

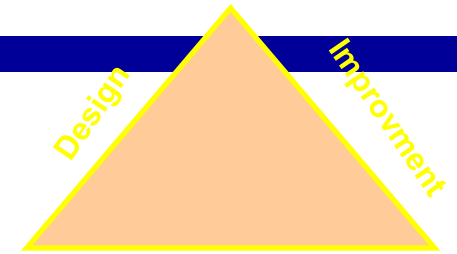
Welcome to Six Sigma Training

Six Sigma Overview

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www.anexas.net



About Anexas



Process Management System

Anexas is a Six Sigma Training and Consulting organization with presence across the globe

- Group of more than 50 process improvement consultants located in 6 countries across the globe (US, UK, UAE, Saudi Arabia, Singapore and India)
- Black Belts certified by Anexas are well placed in organizations globally
- In India we conduct regular programs in Bangalore, Chennai, Mumbai, Delhi, Nagpur and Bhilai
- For more information visit website www.anexas.net



-About -Anexas Denmark

- Anexas is a global network of attached professionals and organizations serving the wide spectrum of industries. We operate in various countries and have more than 200 professionals working with member firms and partners around the world.
- Our mission is to provide committed, customized and efficient service to our customers and assist the organizations and individuals to achieve breakthrough results
- Trained more than 1000 professionals across the world from various industries
- Black Belts certified by Anexas are well placed in organizations globally like Siemens, Ford, Tata Consultancy, Eicher, Office Tiger, Deutsche Bank, AXA, Riyadh Bank, Apollo Hospitals, Hewlet Packard, Tata Sky, King Khaled Hospital, etc.



Today's objectives

At the end of the day, participants will:

- Understand why an organization launches Six Sigma
- Understand the flow of the DMAIC methodology for process improvement
- Have practised some of the relevant tools
- Know when and in what context to use the DMAIC methodology and tools

Attitude & Discipline

- Customer Focus
 - View Quality externally from the customer's perspective
 - Measure the same way that the customer does
- Meet customer expectations every time
 - Continuous improvement cycle
 - Systematic
 - Scientific
 - Fact-based
 - Data-driven
 - Process focus

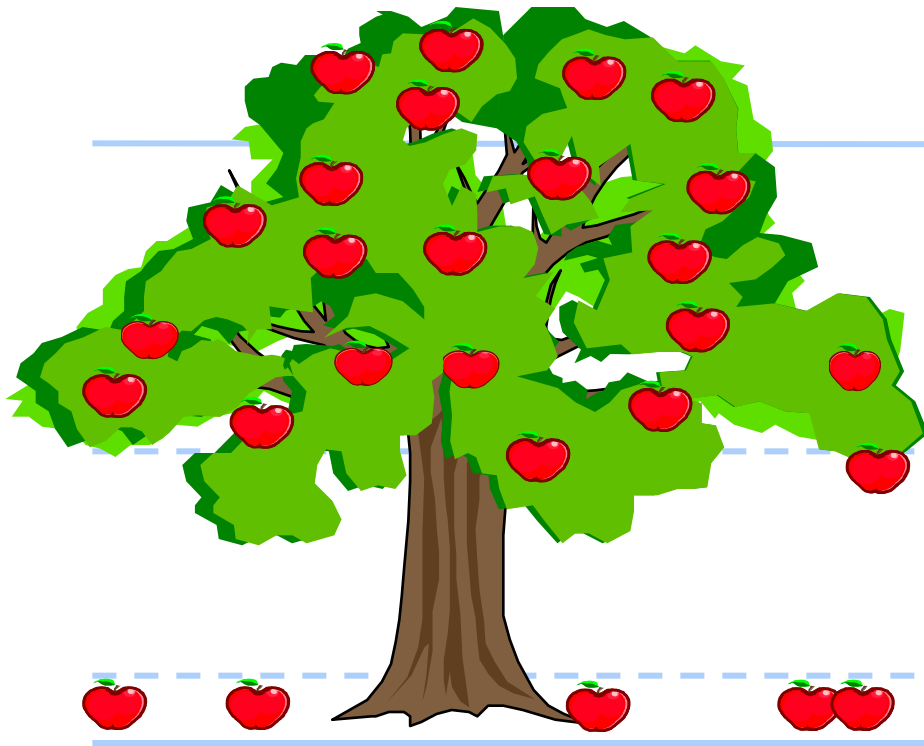
***Customers Have All The Votes Concerning
Extent Of Satisfaction And Value***

Operational Excellence

- "Eighty-five percent of the reasons for failure to meet customer expectations are related to deficiencies in systems and processes, not to the fact that our employees are not up to the challenge..."
- "The Manager's role is to promote process improvement."

