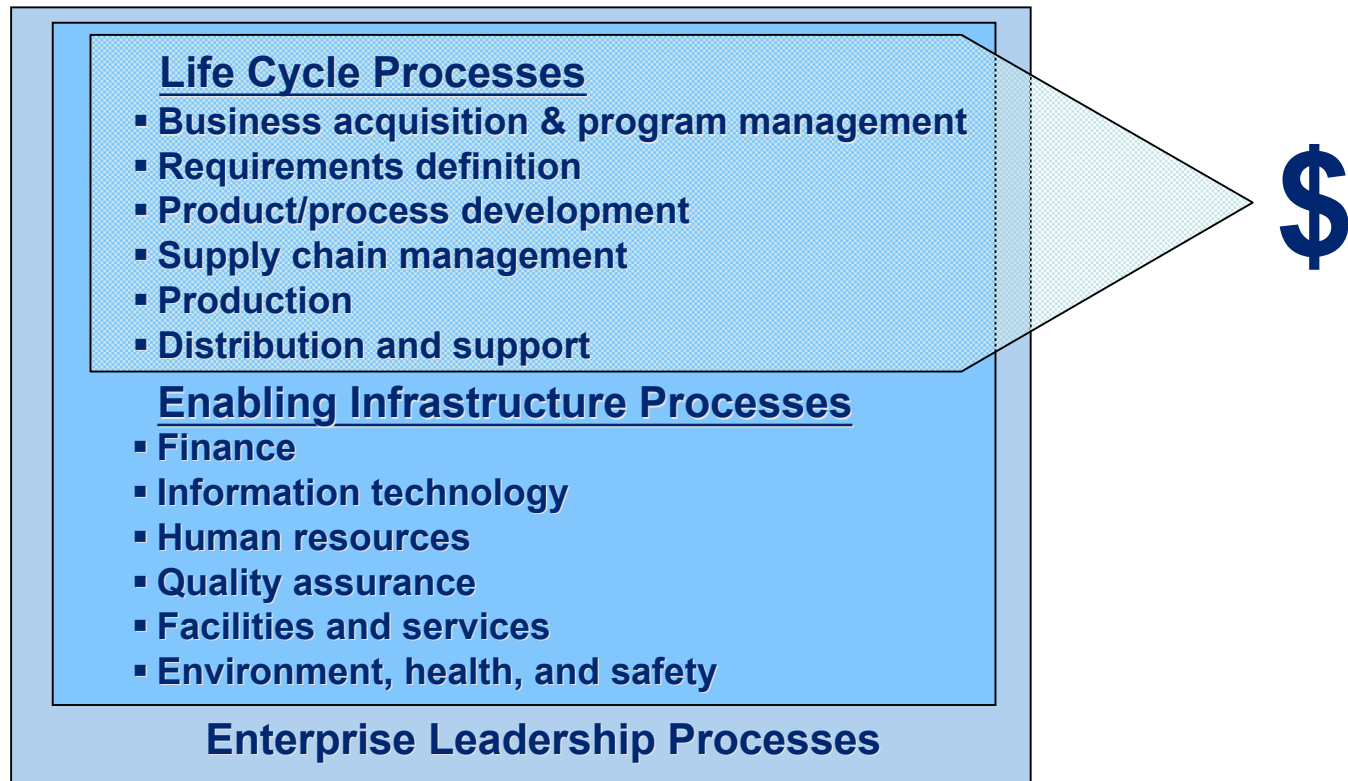
Long Term Cycle

Focus on the Value Stream



- Map the value stream
- Internalize the vision
- Set goals and metrics
- Identify & involve key stakeholders

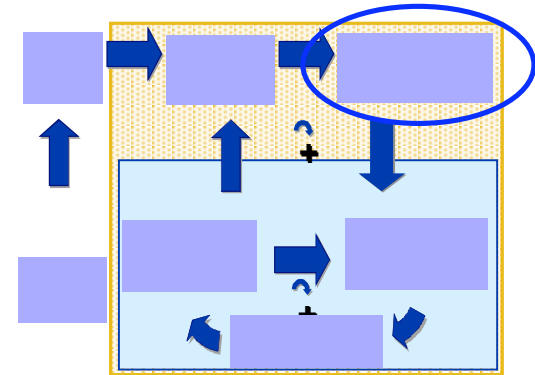
Lean Applies to All Enterprise Processes



**All enterprise processes have value streams -
but not all can be tackled at once.**

Long Term Cycle

Develop Lean Structure & Behavior



- Organize for lean implementation
- Identify & empower change agents
- Align incentives
- Adapt structure & systems

Organizing for Lean

Mass Organization

- Organized by function
- Departments - silos
- Many job categories
- Vertical structure
- Bosses give directions
- “Up and down” communication
- Focus on product
- Suppliers at arms length
- Bureaucratic, sluggish

Lean Organization

- Organized by value stream
- Teams - multi functional
- Few job categories
- Horizontal structure
- Bosses facilitate
- Pervasive and rapid communication
- Focus on customer
- Suppliers as partners
- Flexible, agile

