Understanding Lean Six Sigma Projects

PMI-NNV Dinner Meeting

February 17, 2016

Have you ever seen a project which. . .

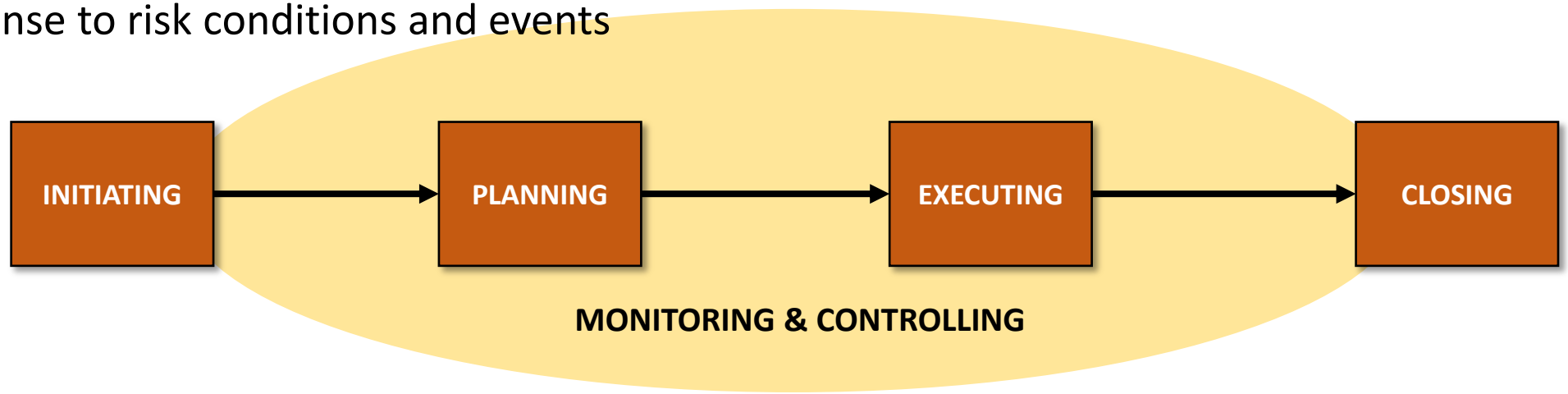
- Was intended to improve an existing product or service, or to launch a new product or service
- Was completed successfully (i.e. no “material” issues in executing the product or service requirements)
- And failed to fully achieve the business objectives used to justify the project?

Today's discussion topics:

- The difference between ***execution*** risk and ***solution*** risk
- Why we tend to overlook solution risks
- What Lean and Six Sigma are
- How Lean Six Sigma (LSS) minimizes solution risk for:
  - Improvement projects
  - New product and service launches
- How to tell when to pay attention to potential solution risk

Project execution risk

- A risk is “an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives”
- Project objectives are defined by the initiator or sponsor who authorizes the project
- Practically speaking, completion of the project itself becomes the objective—not the achievement of the goals which motivated it
- Risk control is focused on “internal-to-project” dimensions—schedule, budget, and quality (fulfillment of requirements)
- Monitoring and controlling processes throughout the project life cycle enable identification and response to risk conditions and events



Solution risk

- The risk that the requirements will fail to produce the desired results—no matter how well they are executed
- Solution risk management entails minimizing the chance that the design of a solution (i.e. the requirements) will not meet customer (end user, stakeholder) wants, needs, and expectations