DEMING

Harvesting the Fruit of Six Sigma



Sweet Fruit
Design for Six Sigma

5 σ Wall, Improve Designs

Bulk of Fruit
*Process Characterization
and Optimization*

4 σ Wall, Improve Processes

Low Hanging Fruit
Seven Basic Tools

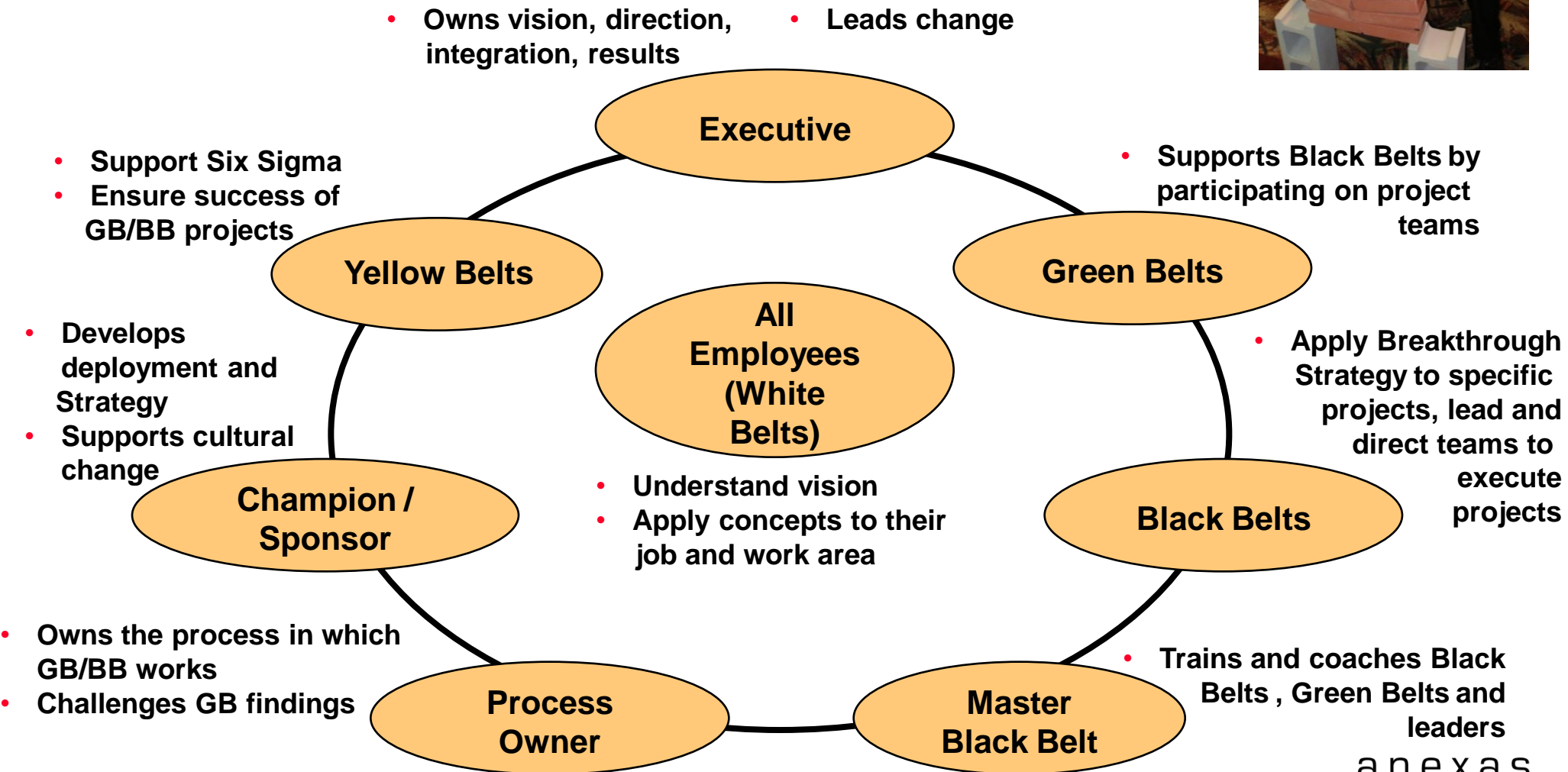
3 σ Wall, Beat Up Suppliers

Ground Fruit
Logic and Intuition

Many organizations in the world have achieved huge savings and improved bottom lines by implementing Six Sigma











