Baldrige Quality Improvement and Lean Six Sigma Concepts for Rural Healthcare

An Introduction to Performance Excellence

Presented by
J.M. "Mickey" Trimm, PhD
For The Alabama Rural Health Association
April 15, 2022

Today's Learning Objectives

- *Understand the Basics of the Baldrige Criteria and Baldrige Award System*
- *Learn about ALPEx and the State Program for the Baldrige System*
- *Learn the meaning and distinguish between Lean and Six Sigma*
- *Recognize the 8 Wastes of Processes*
- *Learn the DMAIC Model for Process Improvement*

ALABAMA PERFORMANCE EXCELLENCE

WHAT IS THE MALCOLM BALDRIGE NATIONAL QUALITY AWARD?

The Malcolm Baldrige National Quality Award was established by the U.S. Congress in 1987 to raise awareness of quality management and recognize U.S. companies that have implemented successful quality management systems. **The award is the nation's highest presidential honor for performance excellence.**

ALABAMA PERFORMANCE EXCELLENCE

Since 1987, 124 Baldrige Awards have been presented (including 7 two-time winners)

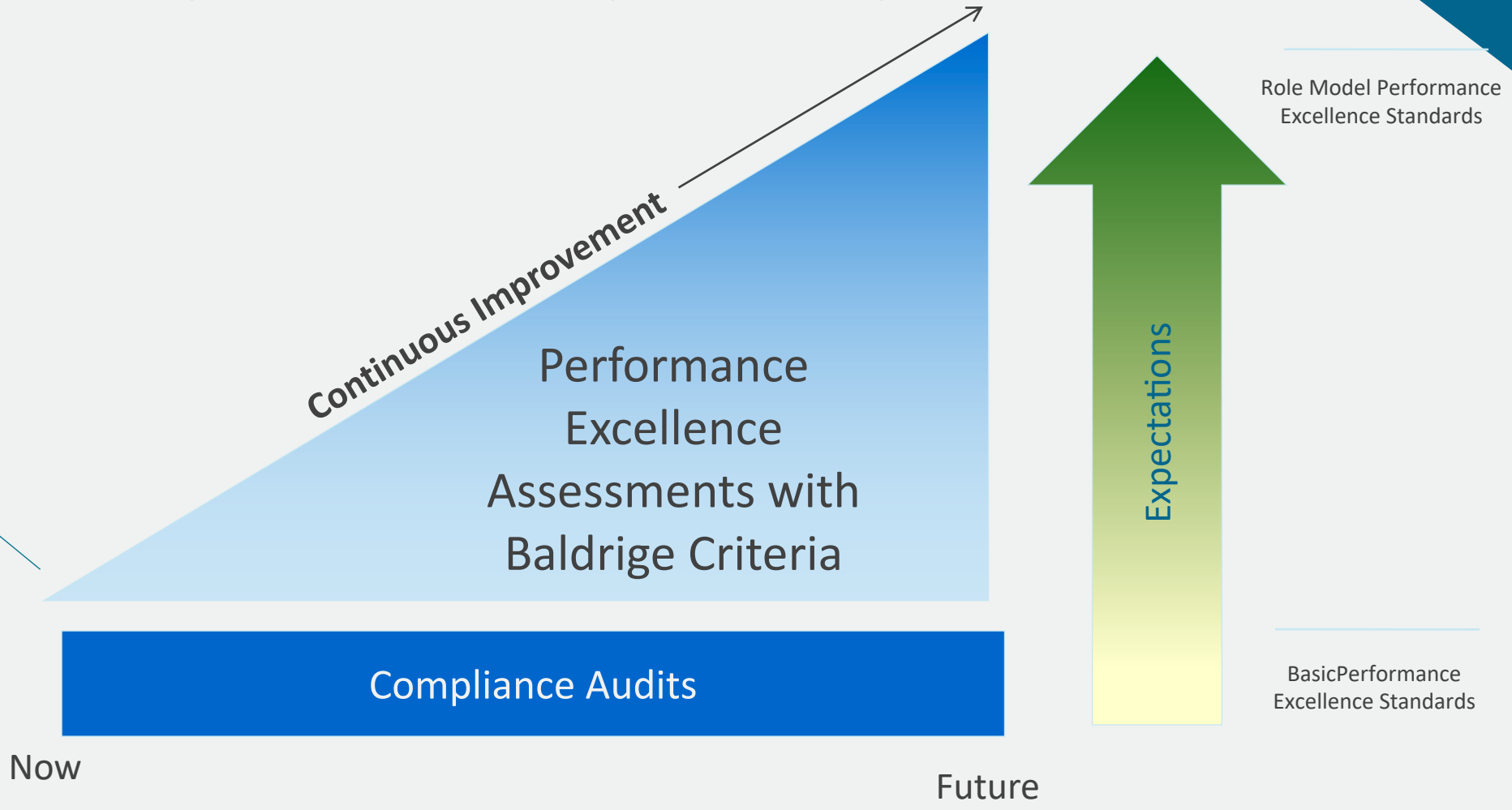
29 Recipients have been in the Healthcare Category

Rural recipients include:

- Kindred Nursing and Rehabilitation
- Hill Country Memorial Hospital
- Schneck Medical Center
- Sutter Davis Hospital

ALABAMA PERFORMANCE EXCELLENCE

Raising the Bar on your Organization

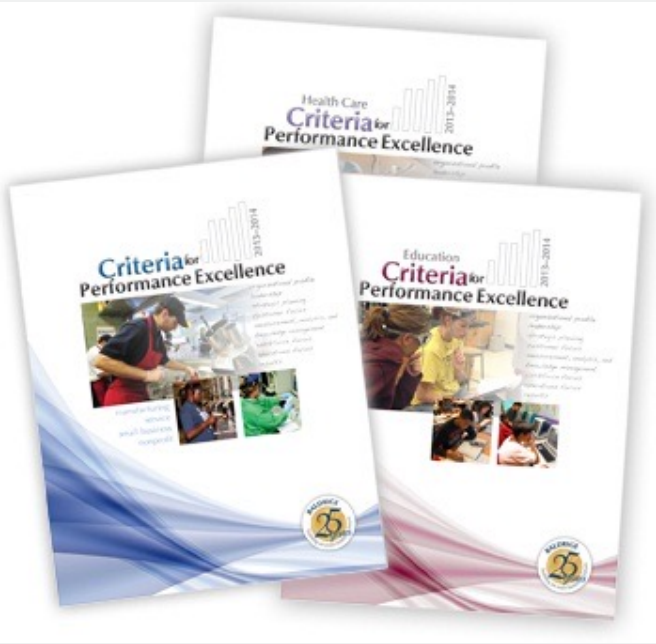


THE REAL VALUE OF THE BALDRIGE PROGRAM

- Organizations use the **Baldrige Criteria**
  - improve operations,
  - strengthening quality, productivity, and customer
- By systematically addressing the Criteria over a period of time (usually years) the organization achieves
  - Better outcomes,
  - Higher quality
  - Better financial results.
- Successful organizations are recognized by state and national programs.
- ***The real value of the program is found in the operational improvements and better outcomes resulting from the effort.***

It's All About The Criteria . . .

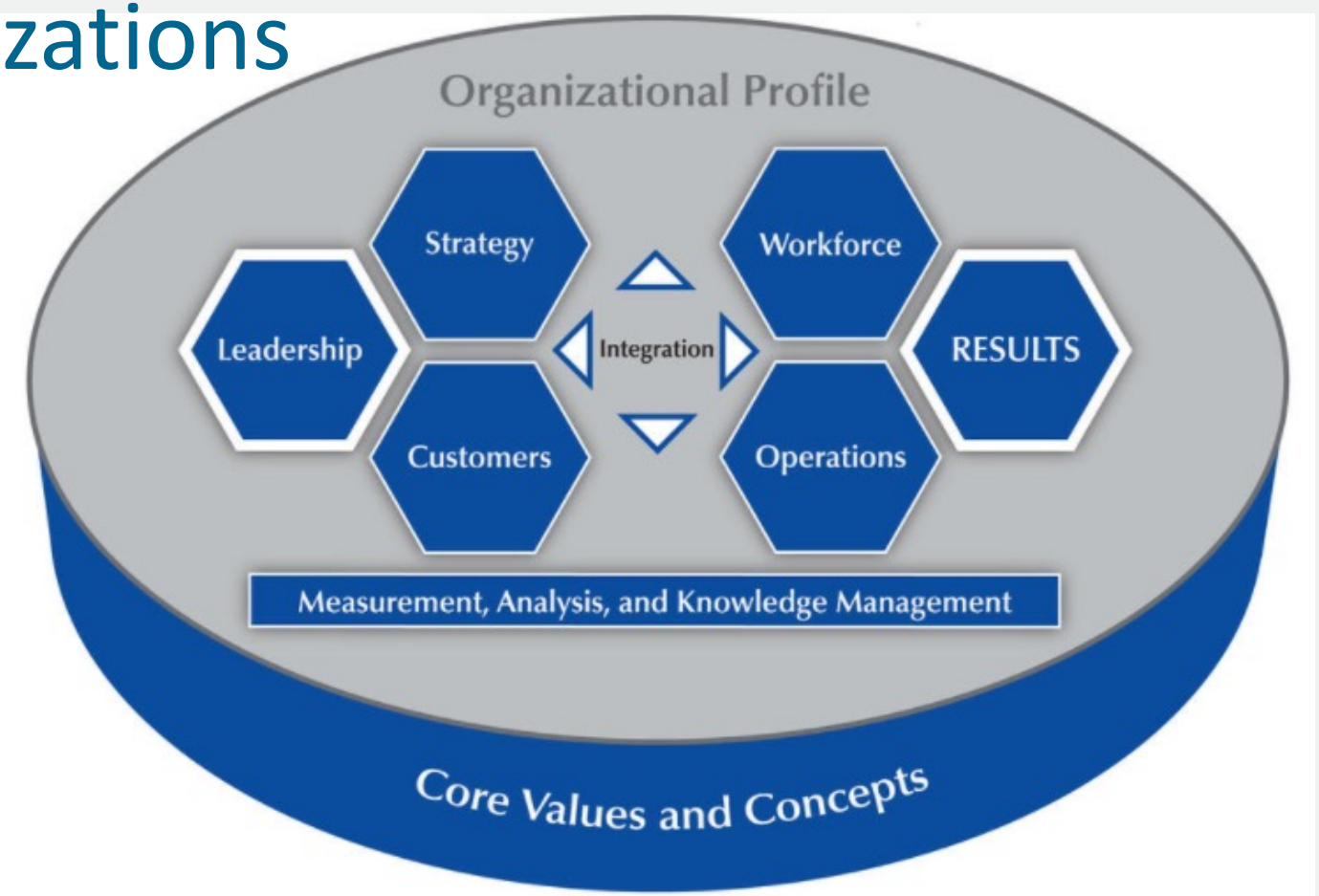
- Empower your organization to reach your goals, improve results, and become more competitive
- Help you assess where your organization is and where it needs to be
- Give you the tools you need to examine your management system



How were the Criteria Developed?

- Developed by the National Institute of Standards and Technology, or NIST
- Collaborating closely with industry experts, NIST produced the seven-category, 1,000-point scoring system and the three-level judging process.
- Companies submit applications of up to 75 pages (up to 50 pages for small businesses)
- The Baldrige judges, who come from industry, academia, and consulting firms and are all recognized quality experts, choose a small set of high-scoring applicants for site visits.
- A team of senior examiners and examiners visits each company for at least several days, conducting interviews and checking documents. The judges then meet a final time to review the top applicants and to select winners.

The Baldrige Framework for Evaluation of Organizations



From Baldrige Performance Excellence Program. 2021. *2021–2022 Baldrige Excellence Framework: Proven Leadership and Management Practices for High Performance*. Gaithersburg, MD: U.S. Department of Commerce, National Institute of Standards and Technology. https://www.nist.gov/baldrige.

The Baldrige Framework is a SYSTEM for Running Your Entire Organization

ALABAMA PERFORMANCE EXCELLENCE

The Review Process

How Organizations Benefit from the Baldrige Program

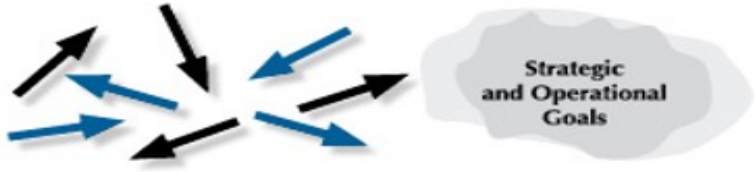
- Using the 275 question Baldrige Framework, an organization performs a ***Self-assessment***, documents the results and submits an application for review.
- A Team of ALPEx volunteer Examiners use the Baldrige ***Framework Criteria*** to evaluate the organization.
- A ***Site Visit*** may be conducted to complete the review.
- A final ***Feedback Report*** shows the organization's strengths and opportunities for improvement.
- The applicant uses the report to M***odify and Improve*** operations and can submit an updated report in subsequent review cycles.

Leadership – How do senior leaders lead?

- Deploy the organization's vision and values to all employees?
- Create an environment for organizational performance improvement?
- Create a workforce culture that delivers a consistently positive customer experience and fosters customer engagement?
- Create an environment for organizational and workforce learning?
- Develop and enhance your own leadership skills as well as those in your organization?
- Enable effective succession planning processes?
- Encourage open, two-way communication throughout your organization?
- Communicate key decisions?
- Take an active role in reward and recognition programs?