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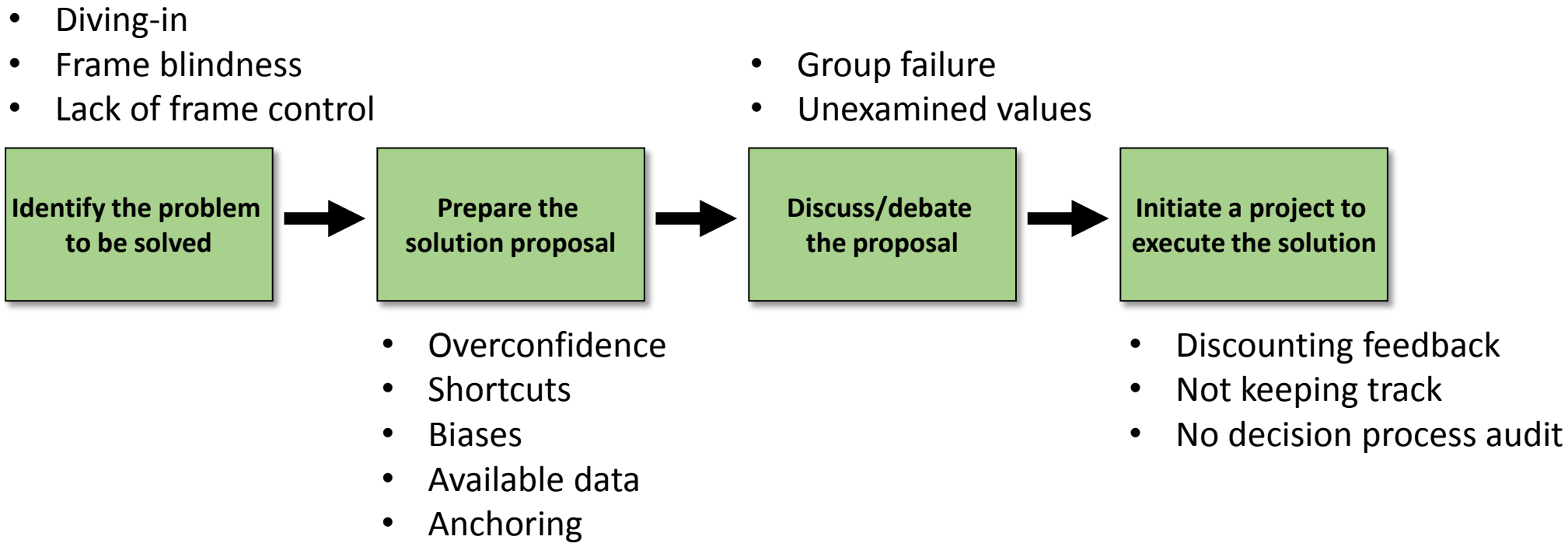
- Released July 2014
- Taken off the market August 2015

Why is solution risk an issue?

Consider how decisions on “what to do” (the solution) are typically made:



What is Lean?

- A process improvement discipline that began in the 1970s with the development of the Toyota Production System (TPS)
- Lean is designed to improve profitability by reducing costs caused by the many forms of **waste** that exist in operations
- In Lean terms, waste is defined as any activity that a customer would not be willing to pay for because the activity does not improve the performance, reliability, durability, or price of the product or service they receive
- Although the Lean discipline was developed in manufacturing, it has been successfully applied to service and transactional operations

Lean waste reduction principles and methods

The developers of Lean identified 8 basic types of waste and formulated a set of principles and methods to deal with each:

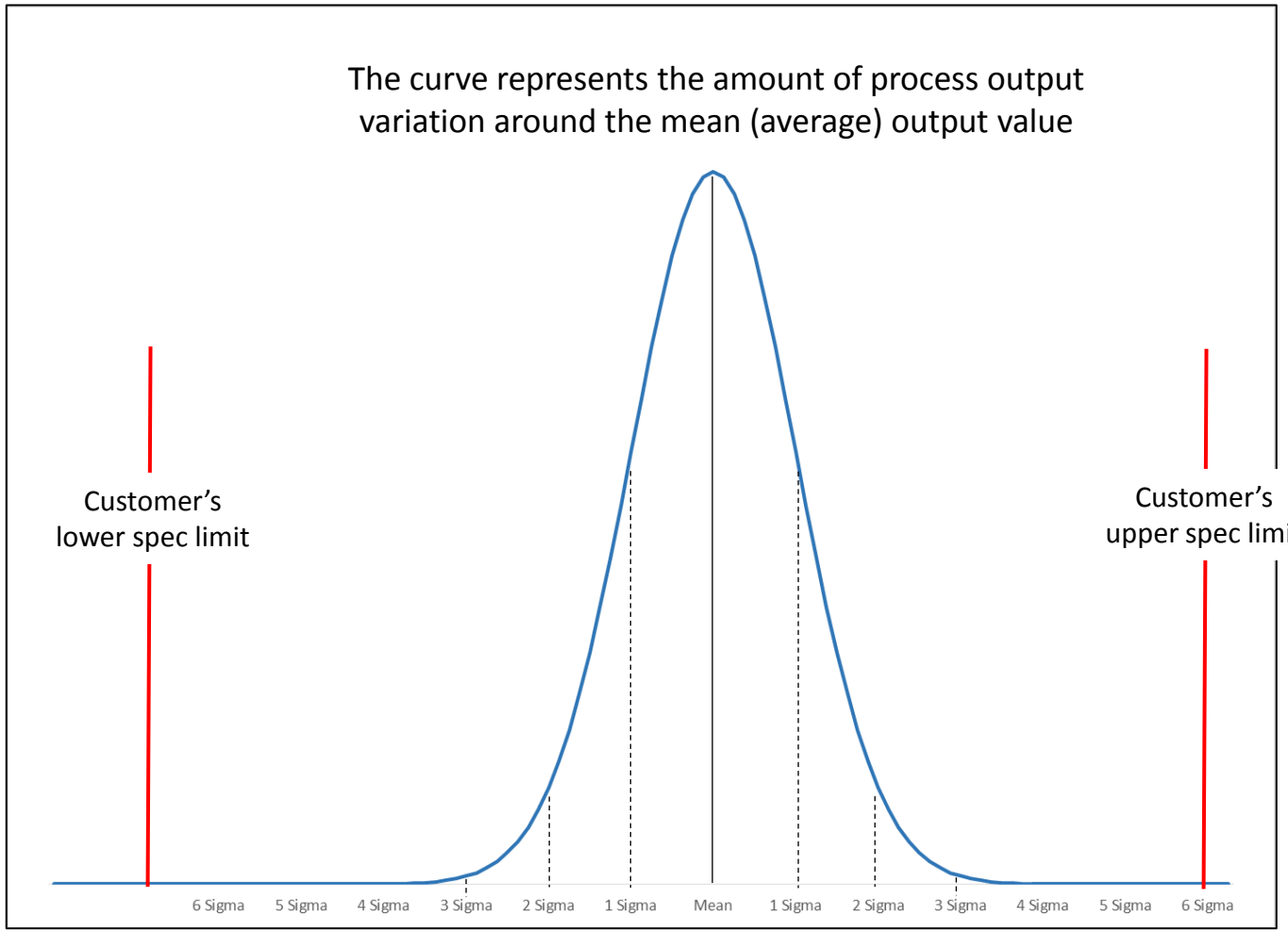
Category	Waste Type	Lean Principle	Lean Methods
People	Motion Waiting Excess processing Non-utilization of knowledge	Workplace management	Standard work Workplace organization (5S, VM) Continuous improvement (*Kaizen*) teams
Quantity	Overproduction Transportation Inventory	Just-in-time (JIT)	Production smoothing Pull (*Kanban*) systems Continuous flow Lead time reduction (e.g. SMED/TPM)
Quality	Defects	Prevention	Mistake proofing (*Poka-yoke*) Autonomous defect control