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Roles & Responsibilities



A Typical One Wave Implementation Plan at an organization

High Level Improvement Timeline

Process Step	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Deliverables
	2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	
Define								Charter Customer Focus SIPOC
	Survey for Project Selection							
Measure								Measures Collection Plan Baseline Sigma
Analyse								Mapping/Analysis Vital Few Opportunity quantification
Improve								Solutions Evaluate Implementation Plan
Control/Verify								Procedures Monitoring Communication

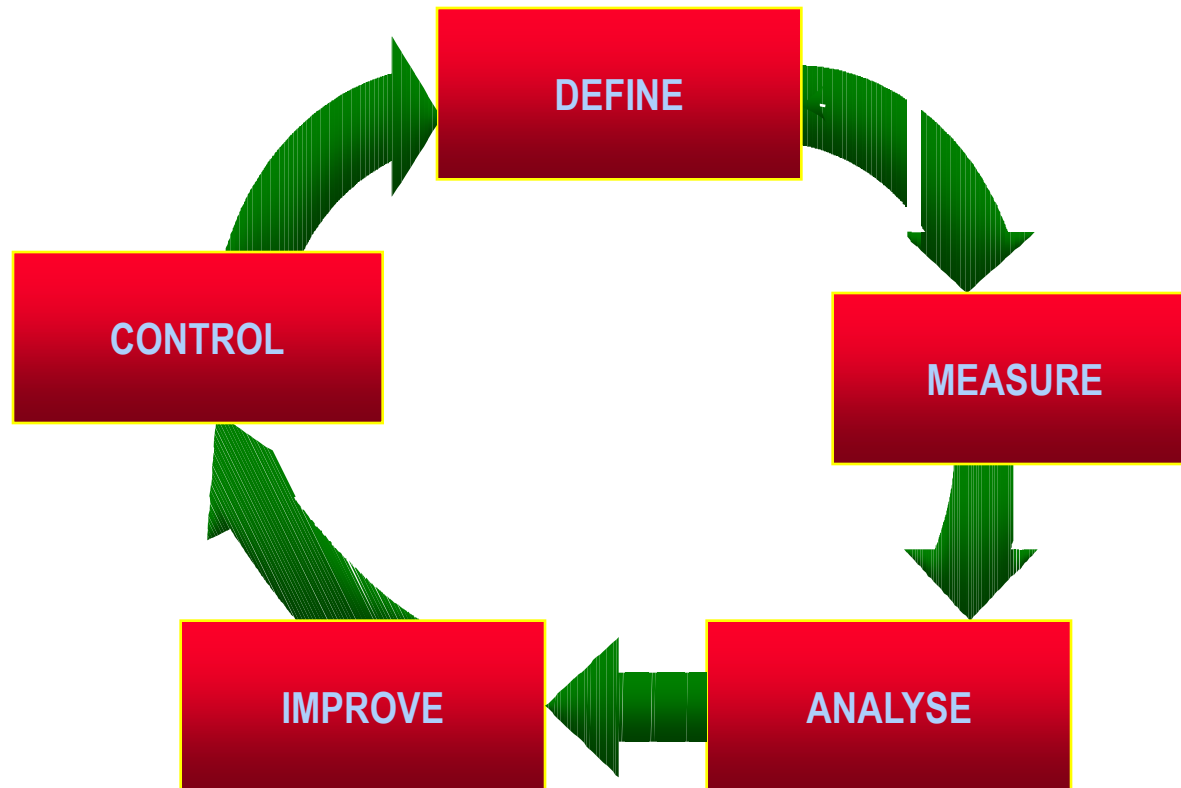
-  Green Belt projects
-  Black Belt projects

Six Sigma Trainings at an organization

- White Belt Training (Half Day Awareness Program)
- Yellow Belt Training - Awareness Programme with/without Business Game (1 Day)
- Champions Training (1 Day)
- Green Belt Training (5 Days spread over 3 months)
- Black Belt Training (10 Days spread over 4 months)
- During Induction, the employees are exposed to Six Sigma philosophy (Half an hour module)

Green Belts and Black Belts are required to pass an exam and demonstrate success in their projects (approved by financial analyst for financial savings) to attain certification

DMAIC : An Improvement Methodology



DMAIC : An Improvement Methodology

- **DEFINE:** Set direction for improvement
- **MEASURE:** Collect reliable data to understand current process performance
- **ANALYSE:** Identify problem's root causes through process and data analysis
- **IMPROVE:** Determine new improved process design
- **CONTROL:** Ensure improvement effectiveness over time

DMAIC Overview

DMAIC Cards Exercise – 10 minutes

- You are given sheets, each of which states an activity in DMAIC cycle
- Based on your understanding of DMAIC till now, classify each of the activity to the respective phase of DMAIC (5 minutes)
- Paste the sheets under the phase you think they belong to (3 minutes)
- Look at what others have done. If you disagree with their classification, give your suggestions and change the place of that sheet (2 minutes)
- Trainer will give feedback after the exercise