Steps Toward Mature Processes

Reacting to Problems (0–25%)

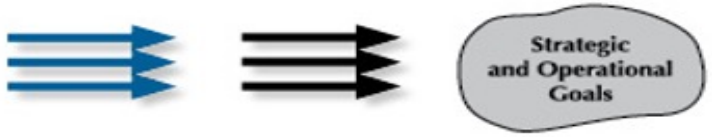


Operations are characterized by activities rather than by processes, and they are largely responsive to immediate needs or problems. Goals are poorly defined.

Early Systematic Approaches (30–45%)

The organization is beginning to carry out operations with repeatable processes, evaluation, and improvement, and there is some early coordination among organizational units. Strategy and quantitative goals are being defined.

Aligned Approaches (50–65%)



Operations are characterized by repeatable processes that are regularly evaluated for improvement. Learnings are shared, and there is coordination among organizational units. Processes address key strategies and goals.

Integrated Approaches (70–100%)

Operations are characterized by repeatable processes that are regularly evaluated for change and improvement in collaboration with other affected units. The organization seeks and achieves efficiencies across units through analysis, innovation, and the sharing of information and knowledge. Processes and measures track progress on key strategic and operational goals.

About ALPEx

The Alabama Performance Excellence (ALPEx) program is Alabama's state level implementation organization for the Malcolm Baldrige National Quality Award program

Alabama Performance Excellence Award History

- Created from the Alabama U.S. Senate Productivity Award under Senator Jeremiah Denton in 1986 and continued under Senator Richard Shelby.
- Program administered from The University of Alabama Business School's Alabama Productivity Center until 2011.
- Dormant from 2012 to 2016.
- University of Alabama Birmingham (UAB) helped reinitiate the program in 2016 and set up ALPEx as a 501-(c)-3 Not-for Profit organization.
- Authorized through the National Baldrige Alliance for Performance Excellence.

Scorebook/Comment Matrix - Excerpt

2019

ALABAMA PERFORMANCE EXCELLENCE AWARD
SCOREBOOK AND COMMENT MATRIX

___ Individual Examiner Scorebook

__X_ Consolidated Comments for Category _____2___
(Enter category number)

___ Pre-Site Visit/Consensus Report

Examiner
Name _____

Applicant
Number _____

2.1 Key Factors

List Those Key Factors That Apply to This Particular Item

2.1 Strengths

#	Initials	Area to Address	Comment
1	TST KK JMT BS SS	2.1a(1)	The strategic plan is developed annually and that involves engagement from administration, the BOD, and the entire leadership team conducting a SWOT analysis using multiple data sources; creating action plans with clear goals and timelines for prioritization that is then reviewed and approved by all stakeholders. Final plans are reviewed and approved by the board. Consultants give input and guide the organization into the future. (A-B)
2	TST	2.1a(2)	Strategic opportunities are identified during the strategic planning process and SWOT analysis. Two opportunities that were addressed in the last strategic plan were, implementing a short term stay satisfaction survey and implementing the Align employee engagement product. (A-O)
3	KK TST	2.1a(3)	BNH has a systematic approach to using multiple data sources during strategic planning that provide insight to opportunities for improvement related to regulatory compliance, risks, and any external environment changes (A-M, L). The strategic plan is then reviewed against action plan process to ensure appropriate goals and timelines are met (D, I).
4	KK TST	2.1a(4)	BNH has identified two key work systems: healthcare services and healthcare support services; key process decisions are made based on which work system owns the process, priority and impact of the process, strategic objectives, and the core competencies of the organization and its suppliers and partners (A-M). BNH has exhibited cycles of learning that engaged contracted consultants to provide specialized expertise (L) Found this strength in 2.1a(4) OFI
5	TST JMT BS SS	2.1b(1)	The organization has identified its strategic objectives, key measures and timelines for accomplishment in figure 2.1-1. (A-O)
6	TST KK	2.1b(2)	The strategic objectives address most of the strategic Challenges and advantages identified by the organization.(A-O)

⇩⇩ ⇩⇩ 2.1 Parking Lot Strengths - Below the Line ⇩⇩ ⇩⇩

#	Initials	Area to Address	Comment
~~7~~	~~TST~~	~~2.1a(1)~~	~~The strategic plan is developed annually by the Owner/Administrator and board of directors. After review of various data and outcomes, a SWOT analysis is conducted and a strategy is developed. Department leaders review the strategy and help develop measurable action plans. Final plans are reviewed and approved by the board. Consultants give input and guide the organization into the future. (A-B)~~
~~8~~	~~KK~~	~~2.1a(1)~~	~~BNH takes a strategic approach to developing a strategy plan that involves engagement from administration, the BOD, and the entire leadership team conducting a SWOT analysis using multiple~~

Benefits to Baldrige Applicants

The ratio of the Baldrige Program's benefits for the U.S. economy to its costs is estimated at **820 to 1**.

124 Baldrige Award winners serve as national role models.

2010–2020 award applicants represent **676,535 jobs**, 5,001 work sites, over $189 billion in revenue/budgets, and about 614 million customers served.

248 Baldrige examiners volunteered roughly **$5.6 million** in services in 2020.

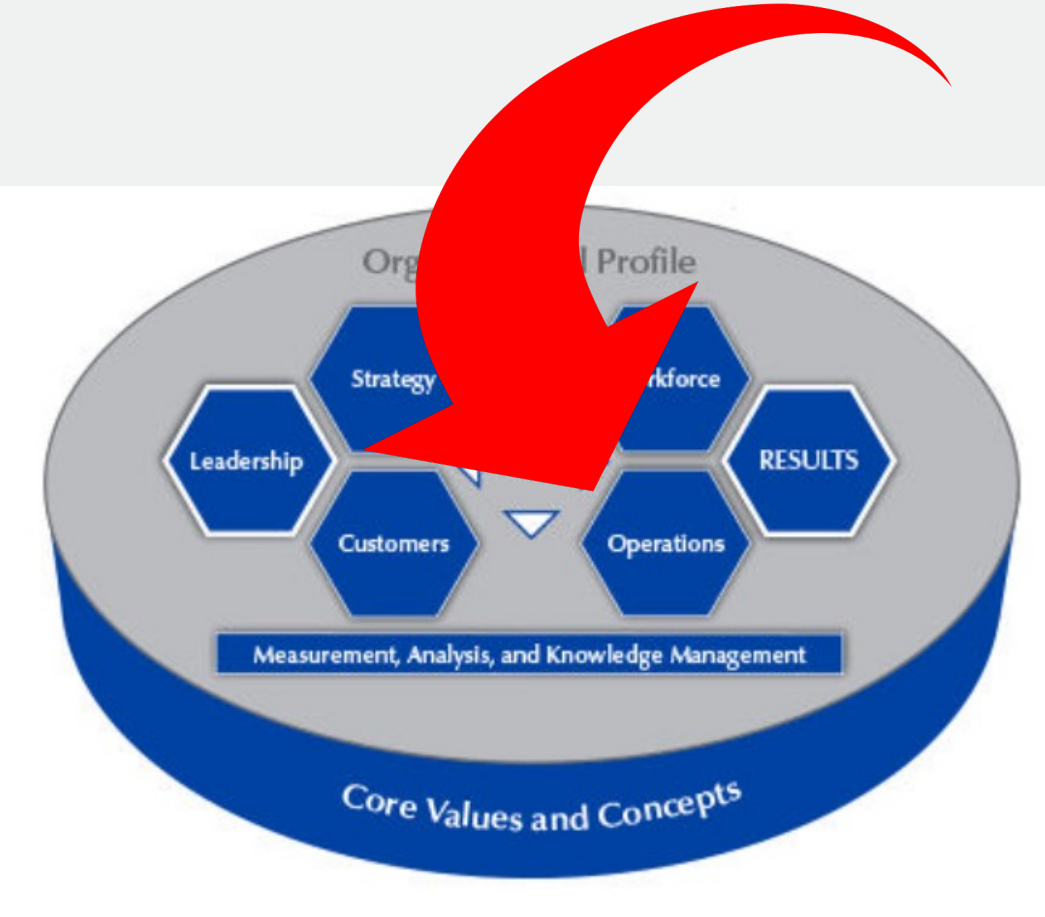
Baldrige-based programs annually evaluate and recognize more than **1,000 organizations** that use the Baldrige Excellence Framework.

2014 Baldrige Winner – Hill Country Memorial, Fredericksburg TX

- 86 Bed Rural Hospital
- Named one of "Top 100 Hospitals" by Truven Health Analytics for the (2012-2014)
- selected by *Becker's Hospital Review* as one of its "Top 100 Great Community Hospitals" in 2014.
- Employee satisfaction and engagement scores ranked in top 10 percent nationally for 2013 and 2014.
- HCM outperformed every hospital in Texas for Value-Based Purchasing ranked by CMS
- From 2010 to 2013 net income increased from $10 million to nearly $20 million, cash flow to total debt ratios improved from 50 to 60, and cash and investments to debt ratios improved from less than 1.5 to higher than 3.

ALABAMA PERFORMANCE EXCELLENCE

Linking Baldrige with Lean Six Sigma



"Baldrige provides the framework, Six Sigma the methodology."

Byrne and Norris (2003)

Baldrige is typically applied at the enterprise level, the Six Sigma is deployed as a number of independent projects (throughout the enterprise).

Accordingly, by implementing the Six Sigma methodology (as independent projects) within the Baldrige framework, firms can achieve higher **operational performance** and **efficiency** (through Lean Six Sigma projects) while operating under the guidelines and the framework of the Baldrige criteria. It that regard, the two approaches are **complementary**.

Lean Six Sigma - It's All About the Process!

- You Can Only Control The Process
- Excellence is a Matter of Steps
- Keep Moving Forward
- Trust the Process

Don't think about winning the SEC Championship. Don't think about the national championship. Think about what you needed to do in this drill, on this play, in this moment. That's the process: Let's think about what we can do today, the task at hand."

Nick Saban

All Work is Made up of Processes

The step-by-step mechanism of process thinking is a prominent part of cognitive behavioral thinking, which was developed by psychiatrist Aaron Beck.

A **business process** or **business method** is a collection of related, structured activities or tasks by people or equipment which in a specific sequence produce a service or product (serves a particular business goal) for a particular customer or customers.

So Let's Define Lean and Six Sigma

Lean Six Sigma is a Process Improvement method that relies on a **collaborative team effort** to improve performance by systematically removing waste and reducing variation and defects in business processes. Lean Six Sigma combines two distinct concepts to gain significant improvement in the efficiency and effectiveness of a business operation.

What is Lean?

Lean is the never-ending, systematic approach for ***identifying*** and ***eliminating waste*** and improving flow of a process while engaging employees. Lean is a way of thinking that can easily be applied to every type of organization. The entire focus of Lean is customer-driven; it is the customer who determines the value and the amount they are willing to pay for the product or service.

Source: Practical Lean Six Sigma for Healthcare

Sperl, Ptacek, Trewn (2013)

Waste is Anything that Provides No Value

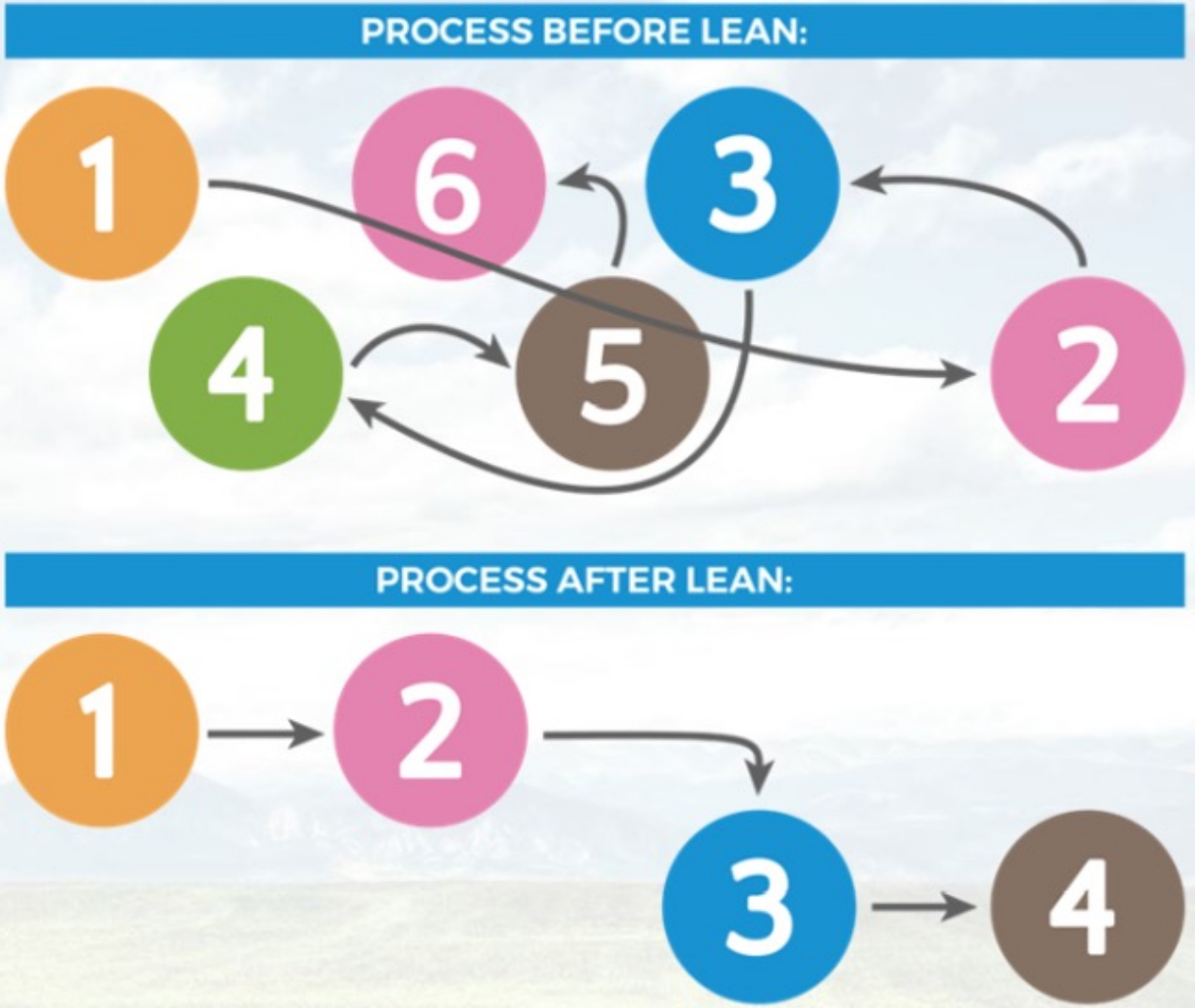
The relentless pursuit of the perfect process through waste elimination...

