Certified Inspector General Inspector / Evaluator Course

INSPECTOR GENERAL INSTITUTE

TRAINING AND CERTIFICATION FOR INSPECTION AND OVERSIGHT PROFESSIONALS

Basics of Lean Six Sigma for Inspectors

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ASSOCIATION OF INSPECTORS GENERAL

Course Objectives

- Define Six Sigma and Lean Six Sigma
- Principles and Wastes of Lean Six Sigma
- Identify the use of Lean Six Sigma for Inspections
- Application of Lean Six Sigma tools

Definition

What is Six Sigma ?

Defined

Six Sigma

- Six Sigma is a set of techniques and tools utilized for process improvement.
- Six Sigma began in the 19th century by German mathematician and physicist Carl Fredrich.
- In the mid 1980s, Motorola engineer Bill Smith bought Six Sigma to the mainstream by using the methodology to create more consistent quality in their products. This essentially means having only 3.4 defects for every one million products.

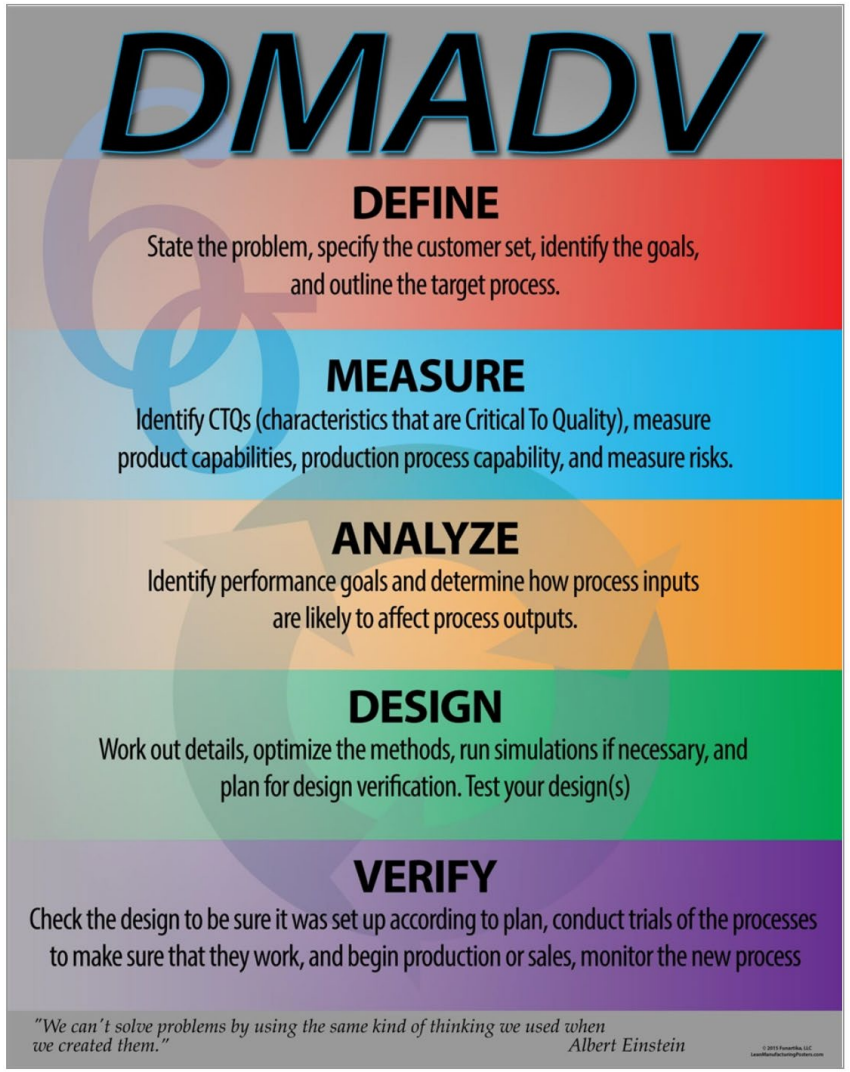
Goal of Six Sigma

- The ultimate goal of Six Sigma is to improve and make more efficient business processes.
- Improve the quality of the process.
- Ultimately to improve the products resulting from that process.