▪ High Level Process Map

- Process Definitions
- Connecting the Customer to Your Process

▪ Customer CTQs

- Types of customers
- Methods of collecting customer requirements
- Translate customer needs into specific requirement
- Customer requirements analysis and prioritization

▪ Project Charter

- Business Opportunities
- Preliminary Problem Statement
- Goal statement
- Project Scope
- Milestones
- Roles

DMAIC Project Charter

Project No.: _____

Project Name:

Resource Plan

Champion / Sponsor:

Green / Black Belt:

Functional Managers/Process Owner:

Coach / Master Black Belt:

Problem Statement

Text

Goal Statement

Text

Estimate Financial Opportunities

Text

Process :

Team Members

Text

Scope

Text

Customer CTQ's

Text

High Level Project Milestone

Text

Validation

Green / Black Belt

CEO

Master Black Belt

Financial Analyst

Process Owner

Champion / Sponsor

DEFINE

Purpose: To set set direction for improvement project by developing a team charter. By defining the customers and their requirements (Critical To Quality = CTQs), mapping the high level business process to be improved.

High Level Map - SIPOC

Suppliers	Inputs	Process	Outputs	Customers
~~~~~	~~~~~	□ → □ → □ → □ → □	~~~~~	~~~~~
~~~~~	~~~~~		~~~~~	~~~~~
~~~~~	~~~~~		~~~~~	~~~~~

