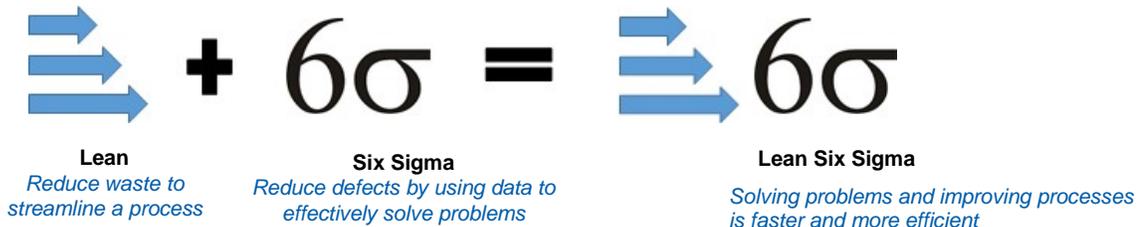


Lean & Six Sigma:

What's the difference?

- a White Paper by Joe Pichert, LSSBB, Ohio Department of Medicaid

"Lean Six Sigma," as one term usually describes a process improvement, however; this phrase represents two distinct processes that overlap, "Lean" and "Six Sigma."



Lean

At its heart, Lean is about speed and the relationship between steps in a process. It is about eliminating non-value-added elements from the process. It is about shrinking batch sizes down to create a "one-piece flow." Lean methodology focuses on streamlining processes and reducing waste and defects.

Toyota invented "lean production" according to Jeffrey Liker, author of *The Toyota Way*. The *Toyota Way* is a system designed to provide the tools for people to continually improve their work.¹ It is also known as the Toyota Production System (TPS). There were 14 principles created that were divided into four sections:

Toyota Production System Principles

I. Long Term Philosophy:

(1) Base your management decisions on a Long-Term Philosophy even at the expense of short-term financial goals.

II. The Right Process Will Produce the Right Results:

(2) Create a continuous process flow to bring problems to the surface. (3) Use "Pull" systems to avoid overproduction. (4) Level out the workload. (5) Build a culture of stopping to fix problems to get quality right the first time. (6) Standardize tasks and processes are the foundation for continuous improvement and employee empowerment. (7) Use visual control so no problems are hidden. (8) Only use reliable, thoroughly tested technology that serves your people and processes.

III. Add Value to the Organization by Developing Your People:

(9) Grow leaders who thoroughly understand the work, live the philosophy and teach it to others. (10) Develop exceptional people and teams who follow your company's philosophy. (11) Respect your extended network of partners and suppliers by challenging them and helping improve them.

IV. Continuously Solving Root Problems Drives Organizational Learning:

(12) Go and see for yourself to thoroughly understand the situation. (13) Make decisions slowly by consensus, implement decisions rapidly thoroughly considering all options. (14) Become a learning organization through relentless reflection and continuous improvement.

 Click the picture to the right for a short video explaining the principles of the Toyota Production System, including examples:



"Make your workplace into showcase that can be understood by everyone at a glance. In terms of quality, it means to make the defects immediately apparent. In terms of quantity, it means that progress or delay, measured against the plan, and is made immediately apparent. When this done, problems can be discovered immediately, and everyone can initiate improvement plans."

– Taiichi Ohno



MORE INFO:

[Lean](#) (page 1)

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Six Sigma

Six Sigma originated from a 19th Century mathematical theory with the bell curve developed by Carl Friedrich Gauss. Six Sigma methodology utilizes information and statistical analysis to measure and improve operational performance, practices and systems to decrease process variation and prevent defects. When a process operates at the six sigma level, the variation is so small that the resulting products and services are 99.999667% defect free.

Six Sigma is a set of statistical modeling techniques and tools for process improvement. At Motorola, Engineer Bill Smith introduced it in 1985. The goal is consistent manufacturing of quality products. Six Sigma is different from other management improvement strategies such as Total Quality Management (TQM) and Zero Defects. To accomplish a Six Sigma level, a production process must generate less than 3.44 defects per 1 million opportunities (DPMO), as shown in the Process Sigma Table pictured at the right.

In addition to being a statistical measure of variation, the term “Six Sigma” also refers to a business philosophy of focusing on continuous improvement by understanding customers’ needs, analyzing business methods and instituting proper measurement methods. Others use Six Sigma methodology to identify business processes that would benefit the most from improvement and focus their improvement efforts there.²

Fun Fact:

The idea for statistical significance was actually introduced in the beer industry in the early 1900's.

The Guinness brewery was far ahead of its time by hiring statisticians, chemists and other scientists to improve the quality and consistency of its beer. They understood the importance of quality control and wanted to apply scientific methods to beer production.

Guinness' biochemist William Sealy Gosset developed the original statistical test while working for the beer manufacturer. He was tasked with studying ingredients to ensure that every pint was brewed to perfection. He is recognized as the first person to effectively analyze small samples and their means, known in the Six Sigma world as the t-test.