DMADV Methodology

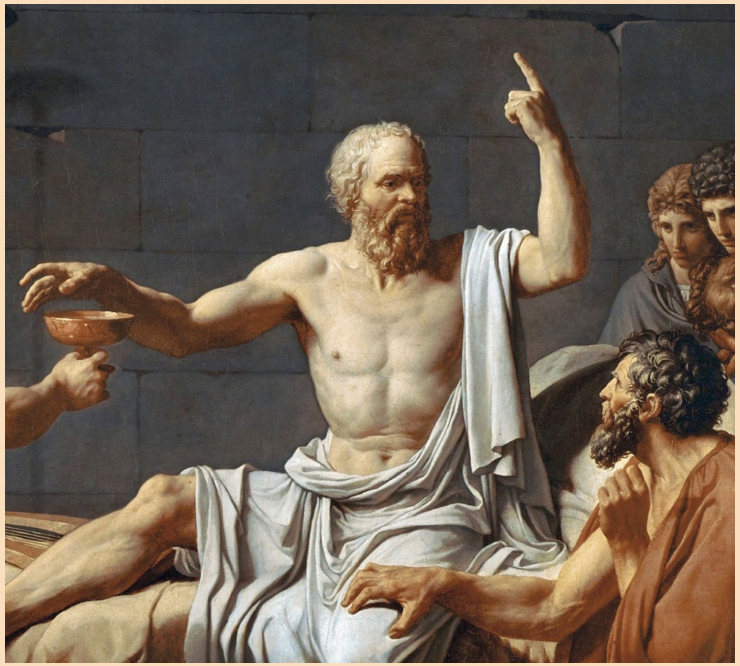
- **Define** – everyone who participates in the project knows their role
- **Measure** – complete picture of the established process
- **Analyze** – ID key functions and characteristics
- **Design** – check performance and capability of your design
- **Verify** – lessons learned; achievements made

DMADV (Define, Measure, Analyze, Design and Verify)



Definition

- What is Lean Six Sigma?



Defined

Lean Six Sigma?

- Is a systemic way of eliminating waste and creating flow in production processes that relies on a collaborative team effort to improve performance by removing waste and reducing variation.
- Waste = Muda

DMAIC in Lean Six Sigma

- **Define**– projects start with a problem that needs solving
- **Measure**–clarify things by seeing how the work gets done
- **Analyze**– figure out what is happening and why, get to the root cause
- **Improve**– need to know the process and the problem(s)
- **Control** – Update SOPs, control plans, process maps, work instructions and Visual Aids

Lean Tools DMAIC vs DMADV

- The **DMADV** method is used when implementing new strategies because of its basis in data, its ability to identify success early, an its methodology, which requires thorough analysis. Like DMAIC, it is an integral part of a Six Sigma Quality initiative.

- **DMAIC** is used for improving an activity for an already ongoing process, product or service.

The 5 Principles of Lean Six Sigma

- **Identify Value** – value in the process to find an efficient solution. Any activity or process that doesn't bring value is considered waste.
- **Value Stream Mapping** – map the workflow to include all actions and people involved in the final work product.

The 5 Principles of Lean Six Sigma

- **Create Flow** – Break down work into smaller batches and visualize the workflow to detect and remove roadblocks.
- **Pull System** – Pull work only if there is demand for it. This will optimize resource capacity to deliver a product when there is a need.

The 5 Principles of Lean Six Sigma

- **Continuous Improvement**– The lean methodology works through continuous improvement. Make sure to include employees on every level in continuously improving and eliminating waste(Muda).