What is Six Sigma?

- An organizational performance measure that focuses on the capability of processes in meeting customer requirements
- A structured, systematic process improvement methodology developed by Motorola during the 1980s
- The Six Sigma process improvement methodology is designed to enable organizations to approach Six Sigma performance levels

Six Sigma as a performance measure

- There is variation in the output of every process
- The amount of variation in output can be measured by standard deviations (sigma) around the output mean
- Variation that causes some output to fall outside of customer specifications is bad
- Variation is controlled in a Six Sigma process to make the output mean 6 standard deviations away from the *closest* customer specification limit
- This distance between the mean and the limit means that *virtually zero* bad output is produced



The horizontal axis represents the range of output variation in standard deviations (sigma)

Six Sigma as a process improvement methodology

- Begins with a clear understanding of a problem which:
  - Negatively affects customers
  - Has causes that are unknown (or not fully understood)

- Progresses through a set of rigorous steps to separate the true root causes from the many potential causes

- Concludes with the implementation of improvements to solve the problem, along with controls to make sure it never comes back

- Like Lean, the Six Sigma process improvement methodology grew up in manufacturing but has also be successfully applied to service and transactional processes

The foundational principle of Six Sigma:

$$Y = f(x)$$

• Y is the **output** variable • Y values are **dependent** on the effect of the Xs • Changes in Y values are **symptoms** of variation in the Xs • We can only **monitor** the Y mean level and variation, not manage or control it	• The Xs are the **input** and **process** variables • There are typically multiple X variables for every Y ($X_1 \ldots X_n$) • Variation in the Xs is **independent** • Mean level and variation in the **critical Xs** are the **cause** of the mean level and variation in the Y • We can identify the critical Xs and **control** their mean level and variation in order to effect improvement and stability in the Y

High-level Six Sigma improvement steps

Define	Measure	Analyze	Improve	Control
• Define the problem • Determine project scope and goals • Charter the project team • Determine the primary Y metric • Identify any secondary Y metrics	• Validate the Y measurement system • Clarify customer specs • Document current process • Determine baseline process capability • Identify all potential Xs	• Characterize the XY relationships • Separate critical Xs from trivial Xs using graphical and statistical analysis	• Validate the critical Xs • Identify potential solutions • Select and pilot the best solution • Plan for full roll-out execution	• Measure and confirm results • Build control plans and procedures • Implement control charts • Hand-off controls to process owners

New product or service: Design for Six Sigma (DFSS)