- Complete high level “as-is” process map, identifying suppliers, inputs, 5-7 high level activities, outputs & customers

Use Survey or Focus Groups?

## Voice of Customer (VOC)

VOC	Key Issues	Requirements
~~~~~	~~~~~	~~~~~
~~~~~	~~~~~	~~~~~
~~~~~	~~~~~	~~~~~
~~~~~	~~~~~	~~~~~

- Gather and display data verifying customer requirements (CTQs)

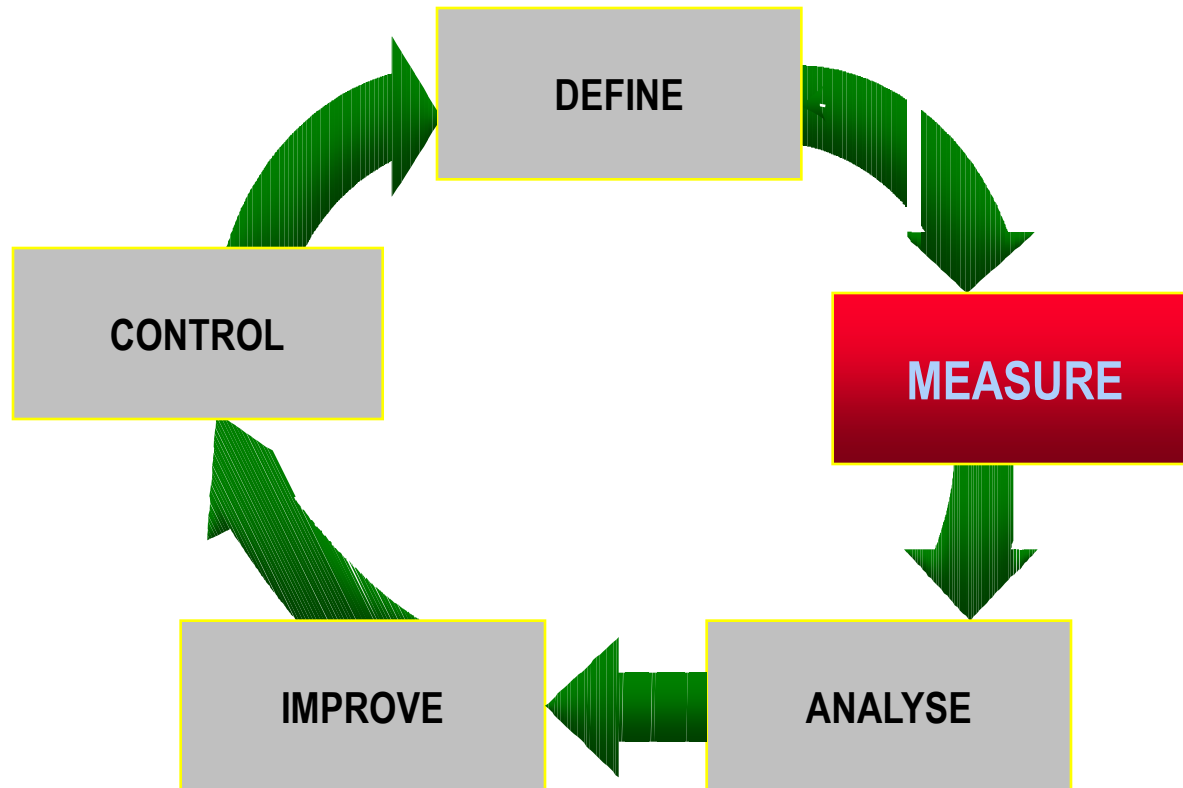
## Project Charter

Problem Statement:	~~~~~
Goal:	~~~~~
Business Opportunity:	~~~~~
Scope:	~~~~~
Roles and responsibilities:	~~~~~
Milestones:	~~~~~ ~~~~~ ~~~~~ ~~~~~

- Develop charter to include:
  - Problem statement
  - Goal for improvement
  - Business opportunity
  - Scope of project
  - Milestones for completion
  - Roles



# DMAIC : An Improvement Methodology



# Measure

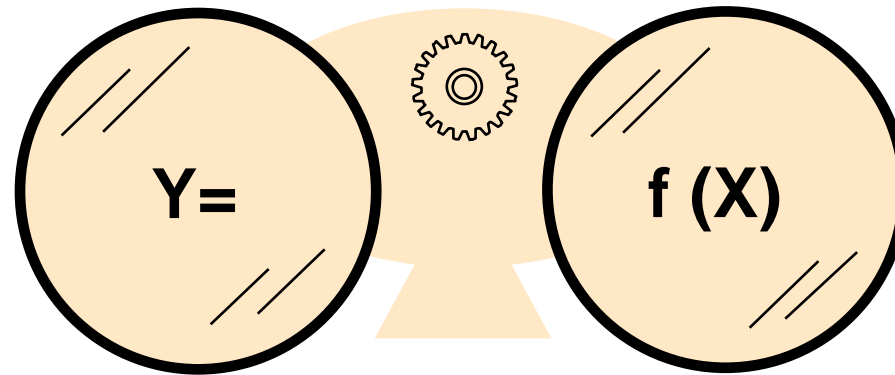
Objective :

- Collect reliable data to understand current process performance

Steps :

- Choose the data to be collected (output measures, process and input measures)
- Organize the data collection plan (What ? Why ? When? Who? How? How many ?)
- Study process variation
- Understand the capability of the process

# Key principles for investigation



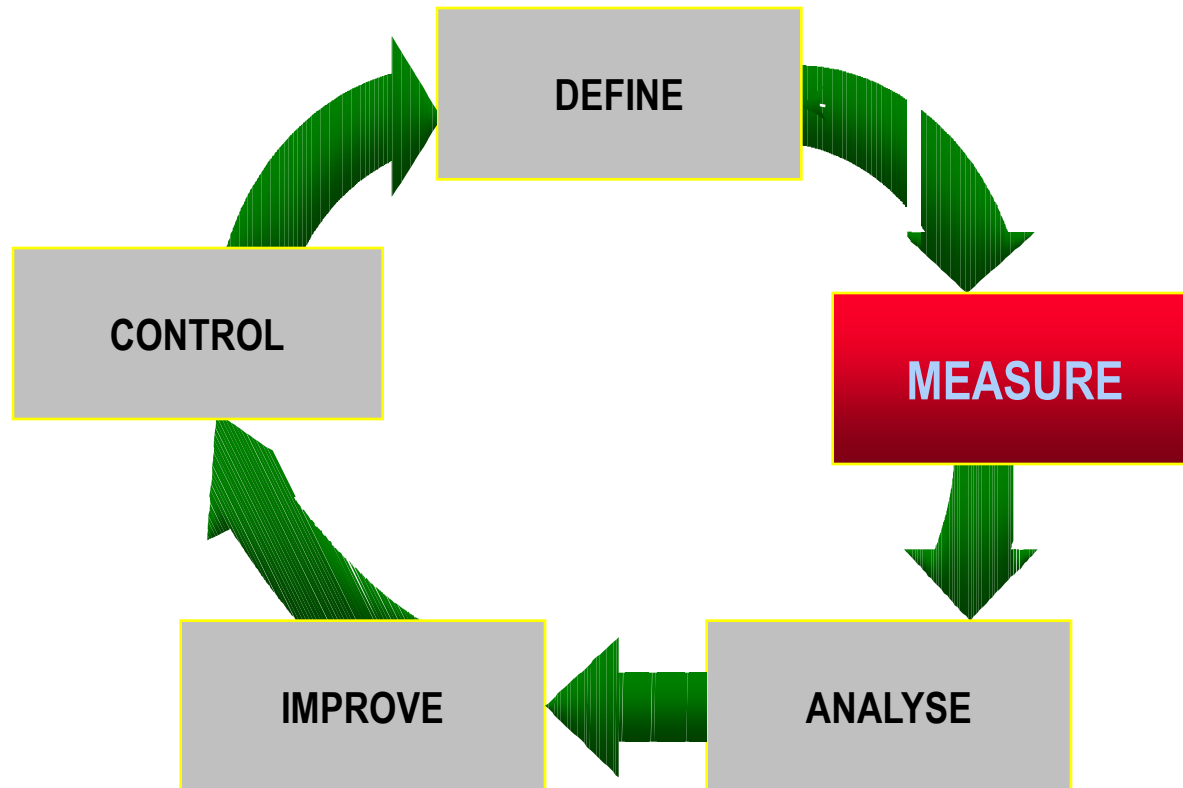
## Response

- Y
- Dependent
- Output
  
- Effect
- Symptom
- Monitor

## Predictor

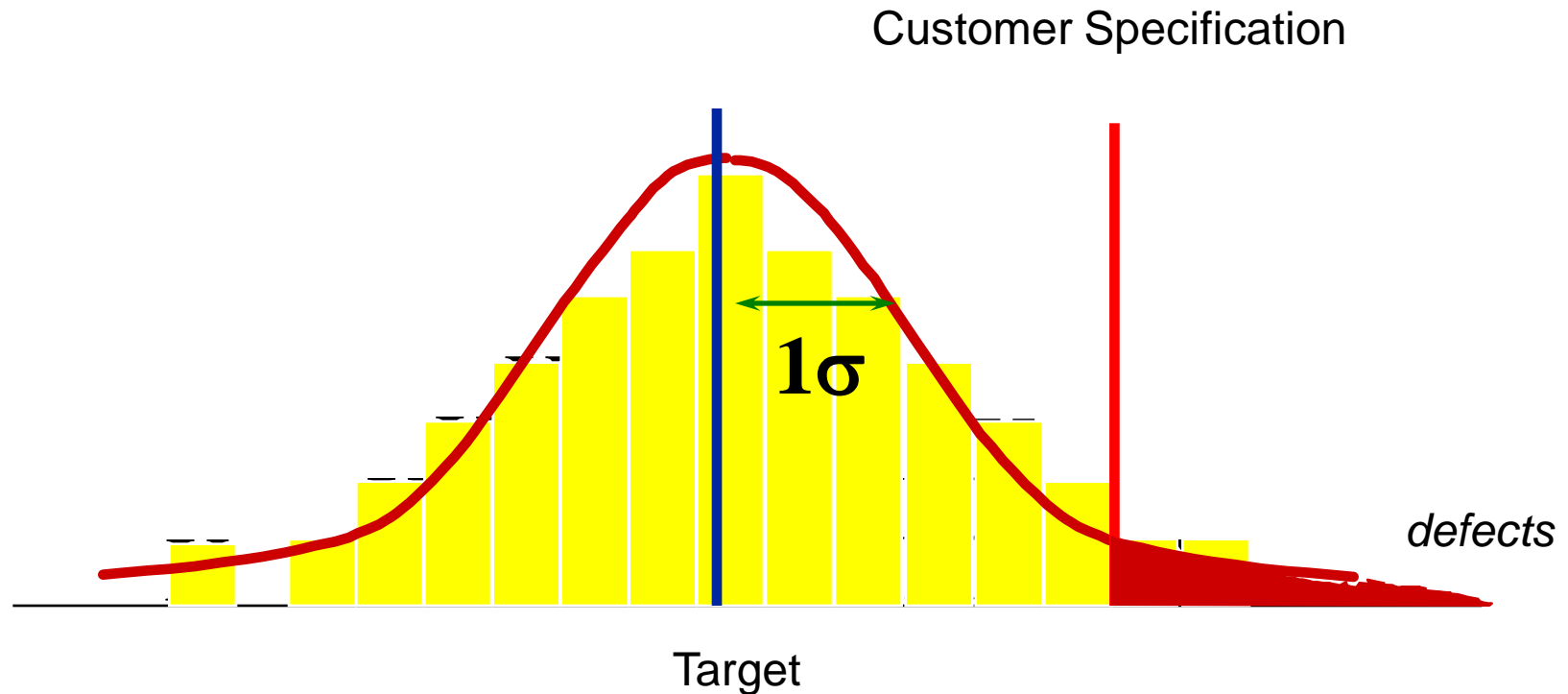
