1. Lean Six Sigma

This section provides an introduction to Lean Six Sigma philosophies and techniques for professional accountants.

Accounting is a process. A kludge (or kluge) is an engineering/computer science term that describes what is best described as a workaround or quick-and-dirty solution that is typically clumsy, inelegant, inefficient, difficult to extend and hard to maintain; but it gets the job done. By contrast, elegance is beauty that shows unusual effectiveness and simplicity.

Many accounting systems their related processes are kludges that are cobbled together over many years. Fewer accounting systems and processes are well-engineered. Accountants sometimes spend a lot of time improving the quality of things that should be destroyed. Idealized redesign is the notion of imagining what you would do to improve some process or system if you have no constraints. What would you do to improve your system if you were unconstrained? If you cannot answer that question and improve a system when unconstrained; you certainly cannot improve a system given the realities of constraints that you must generally live with. Another term for idealized redesign is greenfield project[1].

Born in manufacturing, Lean Six Sigma is just as applicable to accounting processes and accounting information systems as it is to building a physical product.

1.1. Lean

Think about something. In your 40 to 60 hour work week, how much time do you get to think? How much time do you get to be proactive? To be creative? To apply what you have been trained to do[2]?

A process is about satisfying some customer. Lean process methodology is about removing tasks that don't add value and (b) looking carefully to find waste and remove that waste from a system.

1.2. Six Sigma

Six Sigma is a set of techniques and tools for process improvement. Six Sigma is about measurement. Six Sigma essentially targets enhancing the efficiency of business processes by minimizing the number of defects output by processes. The goal is to attain near-perfect processes.

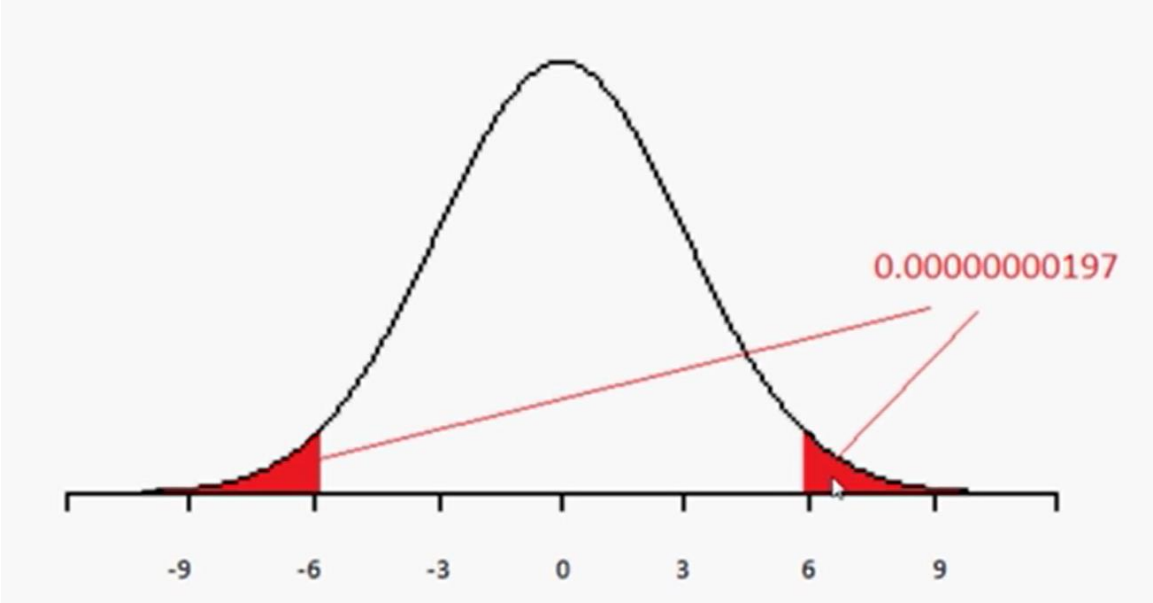
If you can't measure it, you can't control it (i.e. if you can measure it, you can control it) The goal of Six Sigma is to have 3.4 errors per 10,000.