We Spend 75-95% of Our Time Doing Things That Increase Our Costs and Create No Value for the Customer!

Whether building a car or providing healthcare for a Customer, workers must rely on multiple, complex processes to accomplish their tasks and provide value to the customer. Waste — of money, time, supplies, or good will — decreases value.

The Lean Process

- A Lean process:
  - Is faster
  - Is more efficient and economical
  - Delivers satisfactory quality



Eliminating Waste Reduces Costs & Resources

What kinds of Waste do you have in your Organization?

Eliminating Waste

Waste Analysis

Value Added Time

Time to add a form, feature or function without which the customer is NOT satisfied.

Non-Value-Added Time

All other times, both necessary and not required. Can be as much as 75-95% of the total process time.

8 Types of Waste

D	Defects
O	Overproduction
W	Waiting
N	Non-Utilized Talent
T	Transportation
I	Inventory
M	Motion
E	Extra-Processing

The History of Lean

Eli Whitney

Whitney also championed the concept of “Interchangeable Parts.” By standardizing the processes of production, he was able to reduce the costs of manufacturing of rifles.

Eli Whitney invented the Cotton Gin in 1794, substantially speeding the process of removing the seeds from cotton fibers. This process improvement effort resulted in the expansion of textile production and growth of the cotton industry in the Southern United States.

Source: 2014 Bio, A&E Television Networks, LLC.

The History of Lean

Fredrick W. Taylor

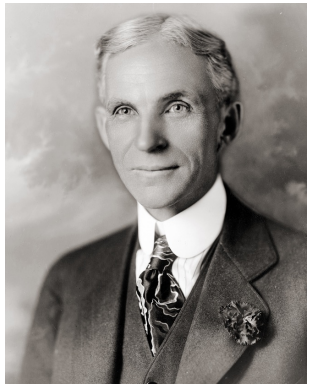
Frederick W. Taylor was the first man in recorded history who deemed work deserving of systematic observation and study. On Taylor's 'scientific management' rests, above all, the tremendous surge of affluence in the last seventy-five years which has lifted the working masses in the developed countries well above any level recorded before, even for the well-to-do. Taylor, though the Isaac Newton (or perhaps the Archimedes) of the science of work, laid only first foundations, however. Not much has been added to them since – even though he has been dead all of sixty years.

Source: Peter Drucker, 1974.

Taylor studied the process of moving pig iron onto rail cars at the Bethlehem Steel Plant in Pennsylvania

The History of Lean

Henry Ford



Henry Ford did not invent the automobile. He didn't even invent the assembly line. But more than any other single individual, he was responsible for transforming the automobile from an invention of unknown utility into an innovation that profoundly shaped the 20th century and continues to affect our lives today.

Innovators change things. They take new ideas, sometimes their own, sometimes other people's, and develop and promote those ideas until they become an accepted part of daily life. Innovation requires self-confidence, a taste for taking risks, leadership ability and a vision of what the future should be. Henry Ford had all these characteristics, but it took him many years to develop all of them fully.

Source: The Henry Ford Museum

The History of Lean

Tajiki Ohno

Ohno was a Japanese businessman. He is considered to be the father of the Toyota Production System, which became **Lean Manufacturing** in the U.S. He devised the seven wastes (or muda in Japanese) as part of this system. He wrote several books about the system, including *Toyota Production System: Beyond Large-Scale Production*.

Born in 1912 in Dalian, China, and a graduate of the Nagoya Technical High School in Japan, he joined the Toyoda family's Toyoda Spinning upon graduation in 1932 during the Great Depression thanks to the relations of his father to Kiichiro Toyoda, the son of Toyota's founding father Sakichi Toyoda. He moved to the Toyota motor company in 1943, and gradually rose through the ranks to become an executive. In what is considered to be a slight, possibly because he spoke publicly about the production system, he was denied the normal executive track and was sent instead to consult with suppliers in his later career

Source: *Toyota Production System: Beyond Large-Scale Production* (English translation ed.). Portland, Oregon: Productivity Press, 1988

Lean Tools

- Waste Analysis
- Flow Process Charts
- Value Stream Mapping
- 6S Workplace Management
- Visual Management
- Cause and Effect Diagrams
- FMEA

What is Six Sigma?

Six Sigma is a business improvement approach that seeks to **Find** and **Eliminate** causes of mistakes or defects in business processes by focusing on product outputs that are critical importance to Customers.

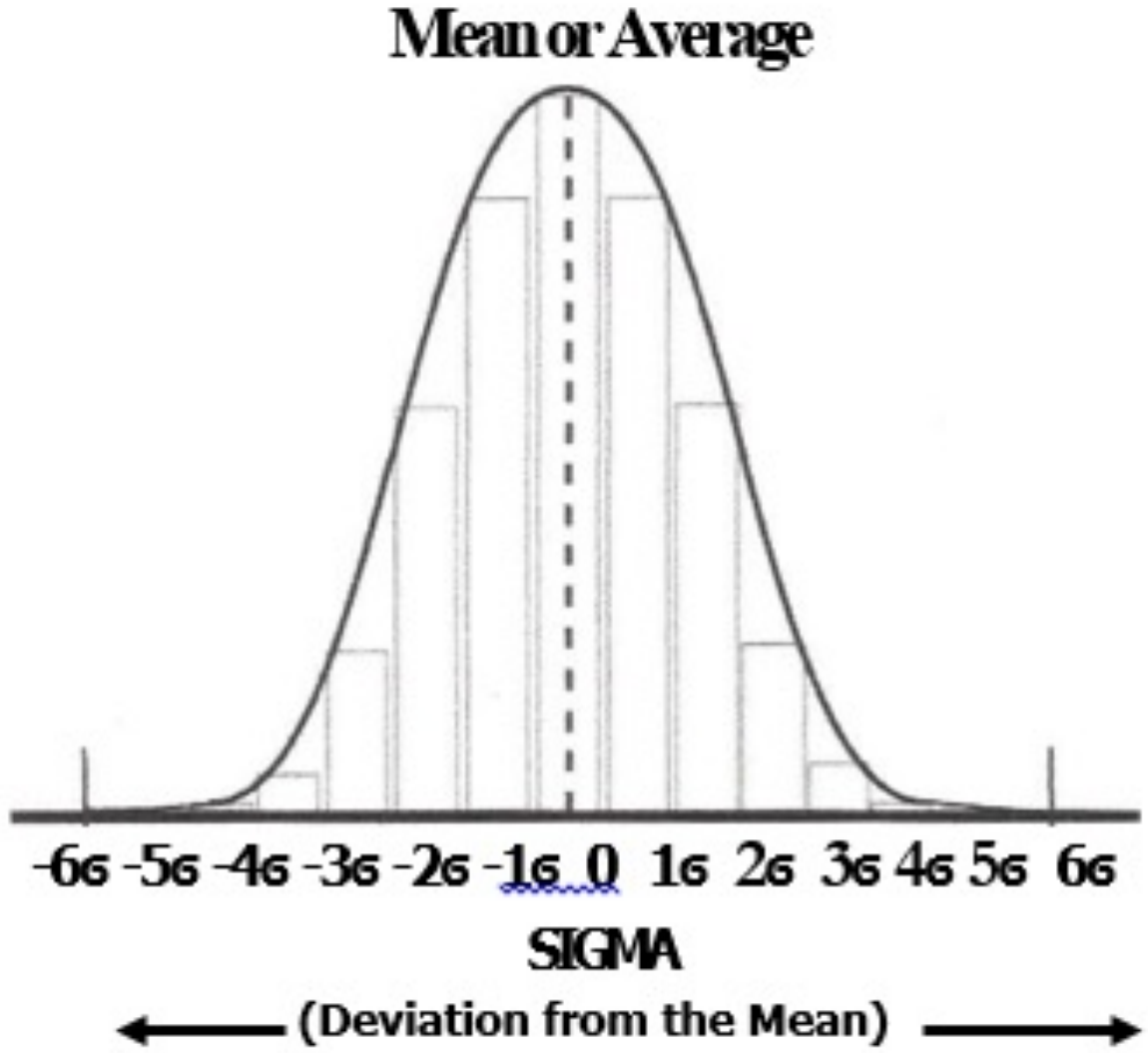
Sneed, 2004

Six Sigma measures how much of the **Normal Process Variation** falls within the process requirements.

All Variation is NOT the Same!

Process variation happens when processes fail to follow a precise pattern. It's a leading cause of quality issues both in transactional and production processes.

Six Sigma Identifies the Processes which fall within Acceptable Outcomes



What Does 6 Sigma Mean?

Six Sigma: 3.4 DPMO Visualized

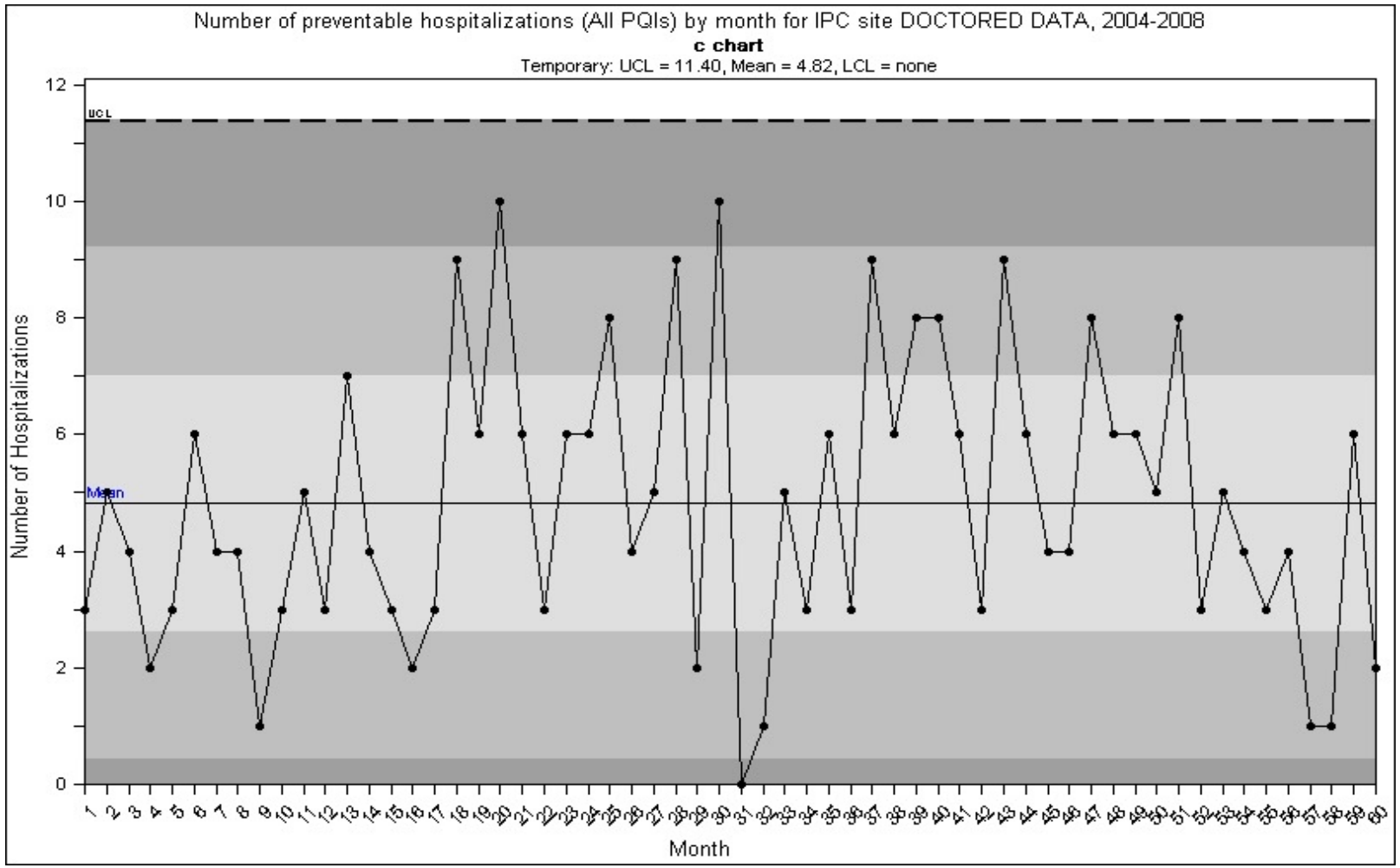
A Six Sigma process has a 99.99966% defect-free rate.