- $X_1 \dots X_N$
- Independent
- Input-Process variables
  
- Cause
- Problem
- Control

# DMAIC : An Improvement Methodology



# The sigma of the process

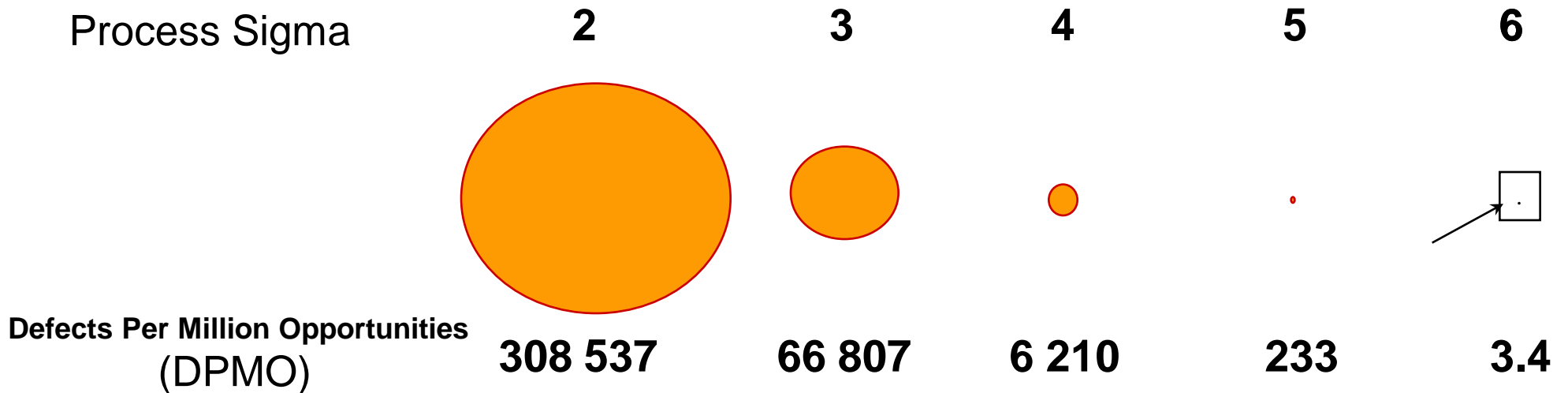
Every human activity has variability....



Comparing process variation and customer specification is the essence of Six Sigma

# What is 6 sigma ?

- A measurement scale which compares the output of a process to the customer's requirements



# An Example

Here's one way to look at it...

Consider a hockey goalie whose primary job is to block shots taken by opponents.

A good way to rate performance would be the number of shots blocked as a fraction of the number of shots faced.

Let's assume the following: our goalie plays 32 games per year (a full season) and faces an average of 8 shots per game for a total of 256 shots per year.

If our goalie has "Six Sigma" capability, only one shot in 1149 seasons will score.

The championship is guaranteed.



Bill Sikes / AP file

# MEASURE

**Purpose :** To measure and understand baseline performance for the current process by collecting reliable data (quantitative & qualitative)

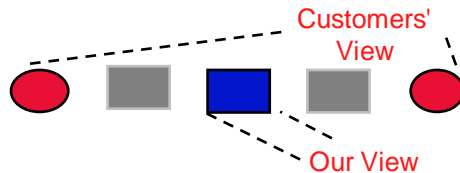
## Data Collection

What	Who	Where	Formula
~~~~~	~~~~~	~~~~~	~~~~~
~~~~~	~~~~~	~~~~~	~~~~~
~~~~~	~~~~~	~~~~~	~~~~~