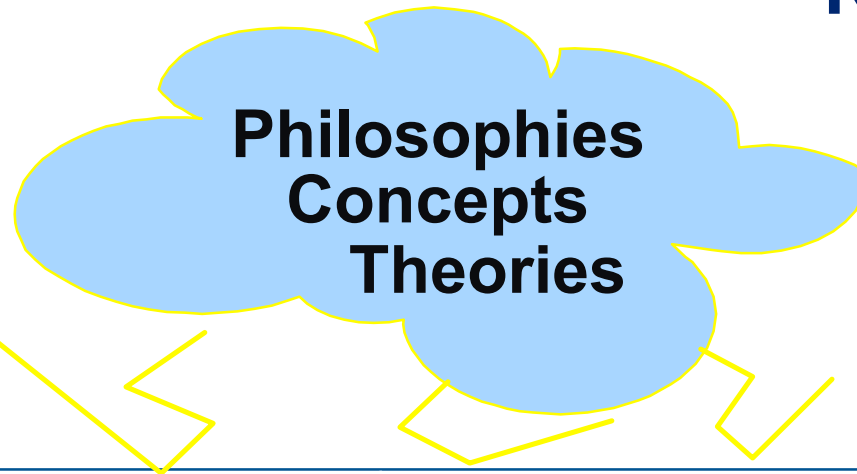
Lean implementation requires *fundamental* changes

Role of Enterprise Leader

- **Develop enterprise level goals and metrics that encourage and promote Lean**
- **Identify and support Change Agents**
- **Promote leadership and risk taking at all levels**
- **Empower teams and individuals**
- **Remove barriers**
- **LEAD!!!**