This is equivalent to 3.4 DPMO (defects per million opportunities), or a single defect for every 294,000 units. How small does this look? The chart below illustrates 1 defect in 294,000 units with powers of magnification.

Source: Goleansixsigma.com

Applying the DMAIC Model

Control Charts



Eliminating Variation Increases Quality & Customer Satisfaction

What kinds of Variation do you have in your Organization's Processes?

Eliminating Defects to Eliminate Variation

Defects are information, products and services that are inaccurate and/or incomplete. Examples include:

- Errors that occur over and over
- Customer dissatisfaction in a process
- Fixing paperwork that is not completely filled in or tracking down the right person to get the information
- Entry errors that cause the wrong actions, like shipping too many or too few to the wrong address

Defects

Defects mean something wasn't created or completed correctly. Defects usually result in re-work or re-do's, which means more time and money spent fixing and correcting.

Defects are usually defined by the customer. Customers don't want to receive products or services with defects, nor do they want to engage in processes that cause defects.

Defects are different for each process. They can result in missing information, non-working products or inadequate services.

Have you experienced a defect in a process recently? Did you get the wrong order at a restaurant? Was your flight canceled? Were your hospital records inaccurate?

What are some examples of defects that you've experienced as a customer?

Source: Goleansixsigma.com

The History of Six Sigma

Walter Shewhart

Shewhart is known as the father of Statistical Quality Control and the Grandfather of Total Quality Management

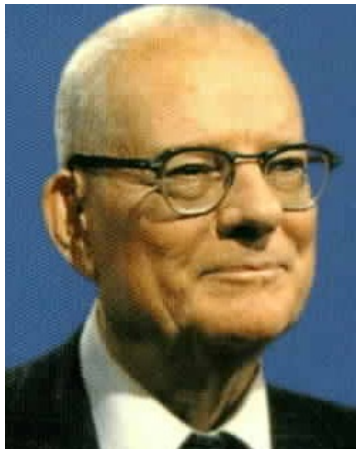
The original notions of Total Quality Management and continuous improvement trace back to a former Bell Telephone employee named Walter Shewhart. One of W. Edwards Deming's teachers, he preached the importance of adapting management processes to create profitable situations for both businesses and consumers, promoting the utilization of his own creation -- the SPC control chart.

He also developed the *Shewhart Cycle Learning and Improvement* cycle, combining both creative management thinking with statistical analysis. This cycle contains four continuous steps: Plan, Do, Study and Act. These steps (commonly referred to as the PDSA cycle),

Source: SkyMark Corporation, 2014

The History of Six Sigma

Edward Deming



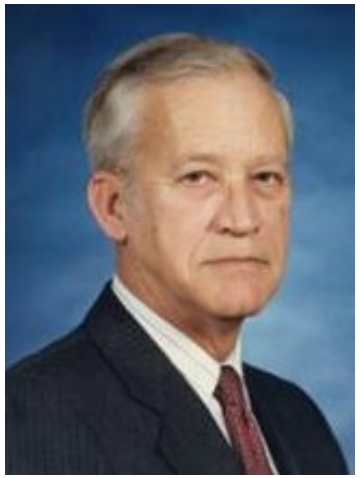
Born in a small town in Iowa, Deming studied at the University of Wyoming and University of Colorado, obtaining M.S. degrees in physics and mathematics. He received his PhD in physics from Yale in 1928. His first job was as a statistician for the U.S. Census Bureau. He later set up a consulting company and taught statistical process control for over 40 years. Deming was also a professor of statistics at New York University's graduate school of business administration (1946–1993), and taught at Columbia University's graduate school of business (1988–1993).

In 1947 Deming worked on the post-war Japanese census. His expertise in statistical process control attracted the attention of the Japanese Union of Scientists and Engineers. From June–August 1950, Deming trained hundreds of engineers, managers, and scholars in statistical process control (SPC) and concepts of quality. This training was used by the Japanese to ultimately develop their automobile industry and surpass the U.S. in automotive quality in the 1970s.

Based on the Japanese success, the U.S. finally recognized Deming and his methods in the 1980s, with the resulting movement of Total Quality Management that laid the foundation for Six Sigma process improvement techniques.

The History of Six Sigma

Bill Smith



Bill Smith was an employee of Motorola and a Vice President and Quality Manager of Land based Mobile Product Sector, when he approached then chairman and CEO Bob Gavin in 1986 with his *theory of latent defect*.

The core principle of the latent defect theory is that *variation* in manufacturing processes is the main culprit for *defects*, and eliminating variation will help eliminate defects, which will in turn eliminate the wastes associated with defects, saving money and increasing customer satisfaction. Smith set a goal for Motorola of 3.4 defects or bad parts per one million parts (DPMO) produced, equating to Six Sigma of acceptable variation. In 2005 Motorola attributed over $17 billion in savings to Six Sigma.

Six Sigma Tools

- Control Charts
- Historical Data Analysis
- Histograms
- Regression Analysis
- Scatter Diagrams

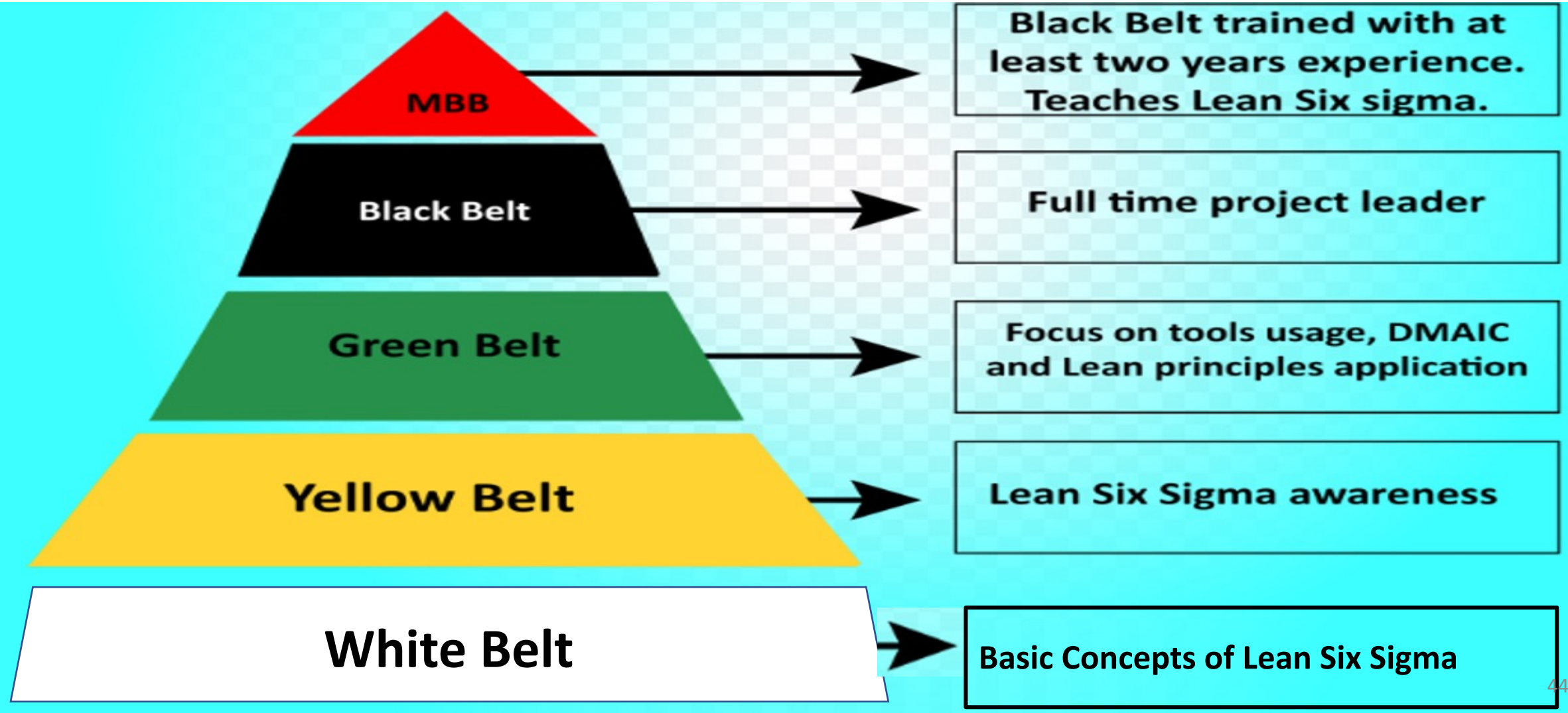
Why Lean and Six Sigma?

- **Six Sigma** will eliminate defects, but it will not address the question of how to optimize process flow.
- **Lean** principles exclude the advanced statistical tools often required to achieve the process capabilities needed to be truly "lean."
- Each approach can result in dramatic improvement.
- Utilizing both methods simultaneously holds the promise of being able to address all types of process problems with the most appropriate toolkit.

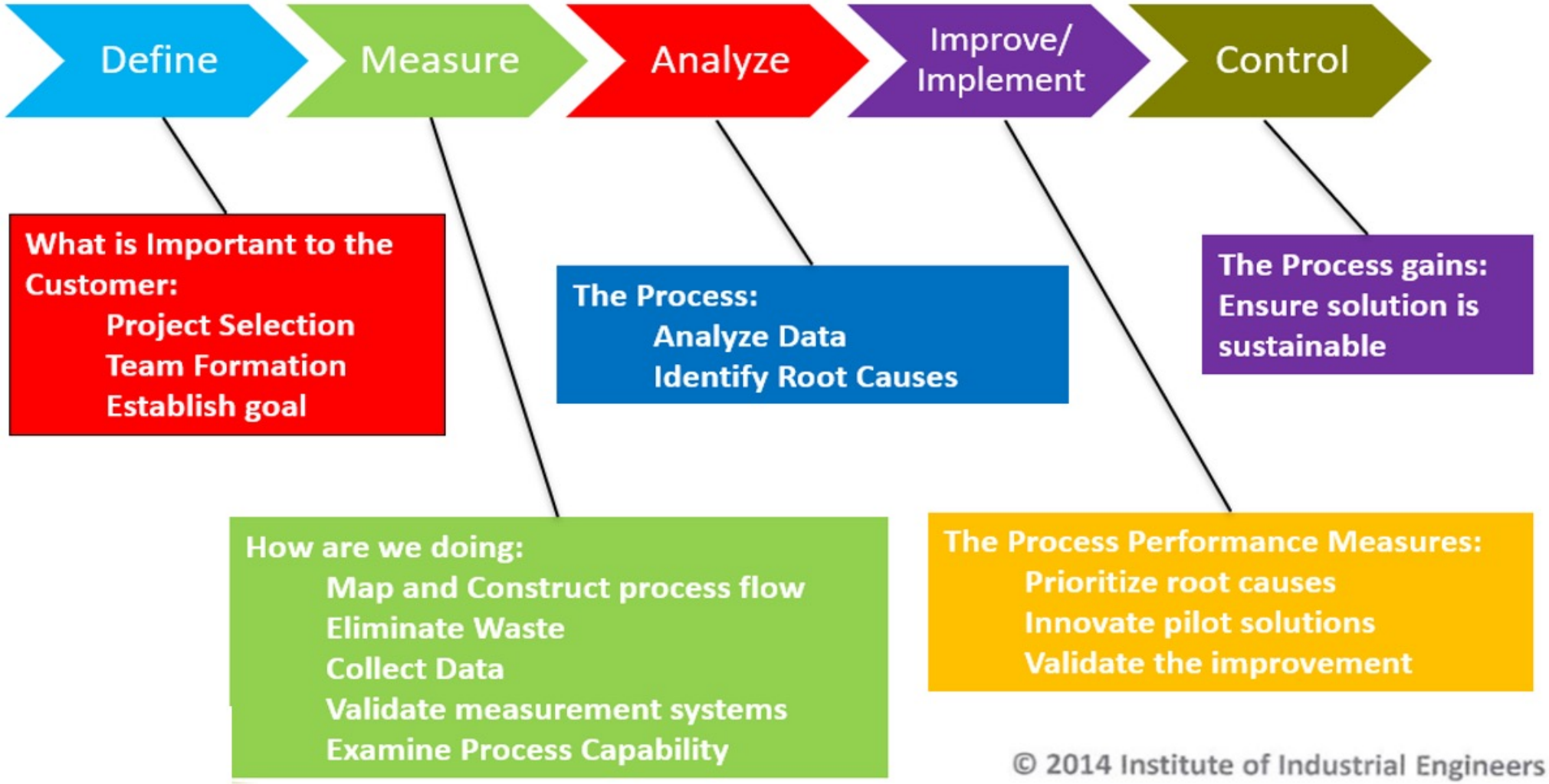
  Example: Inventory reduction requires:

  - *Reducing batch sizes and linking operations - **Lean***
  - *Minimizing process variation - **Six Sigma***

Lean Six Sigma Organization Structure



DMAIC: A Powerful Methodology for Lean Six Sigma



The Process of Process Improvement

	D	Define	Define the problem, process and customer(s) of the process
	M	Measure	Develop a baseline measurement to characterize the problem or current state
	A	Analyze	Analyze the process; Collect and analyze causal data to determine the root causes of Defects
	I	Improve	Develop/implement solutions to remove/reduce sources of problem. Confirm improvement with data
	C	Control	Maintain the gains by documenting and monitoring the improved process

