Lean 6-Sigma

Caltrans & Continuous Improvement

Tammy Roberts
Administration Strategic Planning Advisor
Goal 5: Organizational Excellence
1. Why Lean 6-Sigma?
2. What is Lean 6-Sigma?
3. Lean vs. 6-Sigma
4. Lean Principles & Tools
5. Lean 6-Sigma
WHY Lean 6-Sigma?

• L6S is a methodology, a way to improve processes
• Continuous Improvement
• Finding new and better ways of doing things
• Innovation
• Culture of Sustainability
Challenge the Process
Mission

“Provide a safe, sustainable, integrated and efficient transportation system to enhance California’s economy and livability.”
Vision & Values

“A performance-driven, transparent and accountable organization that values its people, resources and partners, and meets new challenges through leadership, innovation and teamwork.”
Unpacking our Caltrans Vision

<table>
<thead>
<tr>
<th>Performance Driven</th>
<th>L6S helps us to be Performance Driven, by improving and increasing our performance without additional resources. Also, because it is team-driven, it increases employee engagement, which fuels a performance-driven environment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparent and Accountable</td>
<td>L6S helps make us Transparent and Accountable, because we document and communicate our processes.</td>
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<tr>
<td>Values our People, Resources and Partners</td>
<td>L6S helps us Value our People by listening to their ideas and solutions for process improvement. It helps us to value our Resources by eliminating wasteful practices, and to value our partners, because we include them in our process improvements—understanding that our processes impact them and are impacted by them.</td>
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<tr>
<td>Meets new Challenges through Leadership, Innovation &amp; Teamwork</td>
<td>L6S helps us to meet challenges because our leadership has adopted L6S and recognizes the power of innovation and teamwork. L6S is an innovation process and it is always done through a team.</td>
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Why Focus on Process?

85%

Processes

85% of improvement opportunities are here

Services
Products
Outputs

Customer Value
What is Lean 6-Sigma?

What Is Lean Six Sigma?

LEAN
Reduces waste by streamlining a process.

SIX SIGMA
Reduces defects by effectively solving problems.

LEAN SIX SIGMA
LEAN accelerates SIX SIGMA: Solving problems and improving processes is faster and more efficient.
WHAT is Lean?

“A systematic method for the elimination of waste within a system to improve value to customers.”
Lean and Common Misconceptions

Lean is…

- A time-tested continuous improvement methodology
- Non-proprietary (i.e., free)
- Driven by the people who do the work (not top down)
- An investment in fellow employees
- A set of tools to identify and eliminate waste
- Always delivering value to the customer on demand

Misconceptions

- An acronym (LEAN)
- A solution for personnel and performance issues
- An initiative to reduce staff
- A silver bullet or a quick fix
- A “manufacturing thing”

Lean does not require special expertise.
Lean & 6-Sigma Timeline


Eli Whitney
Interchangeable Parts

Frederick Taylor
Time Studies and Standardized Work

Henry Ford
Interchangeable Assembly Lines

Kiichiro Toyoda and Taiichi Ohno
Toyota Production System

Denver Peak Academy Lean Adoption

GovOPS established


Jack Welch & G.E.
6-Sigma (1995)

Frank & Lillian Gilbreth
Motion Studies & Process Charts

Shewhart, Deming, & Juran
Statistical Process Control

Motorola 6-Sigma (1981)

GO-Biz starts Lean/Six Sigma

Eureka Institute

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Eureka Institute
Five Principles of Lean

1. Identify Customers and Specify Value
2. Identify and Map the Value Stream
3. Continuously Seek Perfection
4. Deliver Value based on Demand
5. Deliver Value without Waste
Delivering Value on Demand

Netflix

Amazon

Uber

Amazon Go
Lean Tools

- PDCA – Plan, Do, Check, Act
- A3 – The Lean Storyboard
- Process Mapping & The Value Stream
- Value Added, Non-Value Added, BN-NVA
- The 8 Wastes
- Spaghetti Mapping
- The 5-S Tool
- Standard Work
- The 5 Why’s – Root Cause Analysis
Tool #1: PDCA