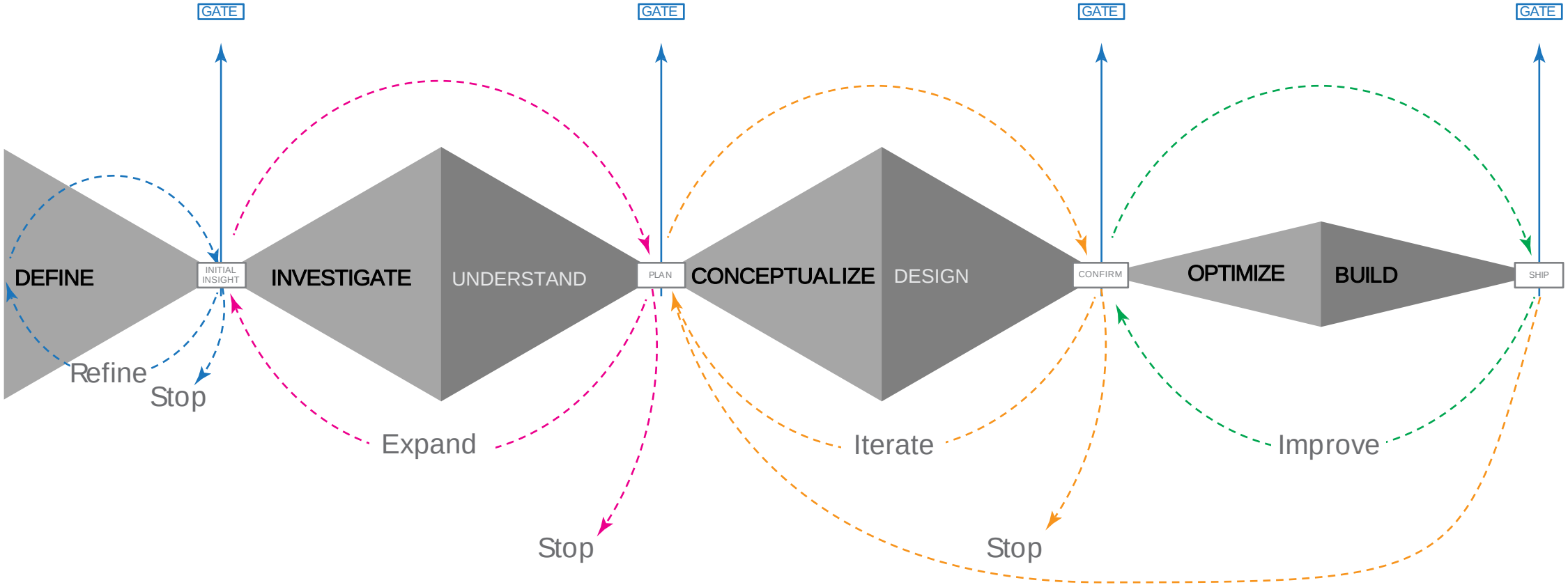
- DFSS is used when a new opportunity is identified, or when customers are “under served” by existing products or services
- “Entrepreneurship is management.” Creativity is *enhanced* by applying a disciplined process
- Relentless focus on the customer. Really understand the customer’s:
  - Needs
  - “Jobs” they use the product or service to accomplish
  - Psychological drivers
  - Desired outcomes

High-level DFSS design steps

Define	Investigate	Conceptualize	Optimize	Build
• Identify the target customer and customer segment • Establish a high level hypothesis about the customer problem to solve • Draft a business case based on the hypothesis	• Analyze customer jobs and pain points • Develop the customer problem statement • Look at how competitors solve the customer problem • Update the business case	• Generate solution ideas • Narrow the potential solution set • Test solution ideas with storyboards, prototypes, or a “minimum viable product” • Select solution to build	• Develop and launch beta • Iterate improvements based on feedback • Create production, support and operational risk control plans • Finalize requirements • Conduct full launch and scale production	

How the DFSS process works

- Customers are actively involved in each step
- No progress to the next phase until the current phase requirements are satisfied



How LSS helps ensure high quality solutions

Project Risk Area	LSS Countermeasures and Controls
Problem identification	• Structured problem definition process • Customer needs analysis—”critical-to-quality” based requirements
Solution development	• Comprehensive and systematic consideration of all factors • Data driven factor winnowing process • Experimental validation of the “critical few” factors • Systematic generation of potential solutions
Solution approval	• Structured solution selection process
Execution and results tracking	• Solution piloting • Results confirmation/auditing • Comprehensive operational control plans

When should Lean Six Sigma be used?

Whenever the answer to *both* of the following questions is “no”:

Are you **sure** you understand the critical factors for:

- Permanently solving the problem?
- Or, winning customers over to the new product or service?

Are the consequences of failure relatively light?

QUESTIONS?