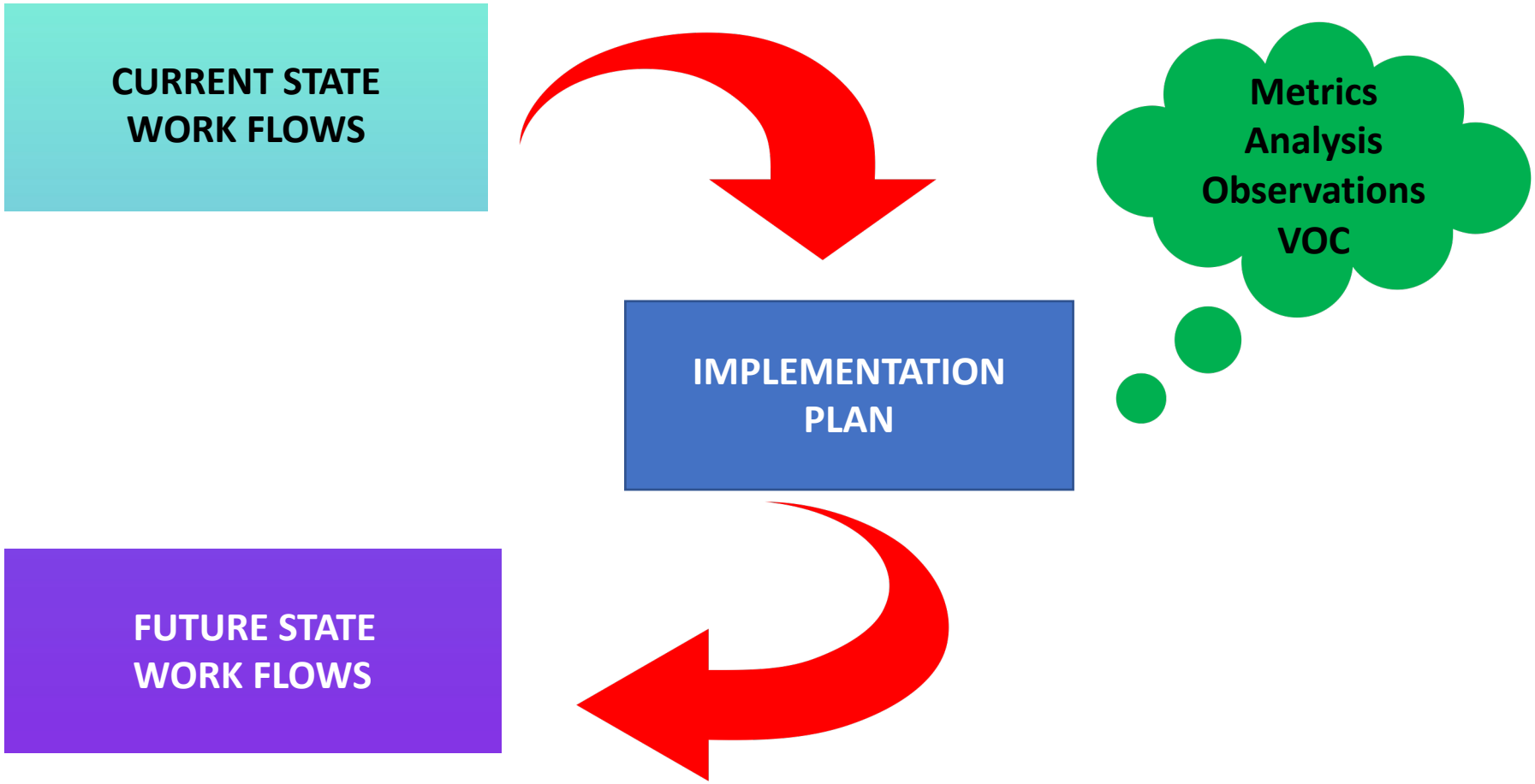
Source: Goleansixsigma.com

The Many Tools of DMAIC

Define	Measure	Analyze	Improve/ Implement	Control
Project Charter	Confidence Intervals	Affinity Diagram	DFSS	Control Charts
Voice of Customer	Measurement System Analysis	Brainstorming	DOE	Control Plan
Kano/QFD	Nominal Group Technique	Cause & Effect Diagram	Kanban	Reaction Plan
Stakeholder Analysis	Pairwise Ranking	e-test	Mistake Proofing	Run Charts
Process Mapping	Physical Process Flow	F-test	PF/CE/CNX/SOP	Standard Operating Procedures
SIPOC	Process Capability Analysis	Fault Tree Analysis	Standard Work	
Idea Creation & Organization • **Brainstorming** • **Brainwriting** • **NGT**	Process Flow Diagram	FMEA	Takt Time	
	Process Observation	Histogram	Theory of Constraints	
Critical to Quality Analysis	Time Value Map	Historical Data Analysis	Total Productive Maintenance	
	Value Stream Mapping	Pareto Chart	Visual Management	
	Waste Analysis	Reality Tree	Work Cell Design	
		Regression Analysis	5S Workplace Organization	
		Scatter Diagram	Reliability	
		t-test		
		Thematic Content Analysis		
		Tukey End Count Test		
		5 Whys		

The Process of Process Improvement

IMPROVEMENT PROCESS



The Process of Process Improvement

The Principles of Lean Six Sigma

1. Customer Focus – Eyes Of The Customer, Value, Waste Elimination
2. Continuous Improvement – Constant, Incremental, Gradual, Undramatic
3. Quality Definition – Common Direction, Focus, Commitment
4. Work Process Focus – Process Issues, Long-Term Orientation
5. Prevention – Elimination, Accurate, Shorter, Better Use
6. Error-Free Attitude – Right First Time, Better Service, Efficient Processes
7. Manage By Facts – Begin By Asking, Avoid Jumping, Measure And Correct
8. Employee Participation – Involving, Quickly Resolved, Committed
9. Total Involvement – Teams, Externally Focused, Solving Problems,

Perpetual Learners (Curiosity)

The Process of Process Improvement

Goals and Benefits of Lean Six Sigma

- Achieve total **Customer** satisfaction and improved operational effectiveness and efficiency.
  - Remove wasteful/non-value-added activities.
  - Decrease defects and cycle time and increase first pass yields.
- Improve communication and teamwork through a common set of tools and techniques (a disciplined, repeatable methodology).
- Develop leaders in breakthrough technologies to meet stretch goals of producing better products and services delivered faster and at lower cost.

Applying the DMAIC Model

The Define Phase

Identifying a process problem and planning an approach to improving it.

"A goal without a plan is just a wish."

Antoine de Saint-Exupery

"In preparing for battle I have always found that plans are useless, but planning is indispensable."

General Dwight D. Eisenhower

"An expert is one who avoids the small errors while sweeping on to the grand fallacy."

Anonymous

Applying the DMAIC Model

The Define Phase

- Look to the Voice of the Customer for identifying problems with processes.
- Identify all problems that are evident.
- Prioritize the problems using Pareto or other methodologies.
- Select the most important problem to address first.
- Select a Lean Six Sigma Team.
- Develop a Project Charter.

Applying the DMAIC Model

The Measure Phase

Develop Baseline measurements to characterize the problem or current state.

Thoroughly understand the current state of the process.

Collect reliable data on process speed, quality, and costs to expose the underlying causes of process variation.

Eliminate any identifiable waste from the process.

Applying the DMAIC Model

The Measure Phase

- Map the Process
  - Flow Charts
  - Value Stream Mapping
  - PERT chart
  - Deployment Flowchart
  - Prioritization Matrix
- Eliminate any Waste that adds No Value to the Process.
  - Waste Walk
  - DOWNTIME

Applying the DMAIC Model

Another Example of a Process Chart

Process: *Emergency room admission*
Subject: *Ankle injury patient*
Beginning: *Enter emergency room*
Ending: *Leave hospital*

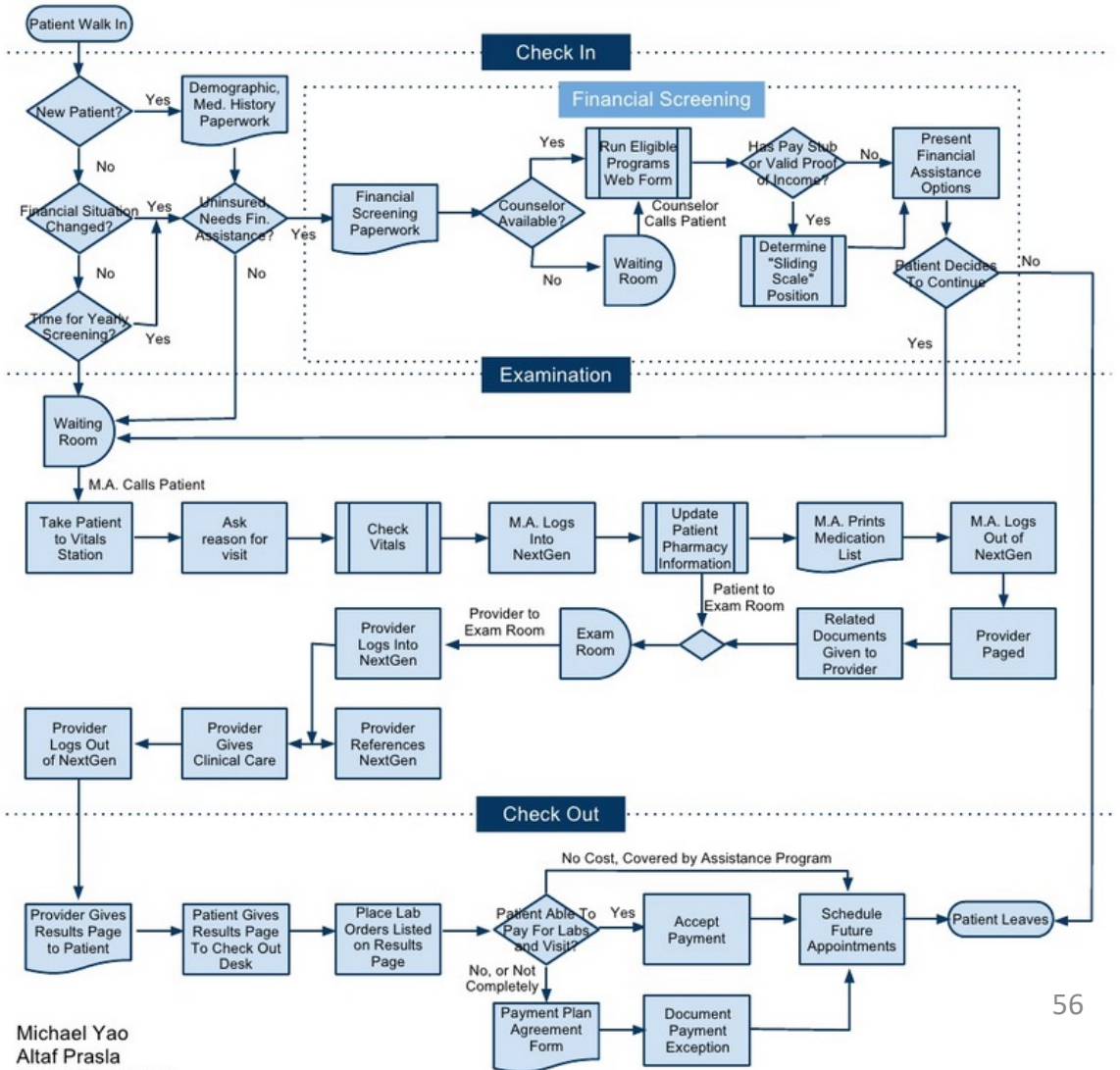
Insert Step
Append Step
Remove Step

Summary			
Activity	Number of steps	Time (min)	Distance (ft)

Step no.	Time (min)	Distance (ft)	○	⇨	□	D	▽	Step description
1				X				Enter emergency room, approach patient window
2			X					Sit down and fill out patient history
3				X				Nurse escorts patient to ER triage room
4					X			Nurse inspects injury
5				X				Return to waiting room
6						X		Wait for available bed
7				X				Go to ER bed
8						X		Wait for doctor
9					X			Doctor inspects injury and questions patient
10				X				Nurse takes patient to radiology
11			X					Technician x-rays patient
12				X				Return to bed in ER
13						X		Wait for doctor to return
14			X					Doctor provides diagnosis and advice
15				X				Return to emergency entrance area
16			X					Check out
17				X				Walk to pharmacy
18			X					Pick up prescription
19				X				Leave the building