Lean implementation requires *effective leadership*

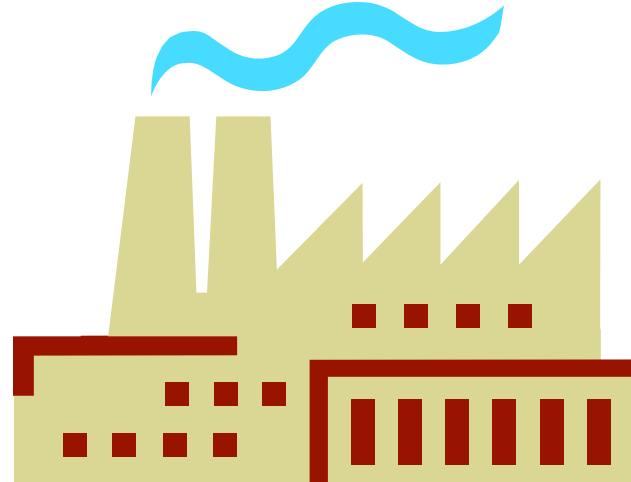
Barriers Inhibit Adopting New Concepts



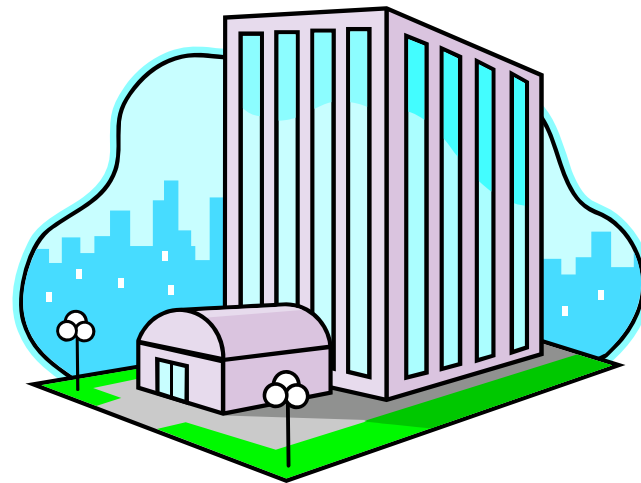
Barriers

Roadblocks

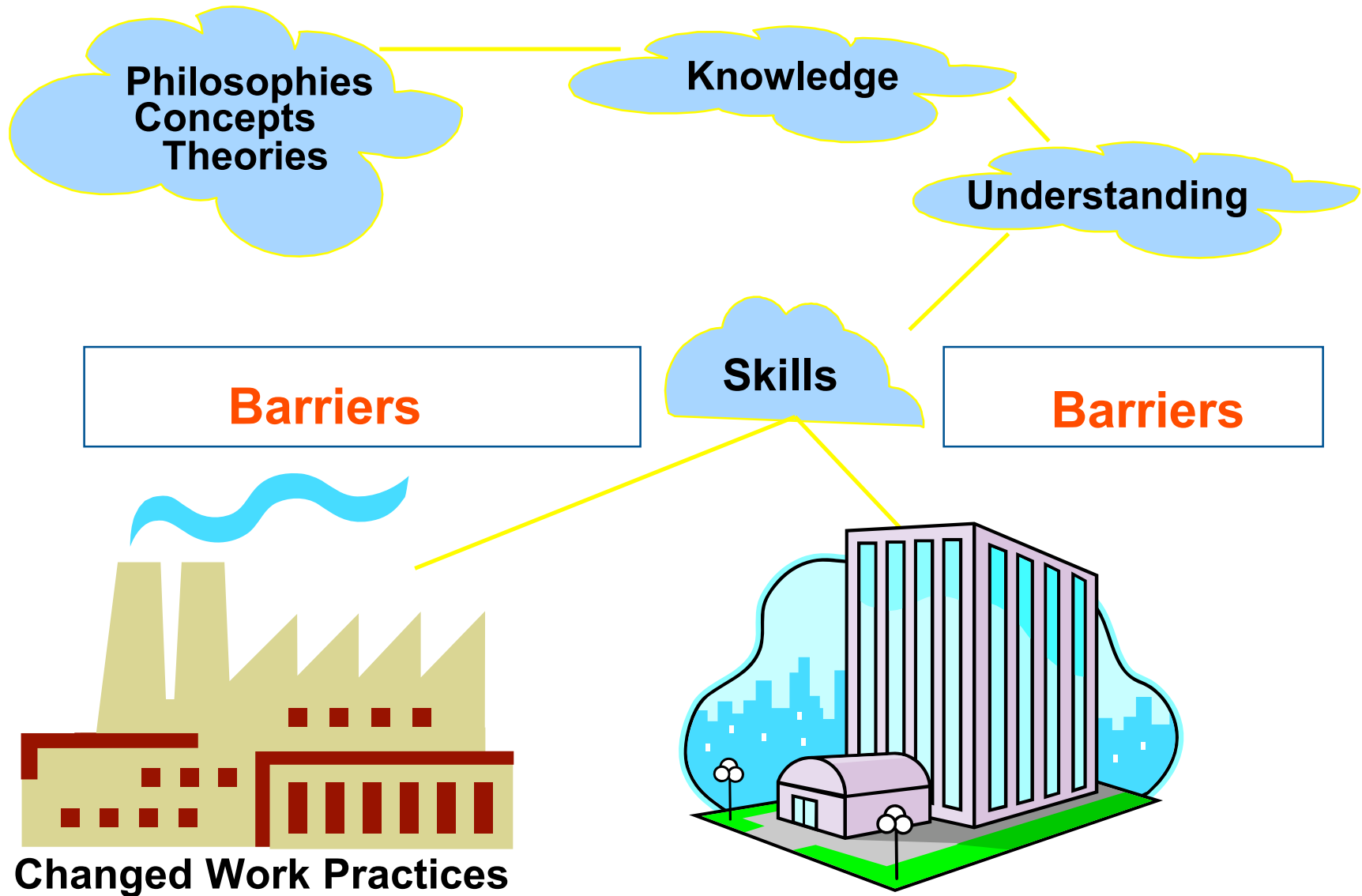
NIH	Politics	Resistance To Change	Mixed Signals	Lack of Trust	Skepticism	Lack of Commitment	Inconsistent Direction
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Changed Work Practices

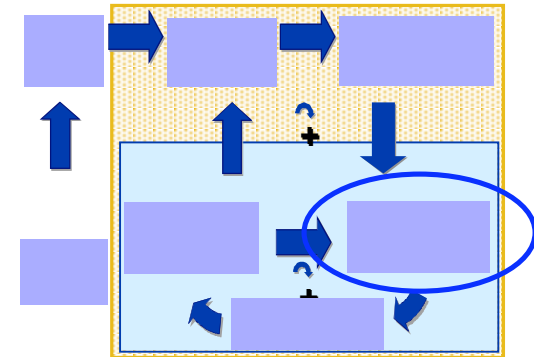


Knowledge, Understanding, Skills Breakthrough Barriers



Short Term Cycle

Create & Refine Transformation Plan



- Identify & prioritize activities
- Commit resources
- Provide education and training

Toyota A3 Sheet

Title: What you are talking about.

Background

*Why you are talking about it.
What is the business context?*

Current Situation

*Where do we stand?
Where we need to be?
Where we want to be?*

Analysis

*-What is the root cause(s) of the problem?
-What requirements, constraints and alternatives need to be considered?*

Goal

What is the specific change you want to accomplish now?

Recommendations

What is your proposed countermeasure(s)?

Plan

What activities will be required for implementation and who will be responsible for what and when?

Follow - up

How we will know if the actions have the impact needed? What remaining issues can be anticipated?

A3 Sheet Example

Acme Stamping Steering Bracket Value Stream Improvement

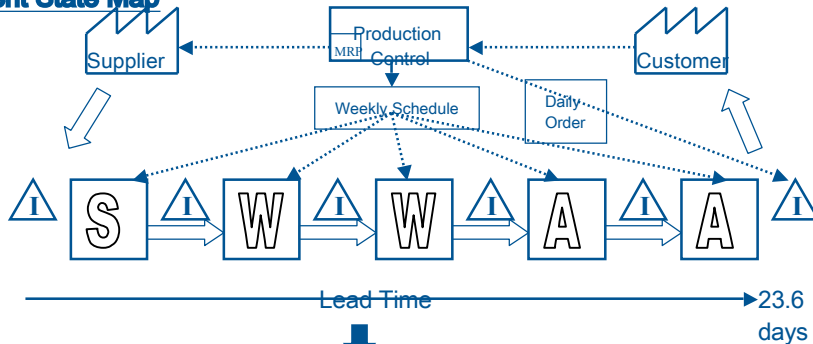
Background

- Product: stamped-steel steering brackets (left- and right-hand drive).
- 18,400 brackets/month; daily shipments in pallets of 10 trays of 20 brackets.
- **Customer State Street Assembly is requesting price cuts and tightening delivery requirements.**

Current Situation

- Production Lead time: 23.6 days
- Processing time: only 188 seconds.
- Large inventories of material between each process.
- Long changeover times; downtime in welding.