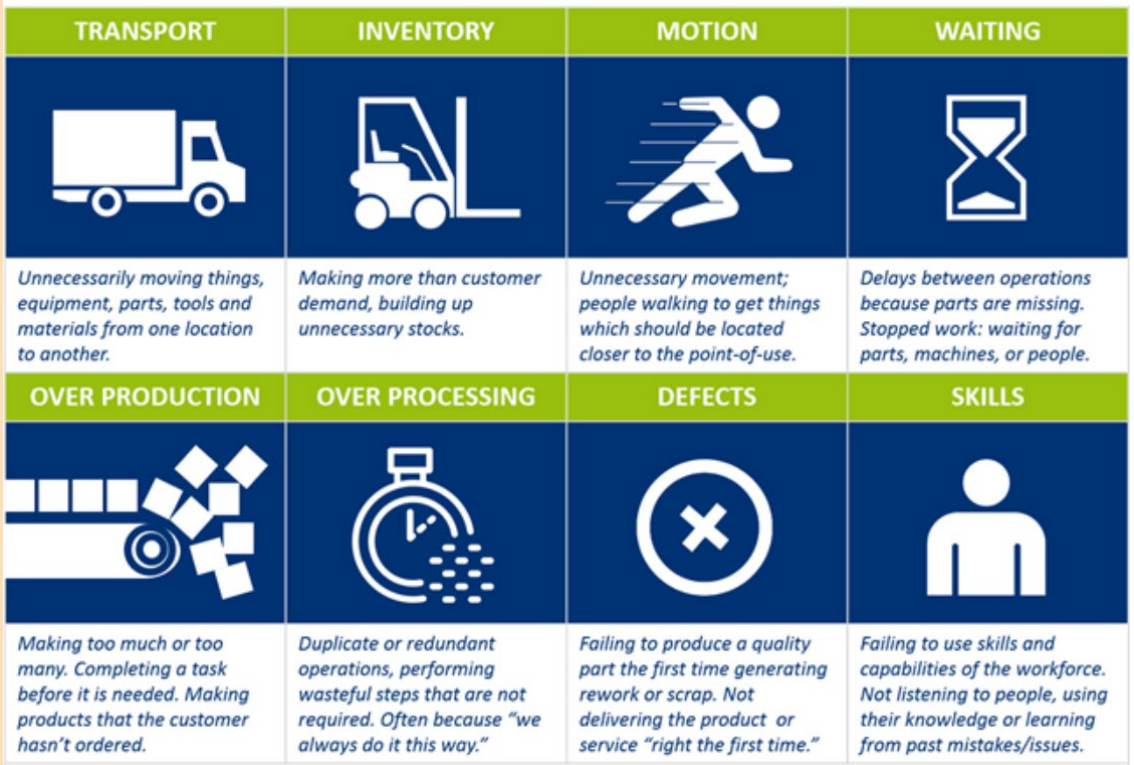
The 8 Wastes of Lean

- Transportation
- Inventory
- Motion
- Waiting
- Over Production
- Over Processing
- Defects
- Skills

The 8 Wastes of Lean

Best way to remember:

- T – Transport
- I – Inventory
- M – Motion
- W – Waiting
- O– Over Production
- O– Over Processing
- D– Defects
- S– Skills



Lean Tools

- **Define**– what are process goals
  project charter
- **Measure**– What is the as-is capability of the process according to data
  process mapping
- **Analyze**– What are the Cause and Effects connections and defects in the process
  root-cause analysis

Lean Tools

- **Improve**– Use the data and process tools to establish the capability of your improved process via pilot runs

  Design of Experiments
- **Control**– use visual workplaces, productions boards or statistical control of the procedure to oversee the optimized process. Maintain oversight until you have reached the six-sigma level.