Applying the DMAIC Model

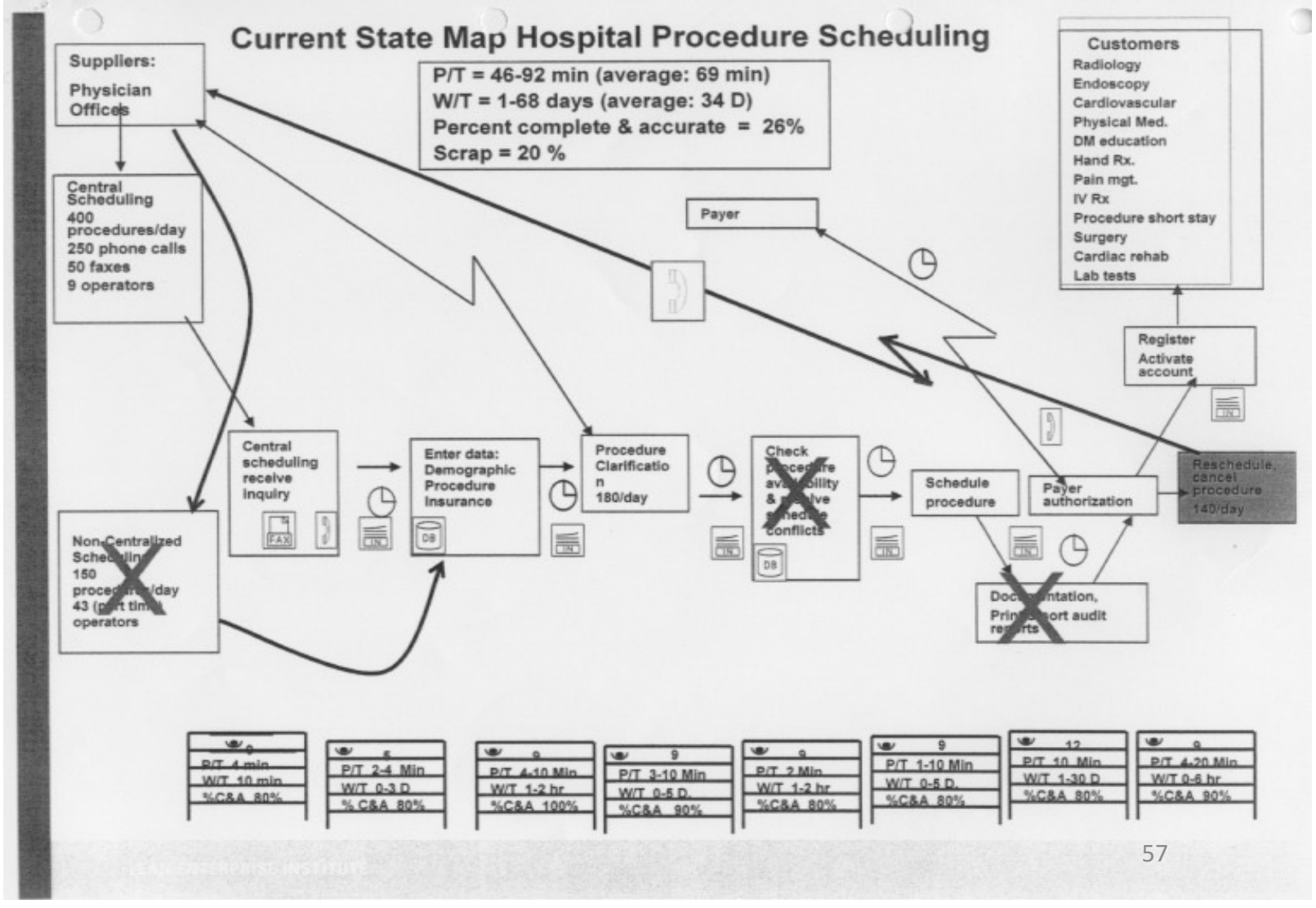
Example of a Flow Chart or Process Map



Michael Yao
Altaf Prasla

Applying the DMAIC Model

Example of a Value Stream Map that has been reviewed for Non-Value Added Activities



Applying the DMAIC Model

The Measure Phase: Data Collection Organization & Analysis Tools

Prioritization Matrix: Raw scores from review team

Average Scores From Survey			
Numbers of Patients Impacted	**Revenue Potential**	**Overall Project Cost**	**Time for Completion**
3	2	2	4
2	5	3	5
1	1	4	1
5	1	1	2
4	3	3	3
2	3	5	2

Prioritization Matrix: Weighted Scores

Parameter	**Numbers of Patients Impacted**	**Revenue Potential**	**Overall Project Cost**	**Time for Completion**	
Weight	0.15	0.4	0.3	0.15	
Unit	**Weighted Scores**				**Total Score**
ED	0.45	0.8	0.6	0.6	2.45
Obstetrics	0.3	2	0.9	0.75	3.95
Medicine	0.15	0.4	1.2	0.15	1.90
Pediatrics	0.75	0.4	0.3	0.3	1.75
Post-op	0.6	1.2	0.9	0.45	3.15
Neuro	0.3	1.2	1.5	0.3	3.30

Applying the DMAIC Model

The Analysis Phase

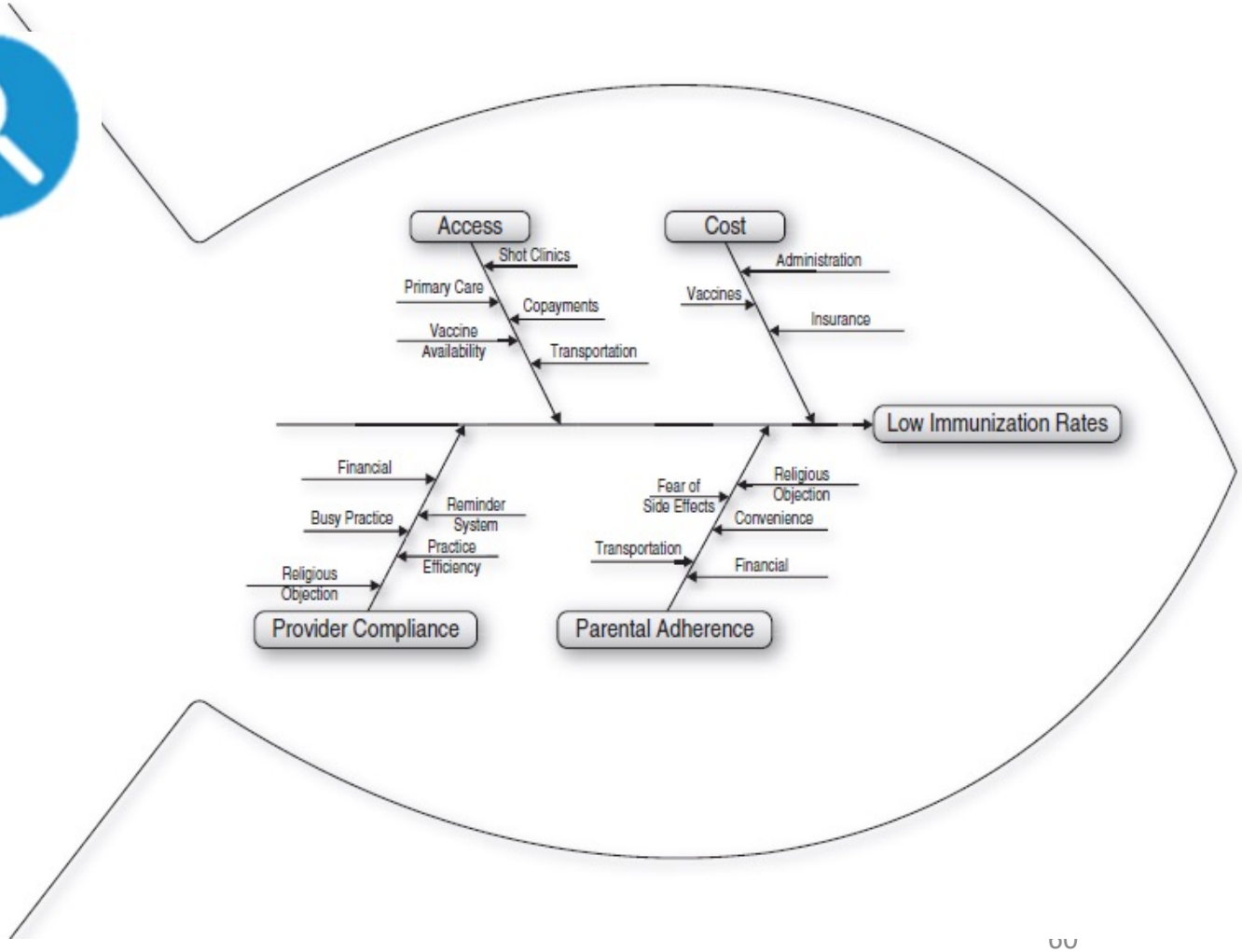
Analyze the Process; Collect and analyze causal data to determine the Root Cause of Defects or Problems.

Applying the DMAIC Model

The Analysis Phase

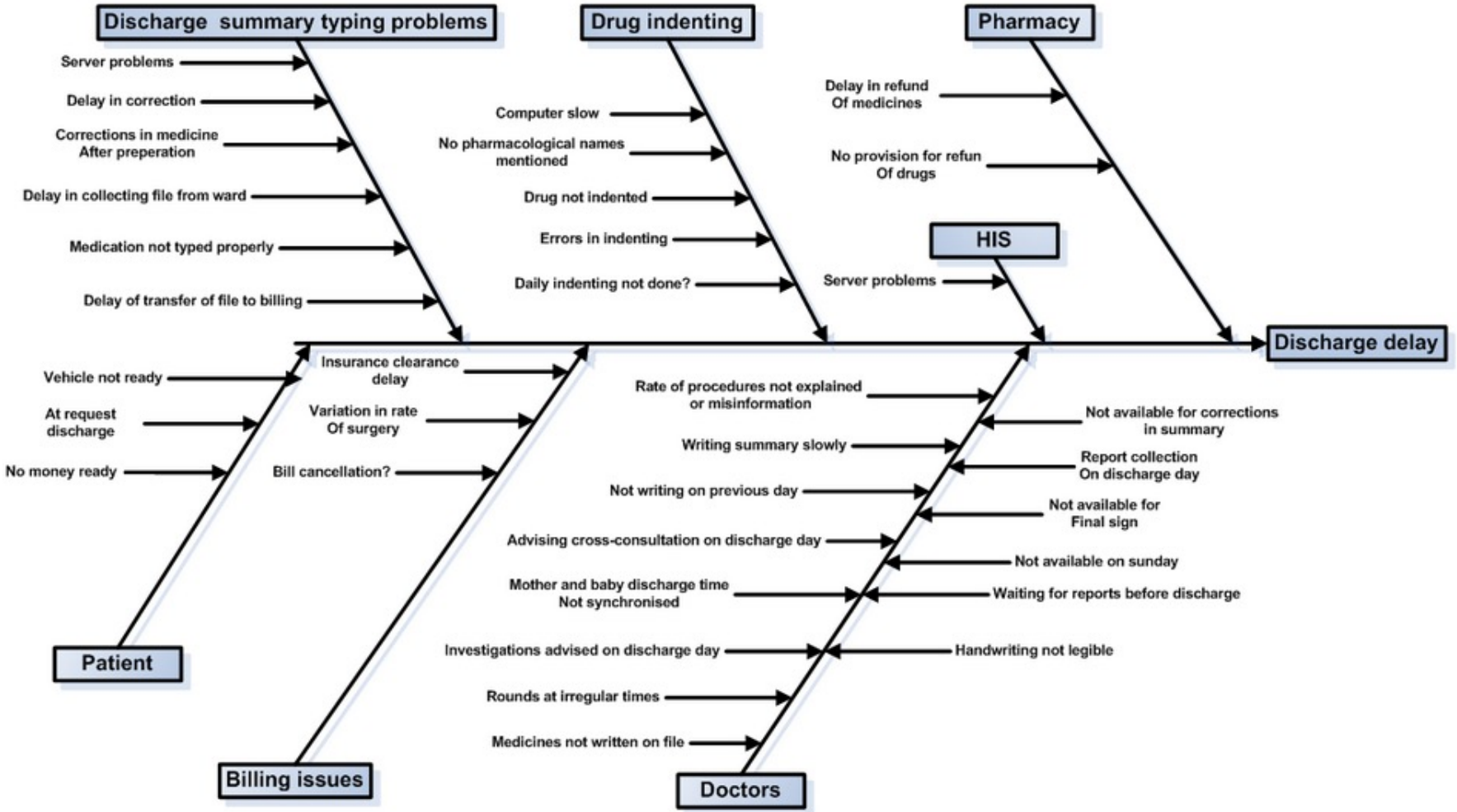
Root Cause Analysis

- 5 Why's
- Brainstorming – (described in Define Phase)
- Cause and Effect Diagram



Applying the DMAIC Model

Cause and Effect Diagram



Applying the DMAIC Model

Prioritizing Problems with an Affinity Diagram

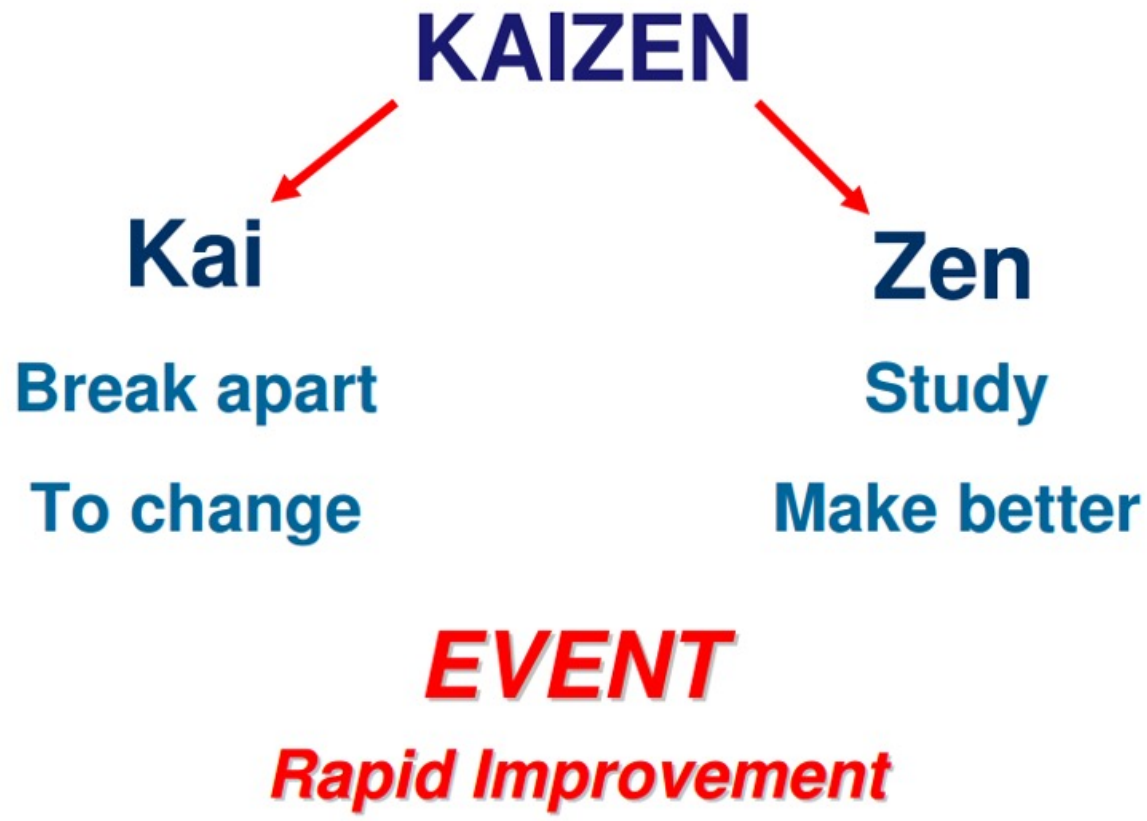
Applying the DMAIC Model

The Improve Phase

Develop/Implement solutions to remove/reduce sources of problem. Confirm improvements with data.