Current State Map



Analysis

- Each process operates as isolated islands, disconnected from customer.
- Push system; material builds up between each process.
- Each process builds according to its own operating constraints (changeover, downtime, etc).
- Plans based on 90 and 30-day forecasts from customer. Weekly schedule for each department. System is frequently overridden to make delivery.

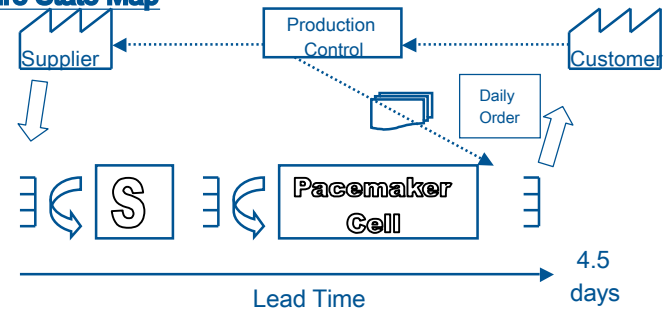
Goals:

- Improve profitability while meeting tougher customer demands:
- Reduce lead time – 23.6 days to ≤ 5 days
- Reduce inventories: Stamping – ≤ 2 days
- Welding – Eliminate
- Shipping – ≤ 2 days

Countermeasures :

- Create continuous flow in through Weld and Assembly
- Establish Takt Time: Base the pace of work through Weld and Assembly on customer demand
- Set new Weld-assembly cell as pacemaker for entire value stream
- Establish EPEX build schedule for stamping based on actual use of pacemaker cell and pull steel coils from supplier based on actual usage by Stamping.
- Reduce Changeover time in Stamping and Weld
- Improve uptime in Weld
- Establish material handling routes for frequent withdrawal and delivery
- Establish new production instruction system with Leveling Box

Future State Map



DELIVERABLES	1	2	3	4	5	6	7	8	9	10	11	12	RESPONSIBLE	REVIEW
CCF at Pacemaker	●	○	○	○	○	○	○	○	○	○	○	○	Smith (IE)	Plt Mgr VSMgr
Kaizen each c/t to <TT	○	○	○	○	○	○	○	○	○	○	○	○		
Weld uptime to 100%	○	○	○	○	○	○	○	○	○	○	○	○	Jones (PC)	Plt Mgr, MH Mgr VSMgr
c/o reduction to <TT	○	○	○	○	○	○	○	○	○	○	○	○		
Pull at Pacemaker	○	○	○	○	○	○	○	○	○	○	○	○	Jones (PC)	Plt Mgr MH Mgr VSMgr
FG = 2 days	○	○	○	○	○	○	○	○	○	○	○	○		
KB	○	○	○	○	○	○	○	○	○	○	○	○	Durham (Mt'l)	Plt Mgr MH Mgr VSMgr PC Mgr Plt Mgr VSMgr
Mt'l handling	○	○	○	○	○	○	○	○	○	○	○	○		
Leveling Box	○	○	○	○	○	○	○	○	○	○	○	○		
Pull from Stamping	○	○	○	○	○	○	○	○	○	○	○	○		
WIP = 1 day	○	○	○	○	○	○	○	○	○	○	○	○		
c/o < 10 min	○	○	○	○	○	○	○	○	○	○	○	○		
Pull from Supplier	○	○	○	○	○	○	○	○	○	○	○	○		
Info flow	○	○	○	○	○	○	○	○	○	○	○	○		
Daily delivery	○	○	○	○	○	○	○	○	○	○	○	○		
RM = 1.5 days	○	○	○	○	○	○	○	○	○	○	○	○		

Follow-up

Confirm reviews and involvement of related departments: Production Control and Material Handling, Purchasing, Maintenance, Human Resources, Finance.

Toyota A3 Sheet

Title:

Background	
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Current Situation	
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Analysis	
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Goal	
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Recommendations	
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Plan	
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Follow - up	
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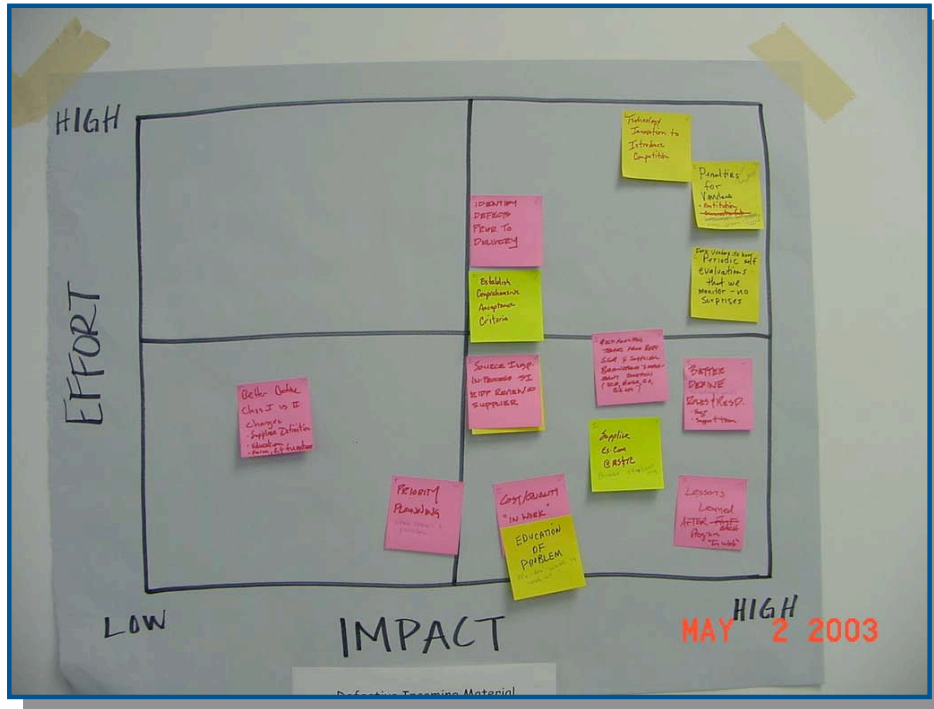
A3 Exercise