  Quality Control Plan

Lean Tools – Defined

- **Project Charters** are used to define the focus, provide scope, direction, and purpose or motivation for the team.
- Project charters detail the desired outcome
- Define Stakeholders
- List Customers
- List team members, project managers and staff
- There is a process section that tells the stakeholders what the plan is and metrics. This should show how the new process will improve results
- Will define risks and timelines

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Lean Tools – Defined

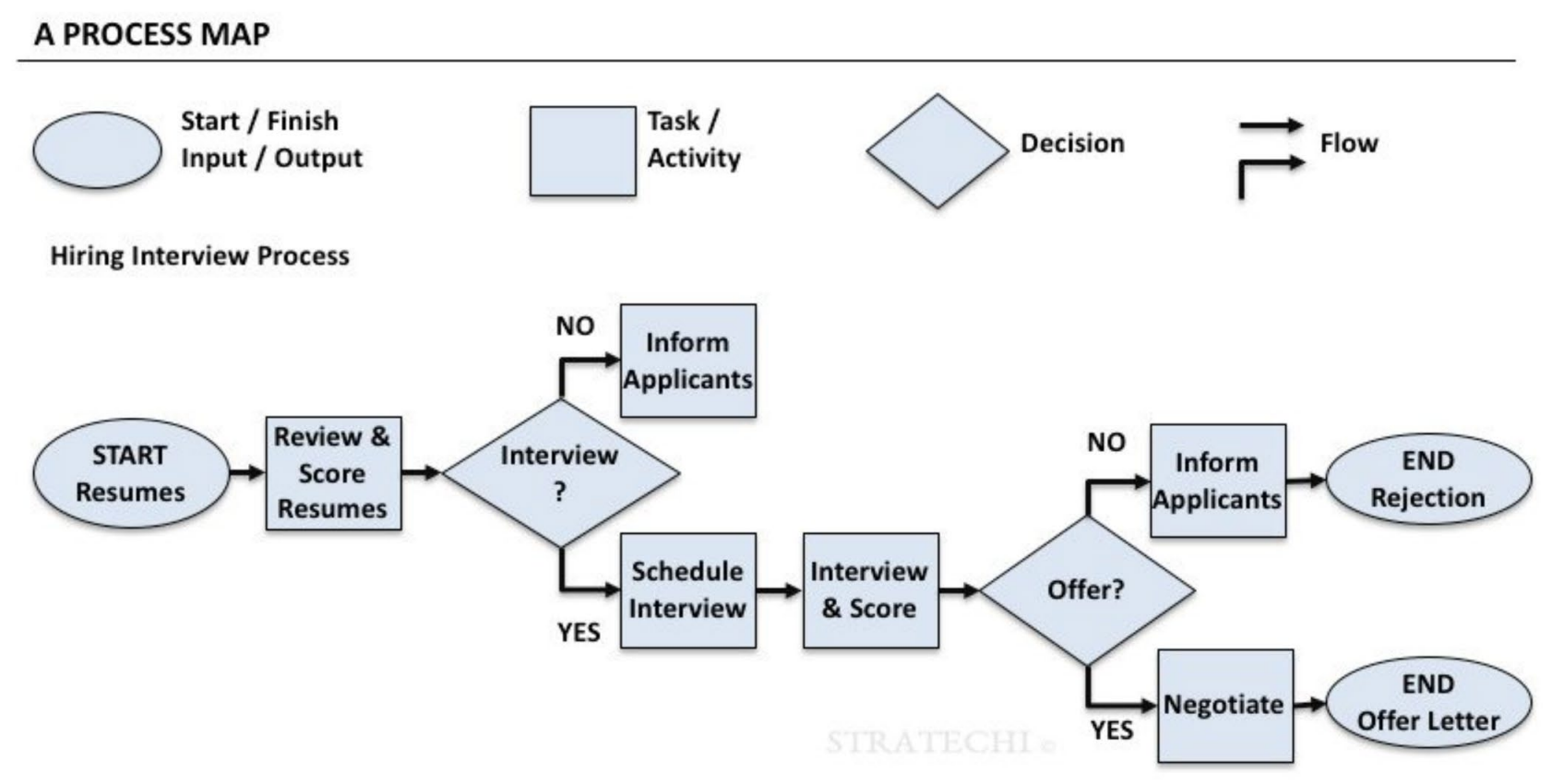
Process Mapping

Inputs	Processing	Outputs
Data	Labor	data/information
Documents	computer	materials
Products	machine	product
people/resources	brain power	resources/skills
		knowledge
		decisions