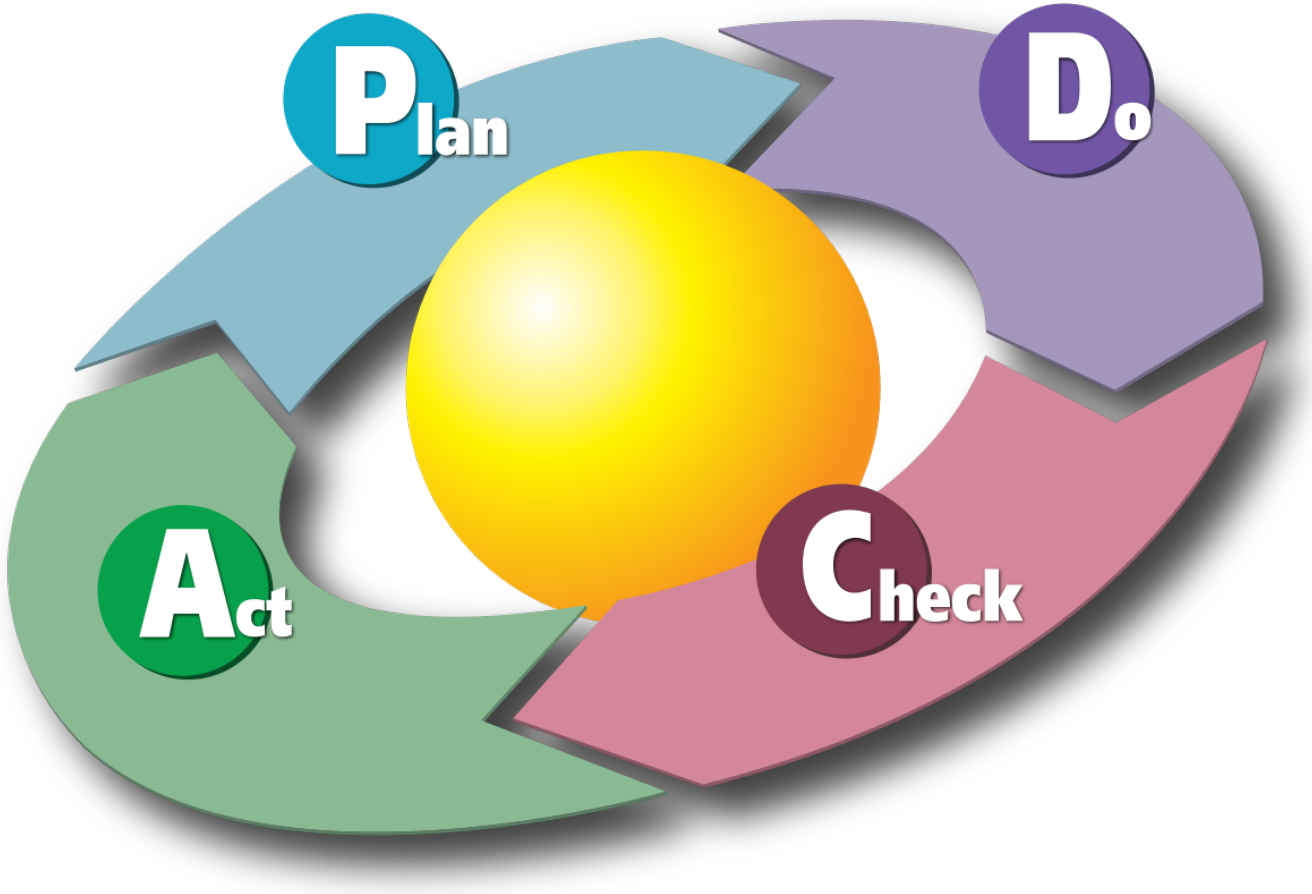
Applying the DMAIC Model

The Improvement Process: Kaizen Event



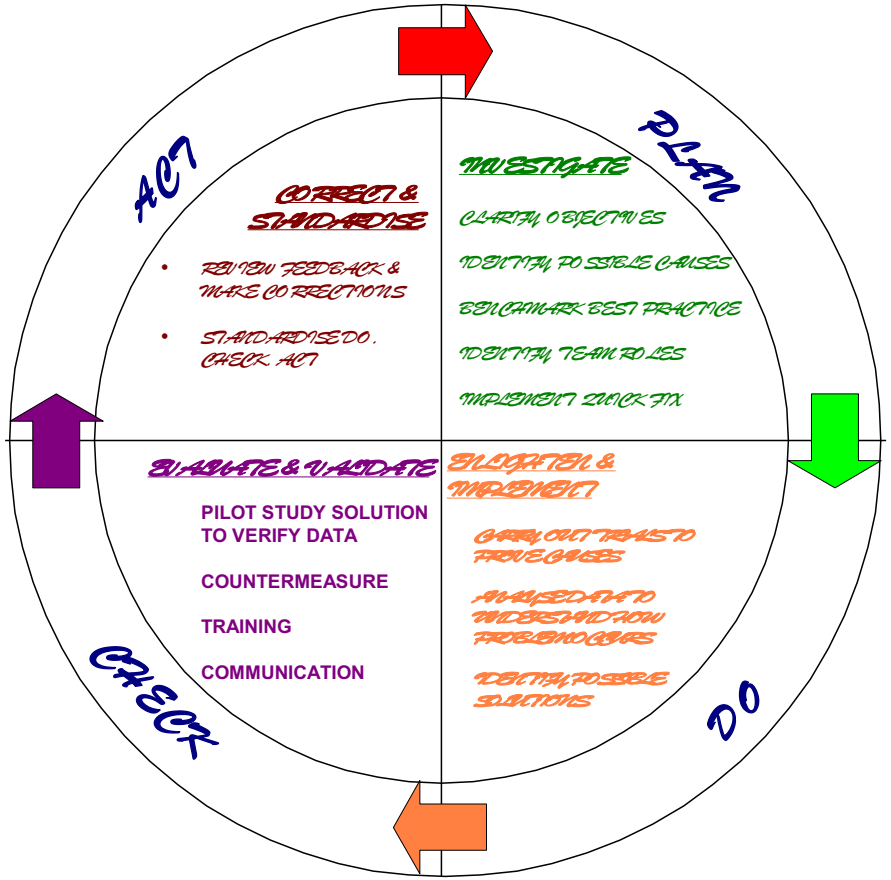
Applying the DMAIC Model

Plan Do Check Act



Applying the DMAIC Model

The Improve Phase: PDCA



PDCA was created by W Edwards Deming in the 1950's as an easy to follow **Problem Solving** Cycle.

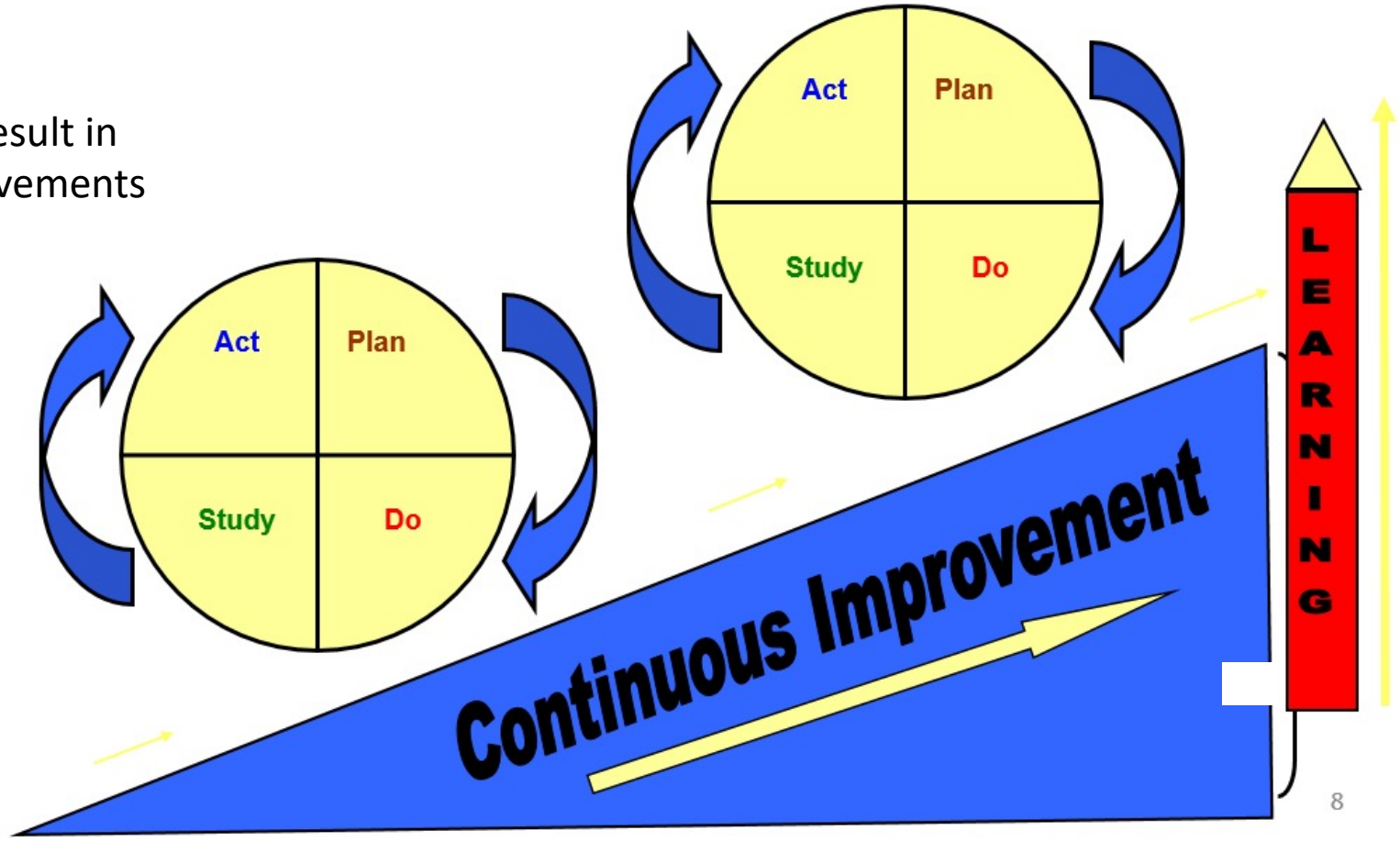
PDCA is also known as **PDSA** or **Plan Do Study Act**

PDCA is an iterative process improvement methodology, where once improvement is achieved, the cycle is started again, attempting to gain further improvement