- **Join your team that prepared the Accounts Payable Value Stream Map**
- **Develop an A3 plan to respond to Question 8 - “Suppose you are the RPI team leader and have to report back to Joanie. What will you recommend?”**
- **Spend 20 minutes preparing your A3 plan**
 - **Verify that the provided information is correct**
 - **Complete the additional information blocks**
- **Present the A3 to the class as if you were meeting with Joanie.**

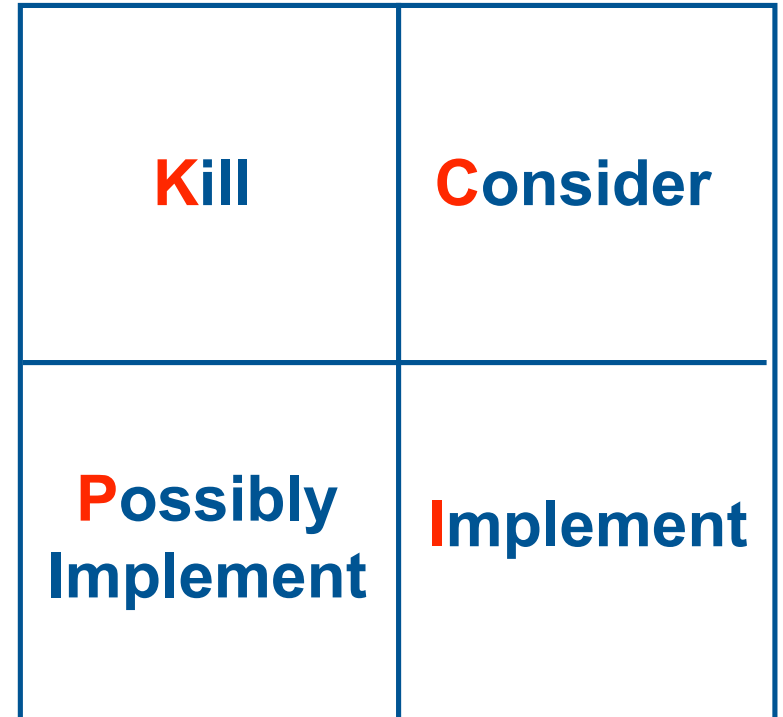
Project Selection

- **Projects are identified from the Value Stream Map**
- **Determine the possible impact of each project on the enterprise**
- **Do the anticipated results lead to the envisioned future state?**
- **Possible analysis tools:**
 - **PICK charts - simple and intuitive prioritization**
 - **Pareto charts - data driven prioritization**
 - **Cost/Benefit analysis - prioritization based upon return on investment**