Lean Tools – Defined

Process Map

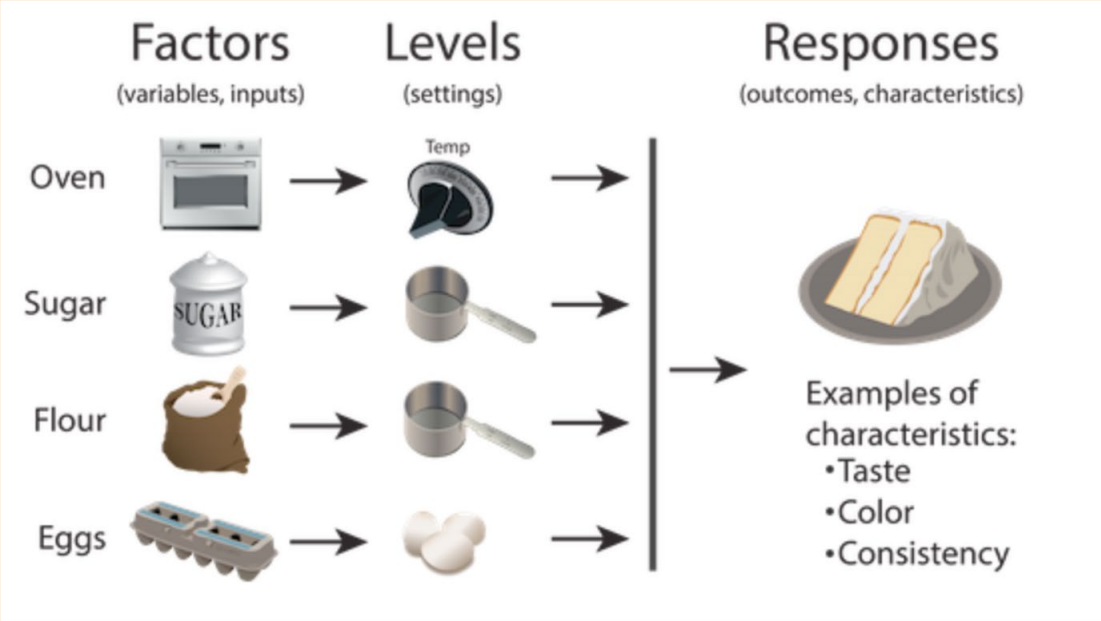
- Start Simple
- Map Process with a group
- Start and end somewhere