Applying the DMAIC Model

Kaizen Event

Repeated Cycles result in
Continuous Improvements

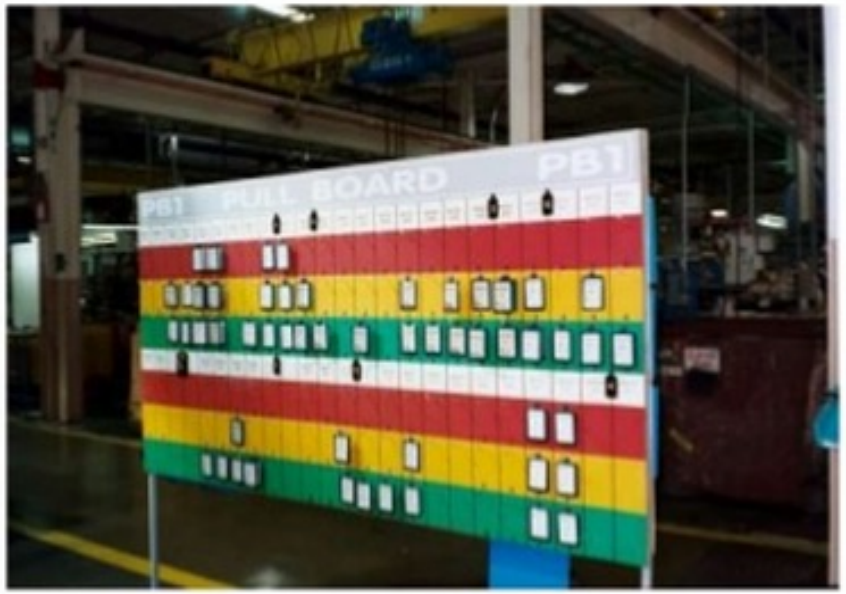


Applying the DMAIC Model

VISUAL WORK
Workplace Structure -Organization

Applying the DMAIC Model

VISUAL WORK
Process Improvement – Process Identification



Information Flow

Material Flow

Applying the DMAIC Model

VISUAL WORK
Process Improvement – Process Documentation

Work Instructions

Standard Work

Applying the DMAIC Model

VISUAL WORK
Employee Engagement – Ownership of the Process

Applying the DMAIC Model

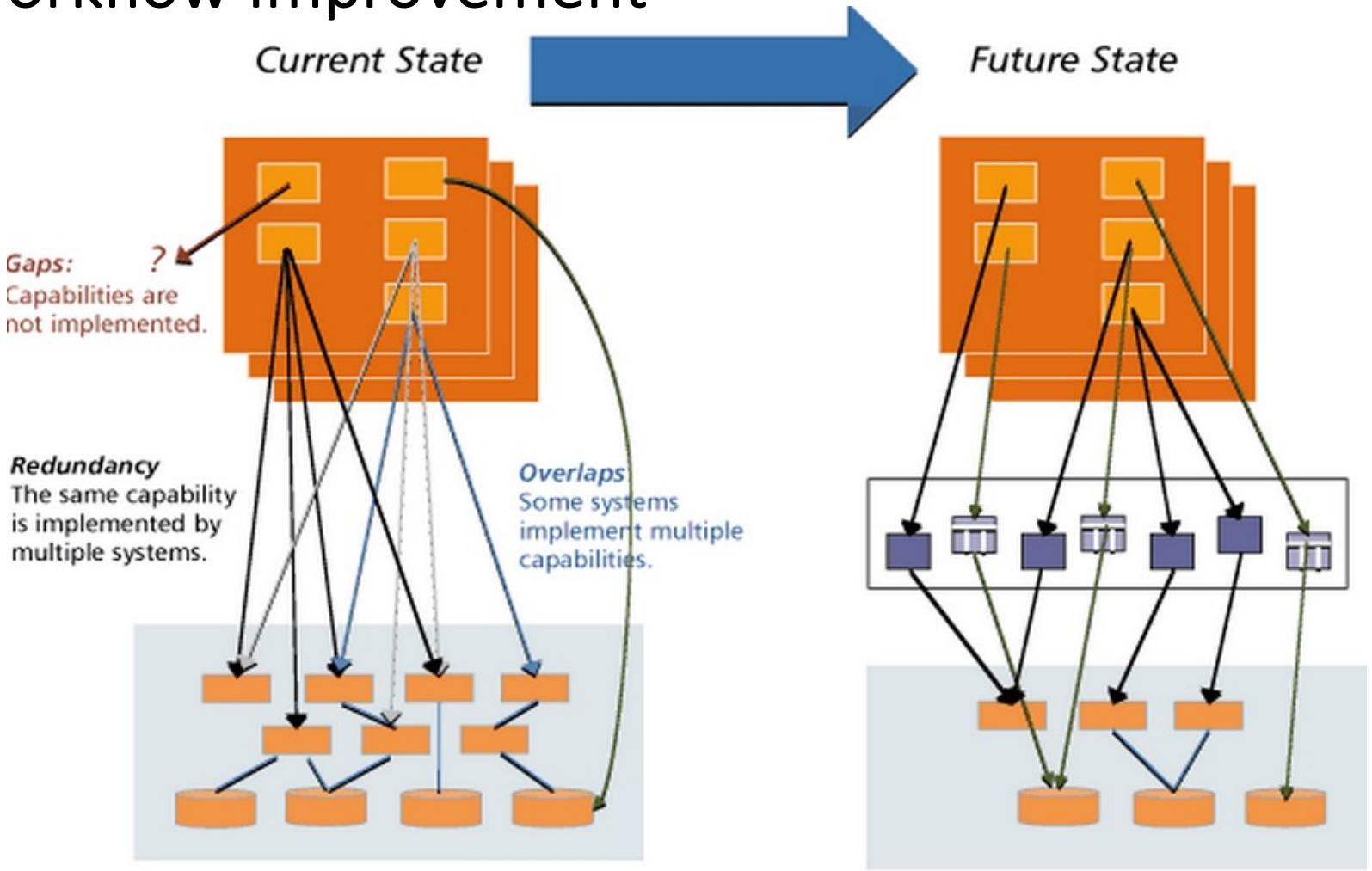
VISUAL WORK

Before Visual Management

After Visual Management

Applying the DMAIC Model

Workflow Improvement



Applying the DMAIC Model

The Control Phase

Maintain the gains by documenting and monitoring the improvement process.

- Control Phase focused on factors that lead to deteriorating performance
  - Quality Assurance approaches used during this phase, i.e. monitoring, responding to quality lapses
  - Continuous Quality Improvement (CQI) applied to ensure that that the concept of improvement is integrated into a culture of improvement

Applying the DMAIC Model

The Control Phase

- "Sustain the gains" is a primary goal of Control Phase
  - Workforce inertia to change inhibits change and deployment
- Standardization = performing a particular process reliably the same way every time the process is run
  - Example: assembly line construction of a car part – often performed by machines that maintain strict tolerances based on specific requirements

Applying the DMAIC Model

The Control Phase

Training Programs

- Training is a key part of the Control Phase
- Training program must be tailored to stakeholder needs
- Training modules that can be used to make training specific for subgroups of stakeholders based on specific needs
- Training program development starts at the end of the Improve Phase
- Program is then finalized and “polished” during the Control Phase
- Becomes a long term strategy for ensuring adherence to the improvement plan

Applying the DMAIC Model

The Control Phase

Set up a Process Monitoring Program

- The monitoring plan is another deliverable from the Control Phase.
- Once an improvement is deployed, almost inevitably the world in which the process is operating changes, affecting performance.
- Without some way of monitoring those changes, it is difficult to determine if the process improvement remains viable.
- An effective monitoring plan is necessary to not only determine if the desired improvements in performance are sustained, but the plan should also contain metrics that aid in troubleshooting lagging process execution.

Providing Leadership for Lean Six Sigma

Senior Management Role

- The key role of executive leaders is to decide to do Lean Six Sigma and to endorse it publicly throughout the organization. Company leaders must kick off and reinforce the comprehensive scope of Lean Six Sigma to engage everyone's support and participation. It's important for Lean Six Sigma to be a companywide initiative; that point cannot be overemphasized.

- And as you begin this business-changing enterprise, visible leadership is crucial. It rallies the employees, it lends legitimacy to your projects, and it sends the clearest signal that Lean Six Sigma and your targeted outcomes are major company priorities.

Providing Leadership for Lean Six Sigma

Creating the Steering Committee

- Identifies projects
- Identifies green belts
- Allocates resources
- Monitors progress
- Reviews effectiveness
- Establishes implementation strategy and policies

Providing Leadership for Lean Six Sigma

Lean Six Sigma Champions

- Key management personnel who provide support, resources, and encouragement for the process.
- Champions require an in-depth understanding of the methods used, especially the measurements and the interpretation of the process measurements.

Providing Leadership for Lean Six Sigma

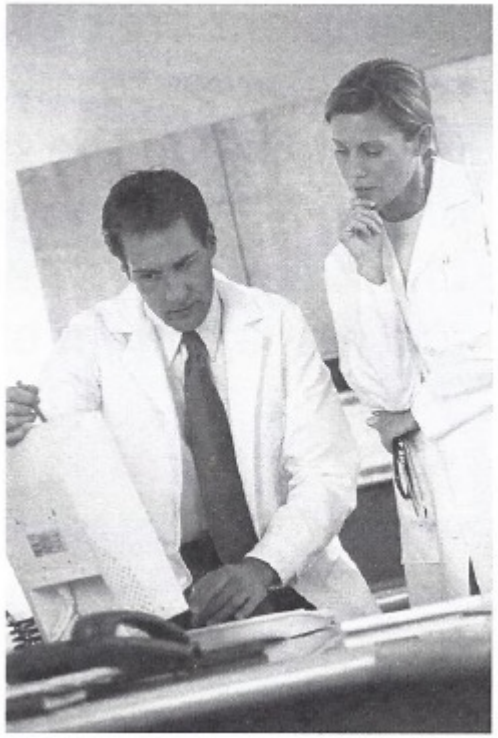
Lean Six Sigma Champions

Champions are closest to the process, and it's not an exaggeration to say that they "own" it in every respect. Depending on the size of a company, champions are drawn from the ranks of the executives and managers. Champions have responsibility for the daily oversight and management of each critical element.

Providing Leadership for Lean Six Sigma

Lean Six Sigma Champions

- Remove obstacles
- Play key role in team selection
- Make key team members available
- Support the scope and kill scope creep
- Aggressively participate in steering committee meetings



Who would be the Champions in your Organization?

Everyone has a Role to Play

Senior Management Team
- Design Value in
- Create Flow

→
- Align Capacity to Demand
- Align Organization around the Customers
- Identify Bottlenecks
- Synchronize the Process Steps

Middle Management Team
- Take out Waste
- Improve Flow

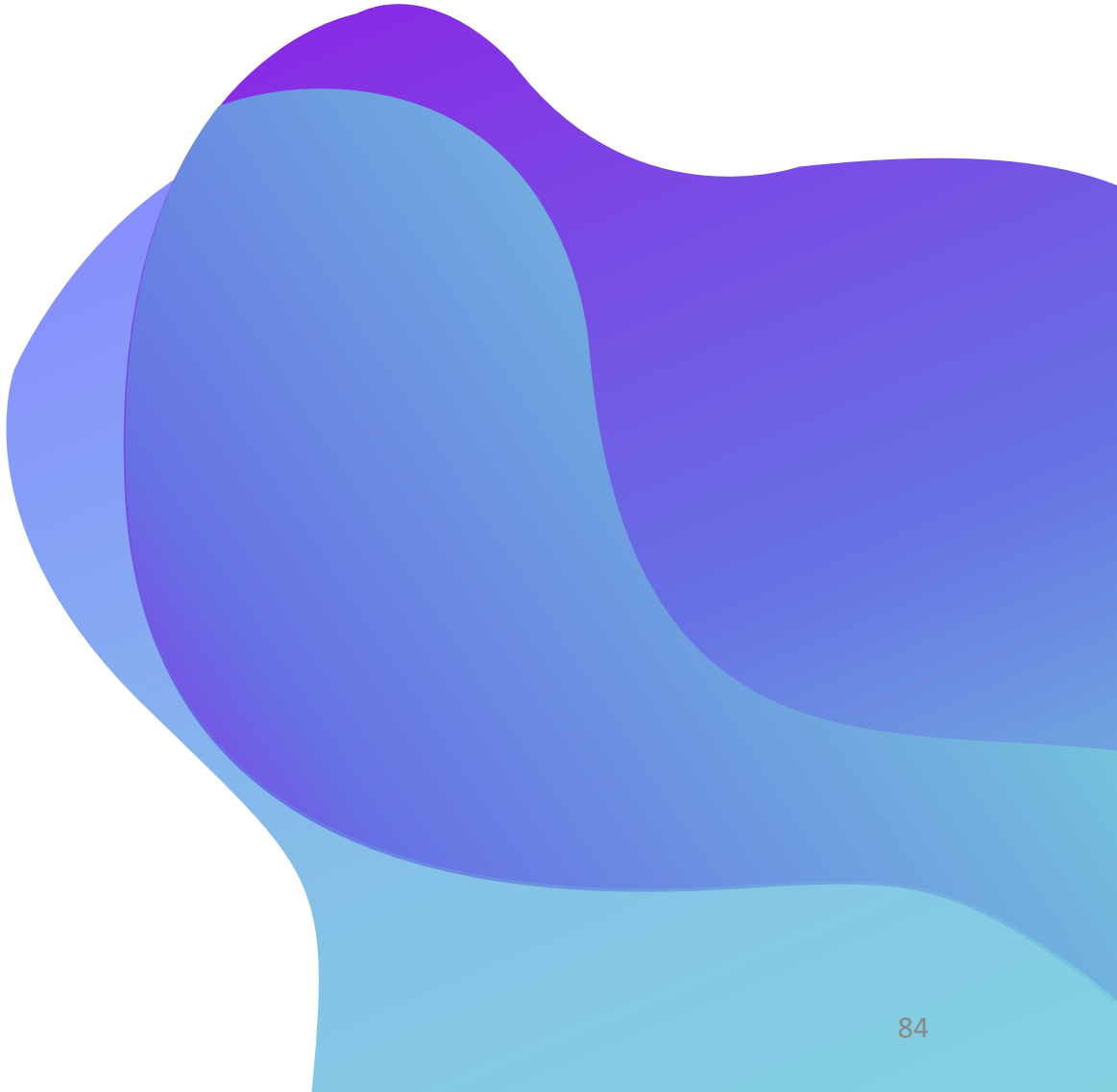
→
- Break down Bottlenecks
- Make every step
  - Capable
  - Available
  - Adequate

Work Force
- Keep Waste Out
- Sustain Flow

→
- Solve Problems
- Standardize
- Continually Improve

QUESTIONS?

The Most Dangerous Phrase in the English Language is “We’ve always done it this way.”



Thank You

LEARN MORE ABOUT LEAN SIX SIGMA

GREEN BELT CERTIFICATION PROGRAM
Presented by ALPEx
May 9-13, 2022
www.alabamaexcellence.org

J.M. “Mickey” Trimm, PhD
205-706-9936
Mickeytrim@aol.com