PICK Charts

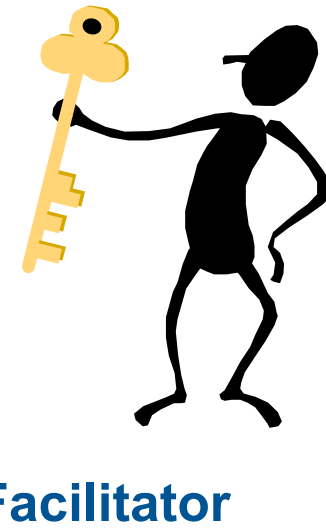
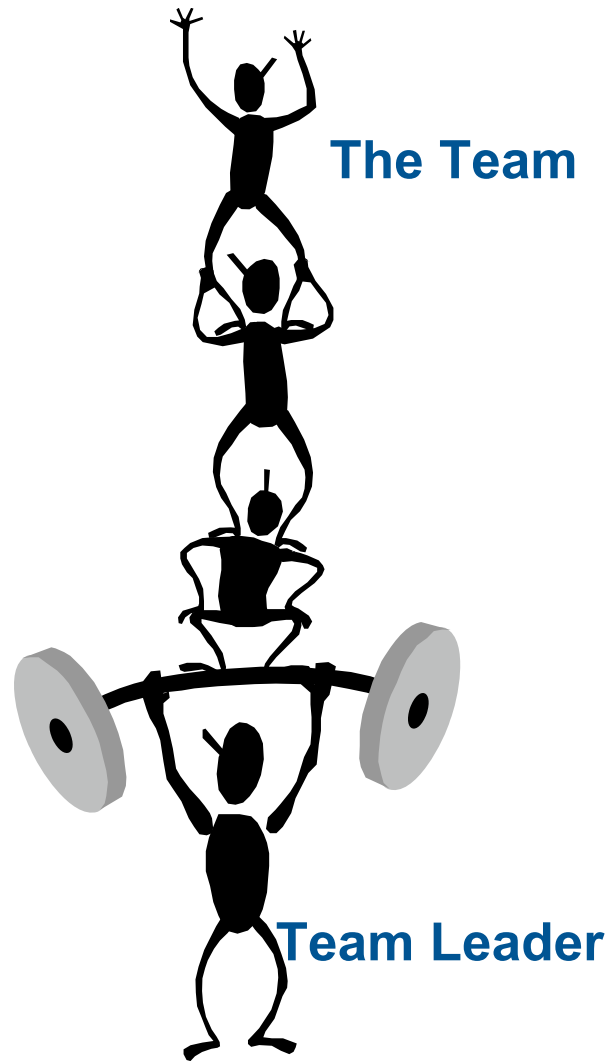
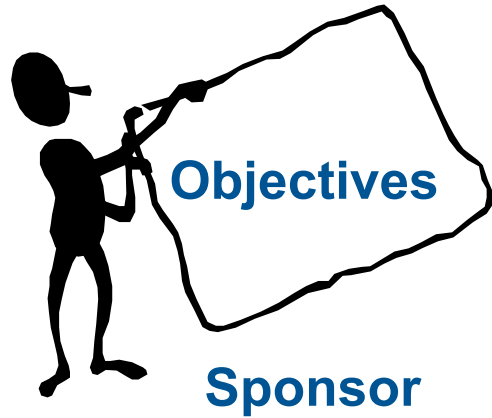


Organize Possible Projects



Prioritize Actions

Roles in Lean Implementation



Provide Education and Training

- **Prepare and motivate people**
 - Train workers in tools and appropriate skills
 - Create common understanding of need to change to Lean
- **Employee involvement**
 - Decision-making and system development happens at the appropriate level
 - Trained and truly empowered people
- **Share information and manage expectations**
- **Identify and empower champions, particularly operations managers**
 - Remove roadblocks (i.e., people, layout, systems)
 - Make it both directive yet empowering

Project Charter Template

Project Description:

One or two sentences that describe the team's task

Start Date:

Team Leader: Person responsible for pre- and post-work follow-up.

Co-Leader:

Preliminary Objectives:

The objectives are the measurable outcomes that the sponsor desires from the project. Usually two or three measurable objectives along the lines of reducing cycle time, handoffs, approvals, defects and/or costs are included.

Team Members: People that need to participate on the team

Value :

The value to the end customer is...?

The portion of the value-added by this project area is...?

Process Owner: Person(s) who owns the process

Facilitator: Person who facilitates the event

Process Information:

Should include:

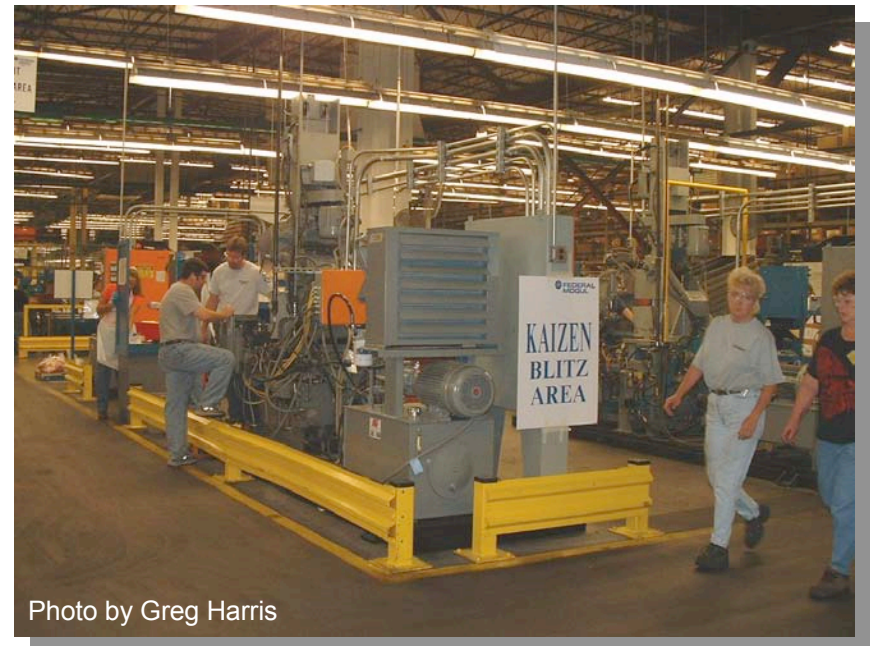
- Project boundaries (where does this process begin and end)
- Any commandments or monuments
- Listing of available process data

Case For Action:

One or two sentences that describe the problem the team is addressing and answer the "Why this project, why now?" question

Kaizen Event

- **Kaizen is the process of:**
 - Identifying & eliminating waste
 - as quickly as possible
 - at the lowest possible cost
- **Kaizen requires:**
 - Continuous, gradual, persistent improvement
 - by all employees and management



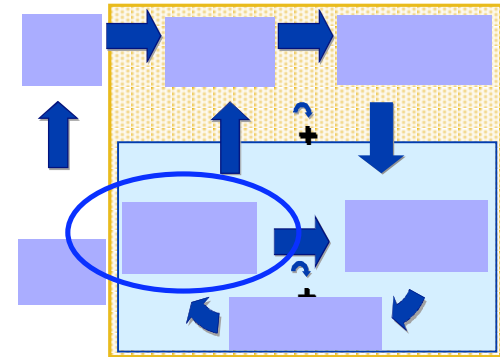
Courtesy of Gregory Harris. Used with permission.