[1] Wikipedia, *Greenfield Project*, https://en.wikipedia.org/wiki/Greenfield_project

[2] YouTube.com, *Bill Peterson - Lean Applied to Us*, https://www.youtube.com/watch?v=tfQiGDUBdD0

Sigma level	Sigma (with 1.5σ shift)	DPMO	Percent defective	Percentage yield	Short-term C_{pk}	Long-term C_{pk}
1	−0.5	691,462	69%	31%	0.33	−0.17
2	0.5	308,538	31%	69%	0.67	0.17
3	1.5	66,807	6.7%	93.3%	1.00	0.5
4	2.5	6,210	0.62%	99.38%	1.33	0.83
5	3.5	233	0.023%	99.977%	1.67	1.17
6	**4.5**	**3.4**	**0.00034%**	**99.99966%**	**2.00**	**1.5**
7	5.5	0.019	0.0000019%	99.9999981%	2.33	1.83

Six Sigma is about the proactive control of boundaries. Set upper boundaries and lower boundaries such that quality control will be alerted and corrective action taken before problems occur



1.3. Lean Six Sigma

Lean Six Sigma[3] is a discipline that combines the problem solving methodologies and quality enhancement techniques of Six Sigma[4] with the process improvement tools

[3] Wikipedia, *Lean Six Sigma*, https://en.wikipedia.org/wiki/Lean_Six_Sigma
[4] Wikipedia, *Six Sigma*, https://en.wikipedia.org/wiki/Six_Sigma

and efficiency concepts of Lean Manufacturing[5]. Born in the manufacturing sector, Lean Six Sigma works to produce products and services in a way that meets consumer demand without creating wasted time, money and resources.

Specifically, Lean is 'the purposeful elimination of wasteful activities.' It focuses on making process throughout your company faster, which effects production over a period of time. Six Sigma works to develop a measurable process that is nearly flawless in terms of defects, while improving quality and removing as much variation as possible from the system.

1.4. Defining quality

There are many different ways to define or think about quality. Engineer and statistician W. Edwards Deming[6] defined quality as "predictability," and called variance "the enemy of quality." To achieve an intended outcome, Deming thought it was important to plan for common-cause variation, which can be predicted, and special-cause variation, which cannot be predicted.

Harold F. Dodge, one of the principal architects of the science of statistical quality control said, "You cannot inspect quality into a product." In other words, once the inspection takes place, it's too late. Rather, data from the quality inspection needs to be utilized to continually improve the process.

Businessman Philip B. Crosby, who developed the concept of Zero Defects while working as senior quality engineer at aircraft manufacturer The Martin Company, defined quality as "a conformance to requirements." He warned against the high cost of nonconformance and said that the desired performance standard of zero defects could only be achieved through the proper management system.

Management consultant Joseph Juran, who focused on management training and the human element of quality control for a variety of businesses, stated that quality is "a fitness for use."

1.5. Cost of Quality: the 1-10-100 rule

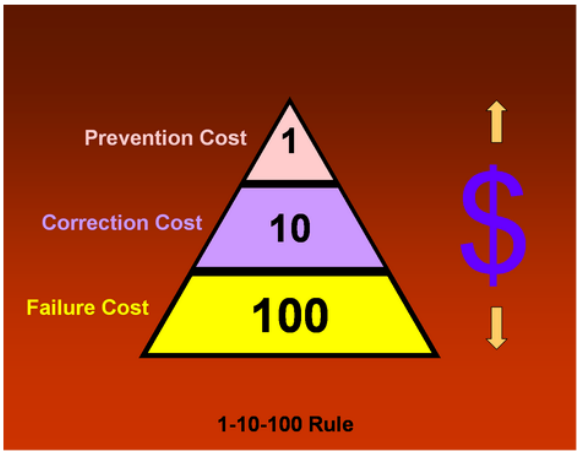
The 1-10-100 Rule is related to what's called "the cost of quality." Essentially, the rule states that prevention is less costly than correction is less costly than failure. It makes more sense to invest $1 in prevention, than to spend $10 on correction. That in turn makes more sense than to incur the cost of a $100 failure[7]. This is depicted graphically[8]:

[5] Wikipedia, *Lean Manufacturing*, https://en.wikipedia.org/wiki/Lean_manufacturing

[6] YouTube.com, *A Theory of a System for Educators and Managers*, https://www.youtube.com/watch?v=2MJ3lGJ4OFo

[7] Michael Canic, *The Cost of Quality: The 1-10-100 Rule*, https://www.makingstrategyhappen.com/the-cost-of-quality-the-1-10-100-rule/

[8] Total Quality Management, *What is 1-10-100 Rule?*, https://totalqualitymanagement.wordpress.com/2009/02/25/what-is-1-10-100-rule/



1.6. Understanding systems

The following are several defines of the term system:

- A system is a set of connected things or parts forming a complex whole.
- A system is a regularly interacting or interdependent group of items forming a unified whole.
- A system is a set of detailed methods, procedures and routines created to carry out a specific activity, perform a duty, achieve an objective, or solve a problem.