- Develop a data collection plan
 - Operational definition
 - Sampling
 - Measurement System Analysis (MSA including Gage R&R)

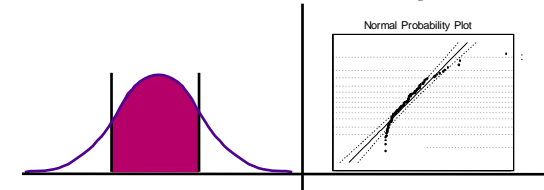


Customer oriented mindset



- Select the measure your customer uses to judge your performance (Key Output Measure Y)
- Plan to collect CONTINUOUS data

Graphical Display

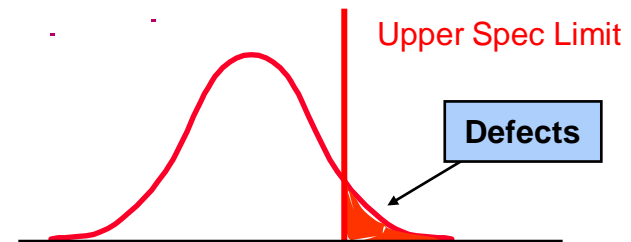


- Display data in graphic form to determine the type of distribution, the metrics to understand variation and set goals for the improvement strategy.
 - Normal Distribution described by Mean and Standard deviation
 - Skewed Distribution described by Q1 (or Q3) and Inter Quartile Range
 - Long tailed distribution described by Median and Span 5-95