PDCA Diagram

PLAN

DO

CHECK

ACT
**P1 | Why Change is Needed**

Sample Questions
- Why are we doing this?
- What is the burning platform?
- What is the chief complaint?
- What is the impact of this issue?
- Intent of the action
- Scope – Start & end points

**P2 | Current State**

Describe attributes of the current state:
- Quantitative
  - (Money/Errors/Amounts/Time)
- Qualitative

Graphically present picture of Current State

**P3 | Future State**

Describe attributes of the future state:
- Quantitative
  - Money/Errors/Amounts/Time
  - Are metrics defined and achievable?
- Qualitative

Graphically present picture of Future State

**P4 | Gap Analysis/Assumptions**

- What holds us back from the Future State?
- What are the root causes of these road blocks?
- Use Tools to ID Waste
- Brainstorm

**D5 | Action Plan**

<table>
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<tr>
<th>Action Item</th>
<th>Assigned To</th>
<th>Date Completed</th>
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</thead>
</table>

**C6 | Results**

<table>
<thead>
<tr>
<th>Result</th>
<th>30d</th>
<th>60d</th>
<th>90d</th>
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<tbody>
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<td>1.</td>
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**A7 | Lessons Learned**

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<th>Went Well/Helped</th>
<th>What didn’t go well/Hindered</th>
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**TITLE:** __________________________________________________  **Team:** __________________________

**Date Started:** __________  **Current Date:** __________  **Executive Sponsor:**  **Process Owner:**
Benefits of the A3

- Aligns to and supports PDCA system
- Creates structure for your innovation projects
- A framework for organization
- Promotes transparency
- A visual charter of work and opportunities
- Communication tool—Tells the story!
Spaghetti Mapping
A process map is a graphic representation of the sequence of actions that comprise a process.

Process Maps are used to:

- Document processes
- Analyze and improve on processes
  - Look for value-added and non-value added steps
  - Eliminate waste

General Guiding Rules:

- Must have a defined scope
- Ensure information is accurate and reflects the work being done
How to Process Map - Shapes

- **Terminal (Start/End)**
- **Decision Y/N**
- **Activity (Process Step)**
- **Flow Line**
Process Map Example

Feeling Thirsty

Prepare Water

Prepare Cup

Prepare Coffee

Milk? Yes → Add Milk

No → Sugar?

Sugar? Yes → Add Sugar

No → Drink Coffee
“If you can’t flow it—You don’t know it!”
Steps for Process Mapping

• Assemble the Team

• Agree on the scope:
  • Which process are you going to process map?
  • What is the purpose of the process?
  • What are the beginning and ending points?
  • What level of detail should be displayed?

• Start by preparing a narrative outline of steps

• Ask (and encourage) lots of questions
Is it Truly Value-Added?

Value Added

Any activity in a process that improves the product or service

Value Criteria:

- Transformational
- Deliver what the customer needs or wants
- Done right the first time, without error

Business Necessary NVA

Activities ensuring that value-added activities have been properly completed.

- These are activities required by law, regulation, and/or policy.

Non-Value Added

Activities that do not contribute to the product or the process and should therefore be eliminated.

- Non-value added activities are waste.
The 8 Wastes

To remember The 8 Wastes, you can use the acronym “DOWNTIME.”

D - DEFECTS: Efforts caused by rework, scrap, and incorrect information.
O - OVERPRODUCTION: Production that is more than needed or before it is needed.
W - WAITING: Wasted time waiting for the next step in a process.
N - NON-UTILIZED TALENT: Underutilizing talents, skills, & knowledge.
T - TRANSPORTATION: Unnecessary movements of products & materials.
I - INVENTORY: Excess products and materials not being processed.
M - MOTION: Unnecessary movements by people (e.g., walking).
E - EXTRA-PROCESSING: More work or higher quality than is required by the customer.
The 5-S Tool

5-S is a technique to organize and sustain an environment in which:

- Everything has a place,
- is in its place,
- and is ready for use.
Standard Work

- Standard work is one of the most powerful Lean tools.
- Eliminates defects (waste) by applying best practices consistently.
- Documents current practices that serve as the baseline for further improvements.
- Helps train and guide team members.
- Makes processes sustainable (through EE turnover).
- Are Visual
Standard Work Examples

Standard Work Includes:

- Job Aids
- Checklists
- Forms
- Policy
Before you attempt to "fix" any process, you must understand the root cause for the problem.