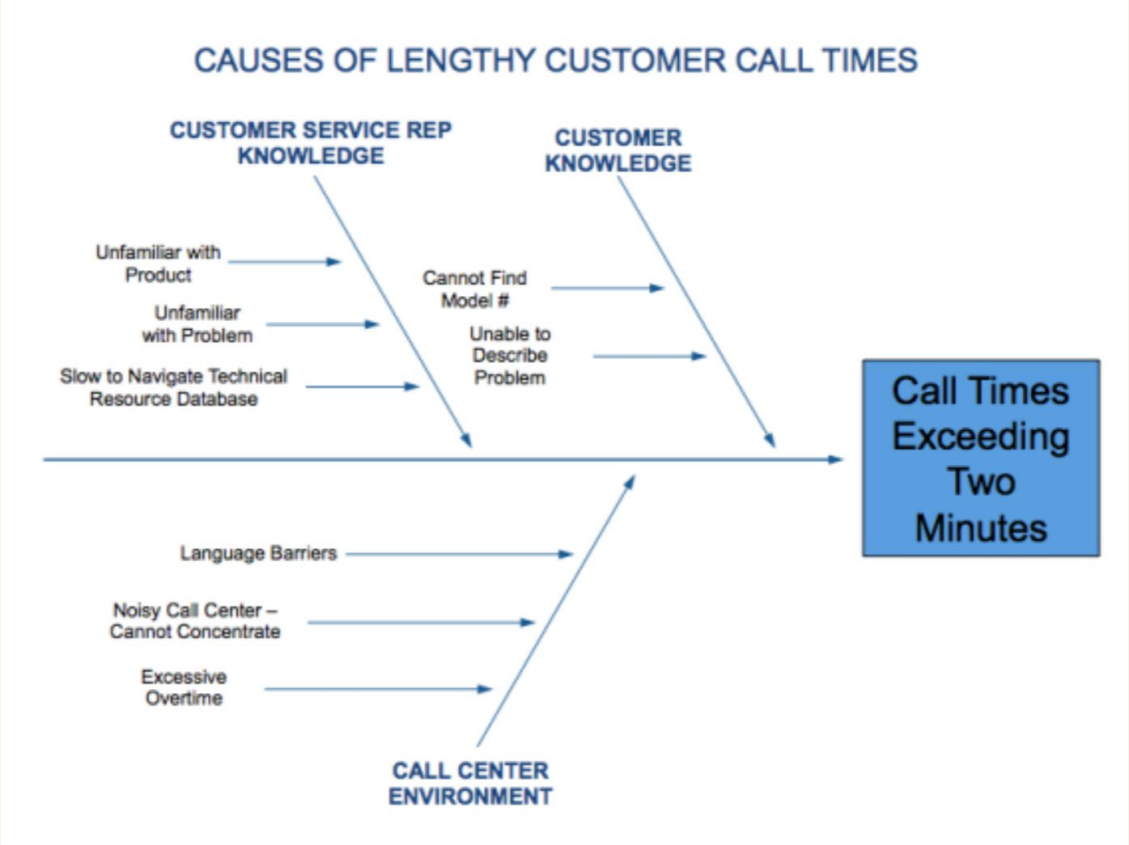


Lean Tools – Defined

- Root Cause Analysis – asking the 5 why's, Ishikawa

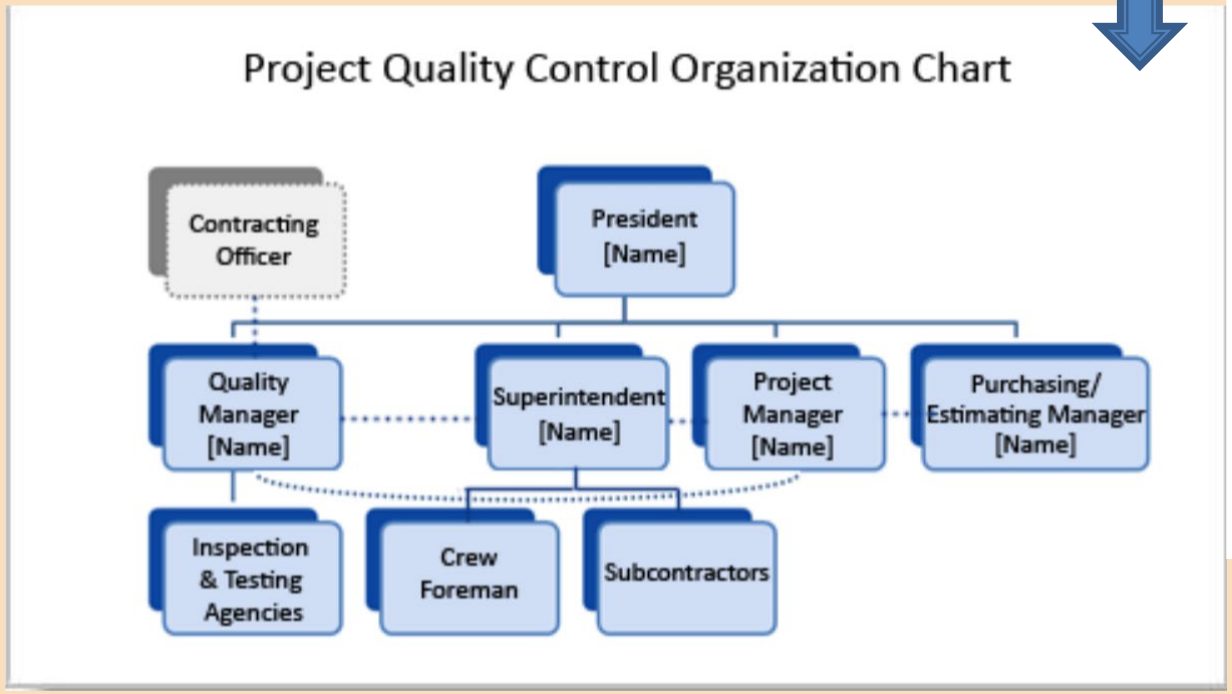
- Design of Experiments–





Lean Tools – Defined

- Quality Control Plan
- Quality Control Org Chart



Process Quality Control Plan

Following slide displays product quality control plan of the manufacturing firm. It covers information about product name, its characteristics, process details, machine used, product class, methods and reaction plan.

Product Name	Characteristics			Process/ Operation	Machine/Tool Used	Product Class	Methods					Reaction Plan
	Length (in mm)	Breadth (in mm)	Height (in mm)				Tolerance	Evaluation	Sample Size	Sample Frequency	Control Methods	
Machine Screw	220	150	270	Threading	Lathe Machine	B	Text here	Machine sensor	1 Piece	Every 30 min	Sampling	Inform Supervisor
Product 2	XXXX	XXXX	XXXX	Text here	Text here	A	Text here	Text here	Text here	Text here	Text here	Text here
Product 3	XXXX	XXXX	XXXX	Text here	Text here	C	Text here	Text here	Text here	Text here	Text here	Text here
Product 4	XXXX	XXXX	XXXX	Text here	Text here	A	Text here	Text here	Text here	Text here	Text here	Text here

Lean Tools

- Bottleneck Analysis = Muri- a resource that cannot keep up with inputs
- Just-in-Time- products are not built until they are ordered and paid for (Toyota, Dell, Harley Davidson)
- Value Stream Mapping- batch size, number of workers, downtime, cycle time, uptime, shows uneven distribution = Mura
- Overall equipment Effectiveness- what could be produced and what is actually produced
- Plan-Do-Check-Act- is iterative process, systematically tests possible solutions, assessing results, implementing workable solutions
- Error proofing- implementation of fail-safe mechanisms

Poka-yoke = poka (inadvertent errors) and yokeru (to avoid)