Deming explains that, "the typical way of managing a complex system is to take the system, break it into parts, and then try and manage each part as well as possible." But that does not work because it is possible to improve the performance of each part, and destroy the system as a whole.

Per Deming, "Working together is the main contribution to systemic thinking as opposed to working apart separately."

You cannot explain the behavior of a system by analyzing the system; you have to use synthesis to understand a system. There is a difference between analysis and synthesis:

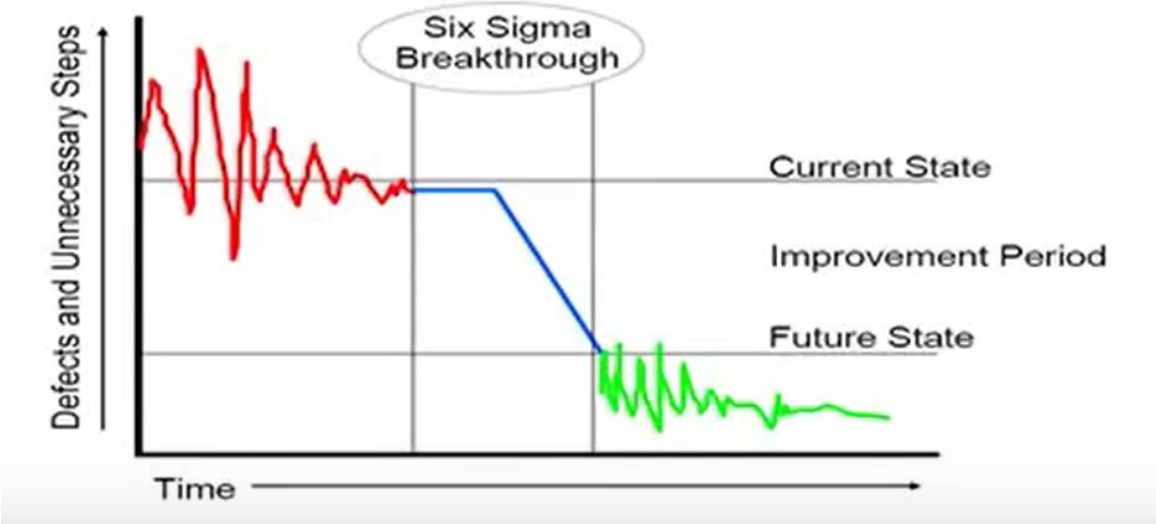
- **Analysis** is separate the whole into parts and study each part individually. Analysis is the dominate mode of thought in the western world. You cannot explain the behavior of a system by analysis. You can reveal its structure and see how it works, but you cannot understand why it works the way it works.
- **Synthesis** the combination of ideas to form a theory or system. If you want to understand why something works the way it does you use synthesis to figure that out.

If you want to understand how something works you use analysis. If you want to understand why something works the way it does you use synthesis. Both analysis and synthesis is necessary to understand a system.

1.7. Lean Six Sigma Principles

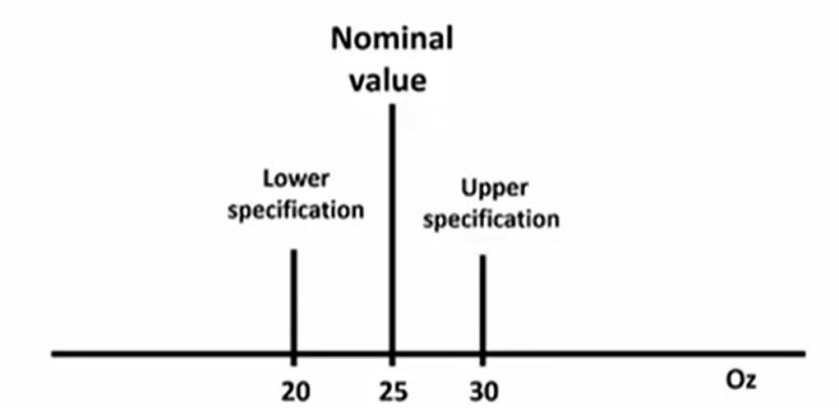
Six sigma[9] is about reducing variability and increasing predictability. These are the fundamental principles of Lean Six Sigma:

- Reducing variability
- Reducing defects
- Reducing unnecessary steps
- Improving predictability



1.8. Process Capability

Process capability[10] is the ability of a process to repeatedly meet a specified requirement.