Guinness understandably didn't want their competitors to know what they were up to so Gosset publicized his work under the penname 'Student.' Today we have what is known as the 'Student t-test' and not the Gosset t- test.

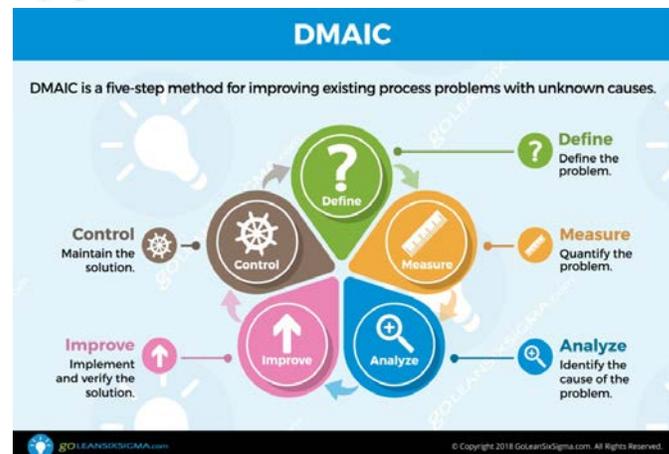
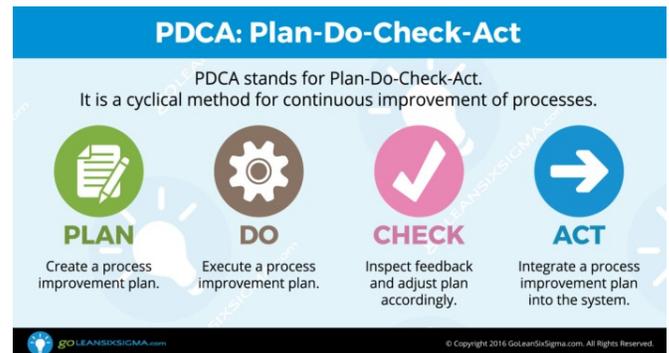


PROCESS SIGMA TABLE

SIGMA LEVEL	DEFECT RATE	YIELD
2σ	308,770 dpmo	69.10000%
3σ	66,811 dpmo	93.33000%
4σ	6,210 dpmo	99.38000%
5σ	233 dpmo	99.97700%
6σ	3.44 dpmo	99.99966%

The Six Sigma Levels and their corresponding defects

LeanOhio teaches two different process improvement methodologies and both can be used for process improvement. Camo Belt training teaches PDCA (Plan, Do, Check and Act) while Green Belts are taught DMAIC (Define, Measure, Analyze and Control). A summary of both methodologies can be viewed below:



Lean Six Sigma

There is overlap in these two distinct systems that make “Lean Six Sigma” a good fit. The synergy between “Six Sigma” identifies the areas for potential improvement and “Lean” corrects and connects the flow of information, reducing waste including defects among the processes.

Lean Six Sigma is a methodology that relies on a collaborative team effort to improve performance by systematically removing waste, combining lean manufacturing/lean enterprise and Six Sigma to **eliminate eight kinds of waste.**

Items to consider in a Lean Six Sigma Initiative:

- 1) Who is your customer and what do they want?
- 2) Analyze the current state of your process (non-value added, movement, etc.)
- 3) Develop a future state that:
 - Creates a one-piece flow
 - Avoids handoffs
 - Level the load
 - Standardize the tasks
 - Eliminate redundancy
 - Establish visual controls
- 4) Implement the change
- 5) Measure performance
 - Lead time
 - % on-time delivery
 - Defects
 - Productivity (widget / hour)

Footnotes:

1 - Liker, Jeffrey (2004). ["The 14 Principles of the Toyota Way: An Executive Summary of the Culture Behind TPS"](#) (PDF). University of Michigan. p. 36.

2 – Kingery, Cathy (2002) The Six-Sigma Memory Jogger II. p.1

TIM U WOOD - The 8 kinds of waste



Lean Six Sigma method shifts from “we’ve always done it that way” and analyzing the problem to determine root cause and effect relationships before improvement action is taken. The Lean Six Sigma method focuses on discovering root causes, validating those causes with data, and considering a range of solutions to test before acting. At the core of Lean Six Sigma is the DMAIC approach that provides a framework for improving existing business practices.

ODM and ODA Kaizen Event - Case Study



The Department of Medicaid and the Department of Aging combined efforts and conducted a Kaizen event using Lean Six Sigma methodology to streamline processes to help better serve Ohioans through provider retention and training.

Read about the many projected benefits [here](#).

Bibliography:

- [The Lean Six Sigma Pocket Tool Book](#), Michael George, David Rowlands
- [Six Sigma DeMystified](#), Paul Keller
- [The Black Belt Memory Jogger](#), Six Sigma Academy Goal/QPC
- [The Six Sigma Memory Jogger II](#), Michael Brassard, Lynda Finn, Dana Ginn, Dianne Ritter
- [The Toyota Way](#), Jeffrey K. Liker
- [GoLeanSixSigma.com](#), [GembaAcademy.com](#) and [minitab.com](#)