Use of Lean Six Sigma in Inspections

There are several tools and concepts that would be extremely helpful for use in inspections. Depending upon the type of inspection the following are what I have used most frequently in past inspections.

- Process Mapping
- DMAIC
- Bottleneck Analysis
- Root-Cause Analysis (Ishikawa)
- Value Stream Mapping

Use of Lean Six Sigma in Inspections

For Process Mapping I mapped out how Medicaid applicants place their application and how the application is processed.

I also used the Ishikawa (fishbone) diagram to show the Inspector General and Deputy Commissioner how various inputs made the process slow and cumbersome. I identified wasteful practices and problems that fed into the process.

The Root-Cause analysis showed that the issues were:

1. number of character space in the application program
2. Not performing an initial search based on SSN instead of name and DOB.

Applying what you have learned

- As an inspector the first thing you should do is define (D) the problem. Once you define the problem, take a closer look at what is happening and why(5 why's). This will involve people directly related to the process. That team can you to develop a measurement (M) and evaluation plan. This same team can be engaged to analyze (A) the problem and offer solutions. Engagement of the workers that handle the process day-to-day operations who are also a part of the solution will gain buy-in and keep the process improvements (I). Evaluations after the process is implemented will provide control (C) to prevent future issues.

Scenario

- Split into teams.
- Assign a team lead to present the project.
- Develop a scenario and provide an example of the Ishikawa diagram for that scenario.
- 15 minutes to develop scenario and Ishikawa
- 3 minutes to present each team's Ishikawa

Questions