- **Kaizen utilizes:**
 - Cross functional team
 - Focused scope
 - Aggressive goal

Short Term Cycle

Focus on Continuous Improvement

- Monitor lean progress
- Nurture the progress
- Refine the plan
- Capture and adopt new knowledge



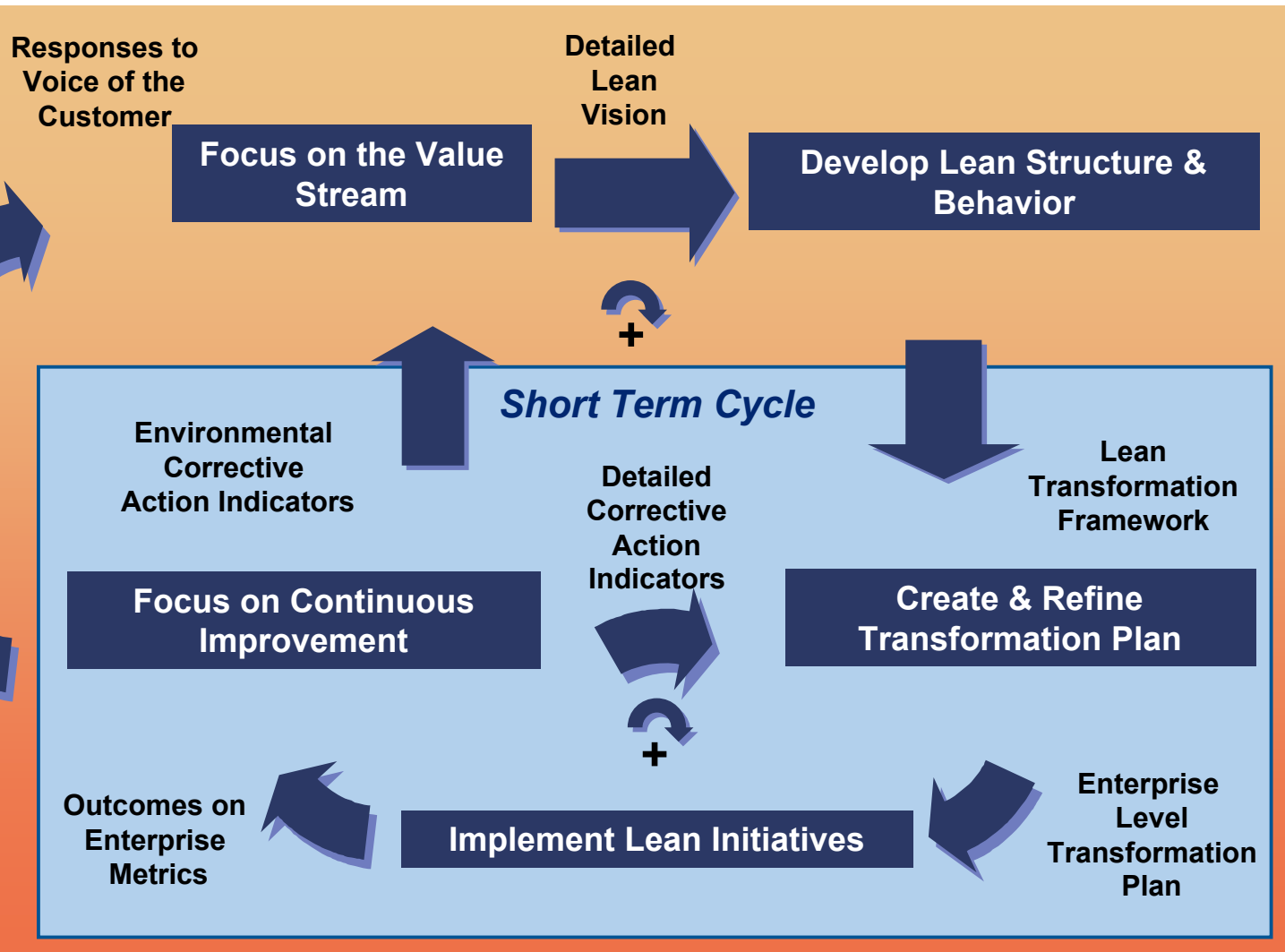
Sustaining Lean

- **Lean must be self sustaining**
- **Invest in the process**
- **Invest in humans and machines to change methods**
- **Neglected processes need to be repaired to bring reliability**
- **Do not use to reduce head count**
- **Do not be in the business for next month's P&L statement , change takes a while**