We often treat symptoms and not causes—often adding layers of policy or review to a process, rather than addressing the root cause for the defect.
Problem: The Washington Monument is disintegrating.

WHY? Because of the use of harsh chemicals.

WHY? To clean pigeon poop.

WHY? They eat spiders and there are a lot of spiders at the monument.

WHY? They eat gnats and there are lots of gnats at the monument.

ROOT CAUSE –
WHY? They are attracted to the light at dusk.
Lean: Putting it All Together

- Challenge the process by asking “Why?”
- Follow the Principles & Use the Lean tools.
- Find the root causes for your defects and non-value added steps.
- Eliminate the waste.
- Re-map your value stream.
- Implement your changes.
- Monitor and Control
- Sustain (Continuous Improvement)
Lean 6-Sigma Process

• Uses Lean principles and tools

• Used for more complex processes

• Uses statistical data to inform decisions and to monitor and control process
What is “6-Sigma”?

Six Sigma refers to the tiny area under the bell curve where the probability of producing a defect is almost nil.

- 6-Sigma = 3.4 DPMO
- 5-Sigma = 233 DPMO
- 4-Sigma = 6,210 DPMO
- 3-Sigma = 55,807 DPMO
- 2-Sigma = 308,537 DPMO
6-Sigma Belts

White
- Intro Level
- 1-Day Training

Yellow
- Intro Level
- 1-Week Training

Green
- Advanced Level
- 3 Weeks Training + Ongoing Coaching

Black
- Coaches
- Green Belts

Master Black
- Coaches
- Black Belts
DMAIC: L6S Roadmap

• **Define:** Define scope of project, objectives, and metrics

• **Measure:** Measure current baseline capability, e.g., number of defects

• **Analyze:** Analyze data for root cause, AKA “critical X’s” or inputs

• **Improve:** Implement your solutions to address the critical X’s (root causes)

• **Control:** Monitor your outputs to ensure you are within “control” limits
L6S Works!

- Timesheets Process: $9 M saved – One Click Process
- Collision Data Reporting: Now produces 2X reports
- DCIU: Reduced a huge backlog and now on verge of achieving their 45 days or less target
- DOE (Fleet Acquisition) 243 > 59 days
- LDO’s Training Calendar: 6 months > 1 month
L6S Update

• **Blair Thompson** is the new Chief over the Office that administers the Lean 6-Sigma Program—the Director’s Office of Innovation, Risk and Strategic Management (DORISM)

• Our next cohort of L6S projects is at the selection stage.

• Project nominations will yield about 12-15 new Green Belts this cohort

• Strategic Objective is to train 30 new Green Belts in the next two years.
What is Lean 6-Sigma?

"Lean 6-Sigma" combines two very powerful methodologies into a single, integrated approach to process improvement. "Lean" was developed by the Toyota Motor Corporation in the early '60s and focuses on improving efficiencies and reducing waste. "Six Sigma" was developed by Motorola, Inc. in the mid '80s and focuses on improving quality and reducing defects through the proper use of data and metrics. Their complimentary nature has proven to be extremely effective in making rapid and transformational improvements across a wide variety of organizations and processes including transactional, service, finance, production, health care, logistics, and many others.

The Lean 6-Sigma approach is designed to produce substantial results using a data-driven, focused approach to an organization's problems. For example, many departments within organizations suffer from backlogs, delays, errors, and significant customer and employee dissatisfaction stemming from what appears to be too much work for too few people. These organizations often react to this situation by demanding more headcount (if the budget allows it) to address the problem. Instead, a Lean 6-Sigma approach is to attack the sources of inefficiencies and errors so that the same headcount can process considerably more work with virtually no defects and with a much higher level of satisfaction for both the customer and the organization.

https://innovation.onramp.dot.ca.gov/lean-6-sigma
Contact

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