[9] YouTube.com, *What Is Six Sigma? The basic principles of Six Sigma*, https://www.youtube.com/watch?v=C8q-Zzqk1Uw

[10] YouTube.com, *Process capability and process capability index*, https://www.youtube.com/watch?v=ouMnoLcK6uw

1.9. Methodology and Process for Moving Information

Moving information is a process. What are the capabilities of your accounting information system. What alternative processes are available and what are their capabilities.

An accounting information system is a system that collects, records, stores, and processes data to produce information for decision makers within an economic entity. Accounting information systems generally consist of six primary components:

- **People** who use the system,
- **Procedures** and instructions used,
- **Data** (or information) about the economic entity and its activities and transactions,
- **Software** used to process the data/information,
- **Hardware**, or information technology infrastructure, used by the system,
- **Internal controls and security measures** used to safeguard the information and assets of the economic entity.

The business function of an accounting information system is to collect and store data about organizational activities, resources, and personal; transform data into information so management can plan, execute, control, evaluate activities, resources, and personnel; and to provide adequate controls to safeguard the organization's assets and information.

1.10. Problems with Spreadsheets

Many companies use spreadsheets within their accounting information systems extensively. But there are problems with spreadsheets[11]. Here is a summary of the top 10 disadvantages of spreadsheets[12]:

1. Vulnerable to fraud
2. Susceptible to trivial human errors
3. Difficult to troubleshoot or test
4. Obstructive to regulatory compliance
5. Unfit for agile business practices
6. Not designed for collaborative work
7. Hard to consolidate
8. Incapable of supporting quick decision making
9. Unsuited for business continuity
10. Scales poorly

[11] YouTube.com, Problem with Spreadsheets, https://www.youtube.com/watch?v=wbiVK6HKHHg

[12] Denizon Team, *Top 10 Disadvantages of Spreadsheets*, http://www.denizon.com/spreadsheets/top-10-disadvantages-of-spreadsheets/

1.11. Automating Processes

Don't overdo it with process automation. First, only processes that are working effectively should be automated. Automating a process that is not working makes no sense. Second, take an incremental approach to automating processes.

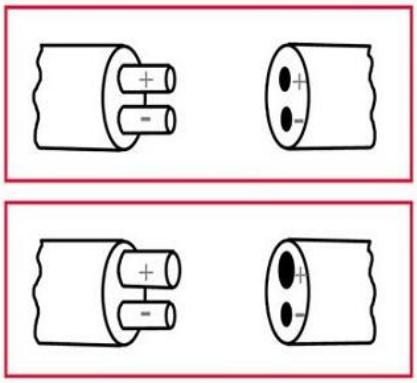
Tesla's CEO Elon Musk said, "Excessive automation at Tesla was a mistake." In the 1980s, General Motors wasted billions of dollars in a largely fruitless effort to automate car product. A lot of mistakes like these are made only to be repeated in the future because people are no aware of the history.

Automation works best when it is applied incrementally to a process that is already working smoothly and effectively.

1.12. Poka-yoke (Mistake proofing)

Poka-yoke is a technique used to prevent mistakes through smarter design. Poka-yoke[13] is a Japanese term that means "mistake-proofing". A poka-yoke is any mechanism consciously added to a process that helps an equipment operator avoid mistakes. Its purpose is to eliminate defects by preventing, correcting, or drawing attention to human errors as the errors occur.

For example, consider the graphic[14] below. You want someone to plug the plug into the receptacle such that positive and negative match up; inadvertently reversing this would have catastrophic consequences. In the top graphic notice that it is possible to make a mistake but in the bottom a mistake would be impossible because of the size differences in the positive and negative receptacle and plug.



Smart design means less user errors.

[13] Wikipedia, *Poka-yoke*, https://en.wikipedia.org/wiki/Poka-yoke

[14] Process Exam, *Six Sigma Tools - Poka Yoke*, http://www.processexam.com/six-sigma-tools-poka-yoke