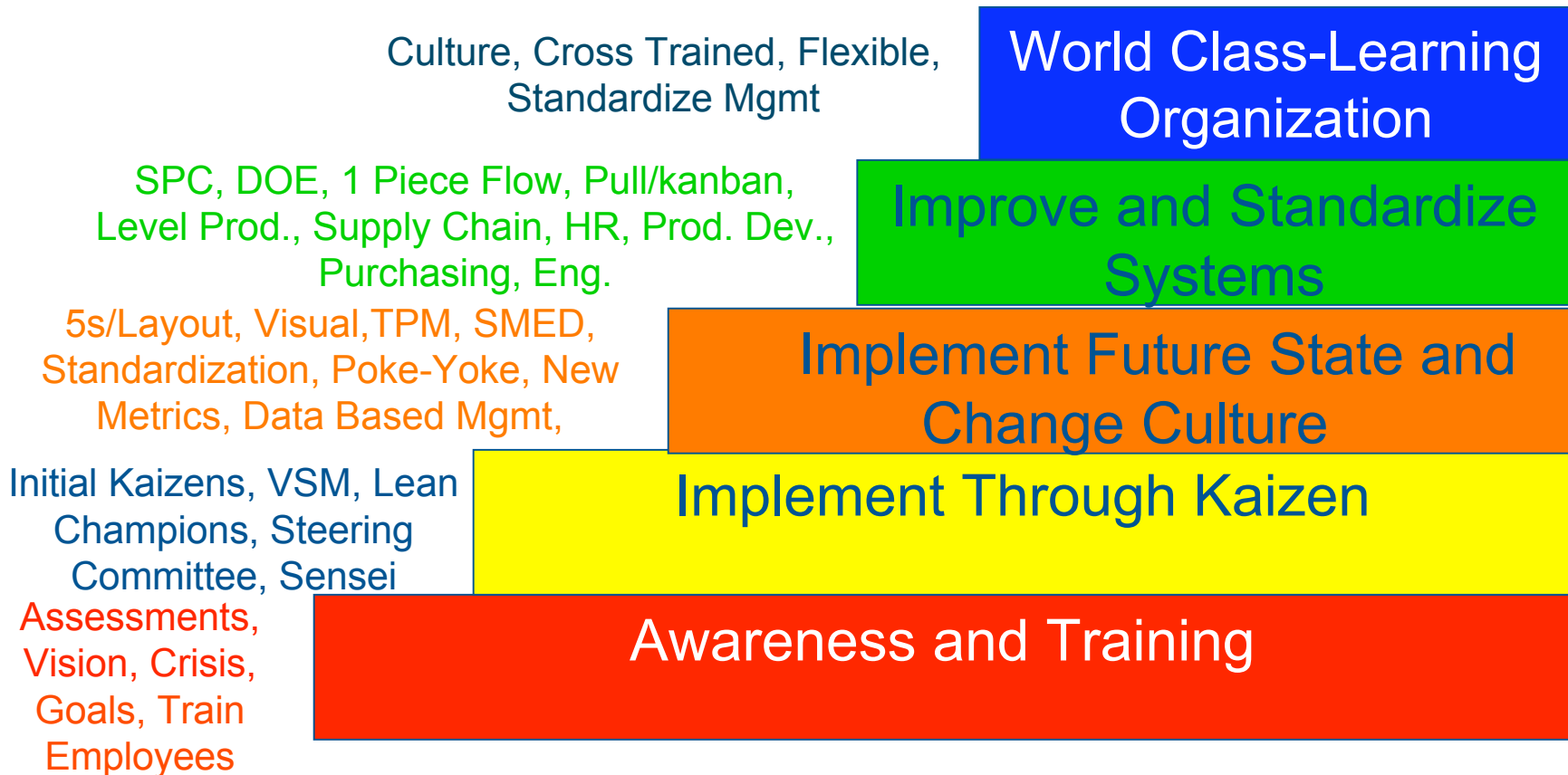
The Ongoing Lean Enterprise

Long Term Cycle

Re-entry Cycle



The Lean Journey



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Take Aways

- **Effective implementation of lean requires**
 - **Aligning action with strategy**
 - **Focus on value streams**
 - **Leadership and organizational change**
 - **Training and empowering the workforce**
 - **Tracking metrics**
 - **Plan-Do-Check-Act cycles at multiple levels**
 - **Sustaining commitment**
- **What you have learned this week prepares you to actively participate in lean improvement projects in your organization**

Reading List

Continuous Process Improvement Transformation Guidebook, DoD, May 2006

Kaplan, R. and Norton, D., The Balanced Scorecard, Harvard Business School Press, Cambridge, 1996

Kotter, J. Leading Change, Harvard Business School Press, Cambridge, 1996

Murman, E. et al, Lean Enterprise Value: Insights from MIT's Lean Aerospace Initiative, Palgrave, Mar 2002, Ch 6

Senge, Peter, The Fifth Discipline, Doubleday, 1990, pp. 150-151.

Transition To A Lean Enterprise: A Guide for Leaders, Lean Aerospace Initiative, Sept 2000

- **Vol I: Executive Overview**
- **Vol II: Transition-To-Lean Roadmap**
- **Vol III: Roadmap Explorations**

Acknowledgements

- **Greg Harris – The University of Alabama in Huntsville**
- **Earl Murman - MIT**
- **Steve Shade - Purdue University**
- **Jeff Sinard - The University of Alabama in Huntsville**
- **Alexis Stanke – MIT**
- **Ken Sullivan – The University of Alabama in Huntsville**