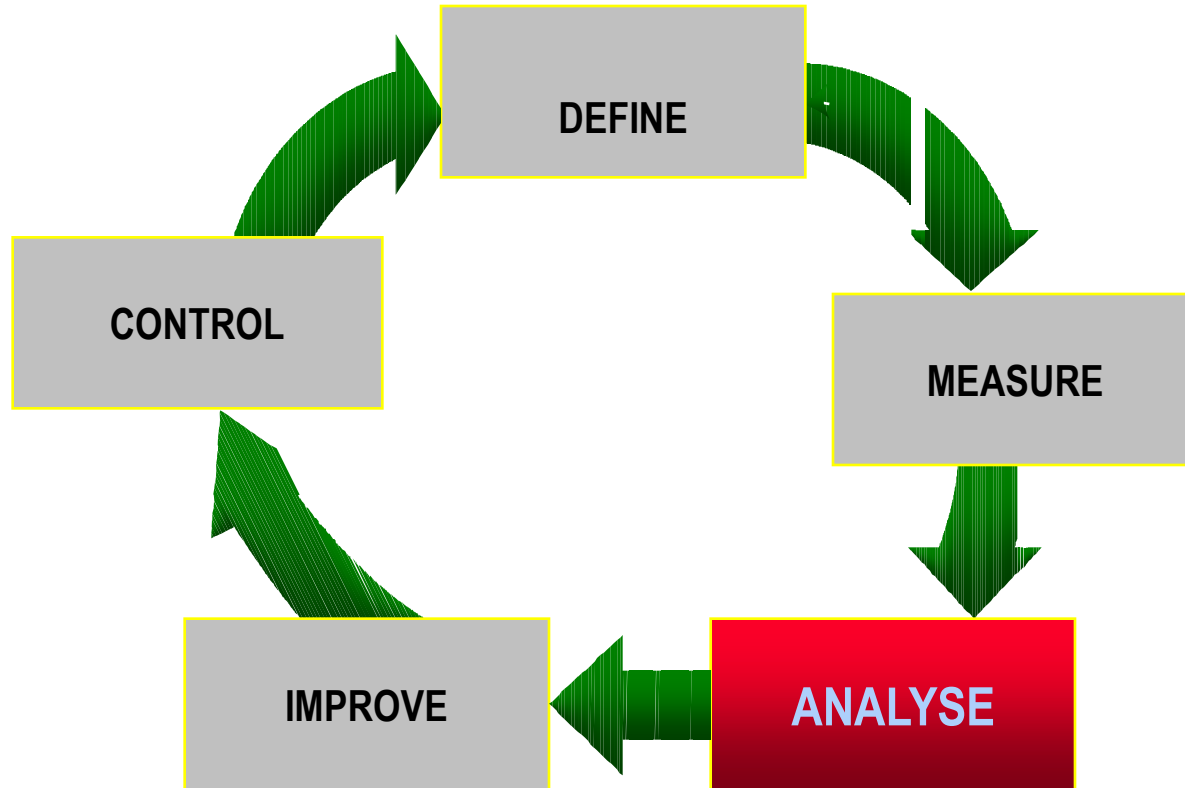
Calculate Process Sigma

Defects "Outside" Spec Limit



- Compute baseline sigma

DMAIC : An Improvement Methodology



Analyse

Objective :

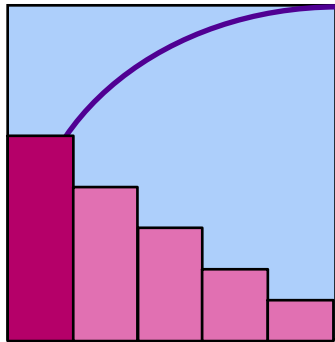
- Identify problem's root causes through process and data analysis

Steps :

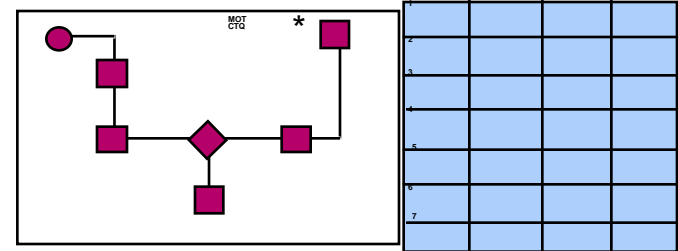
- Pareto chart
- Value analysis in using process map
- Root causes validation

Analyse roadmap

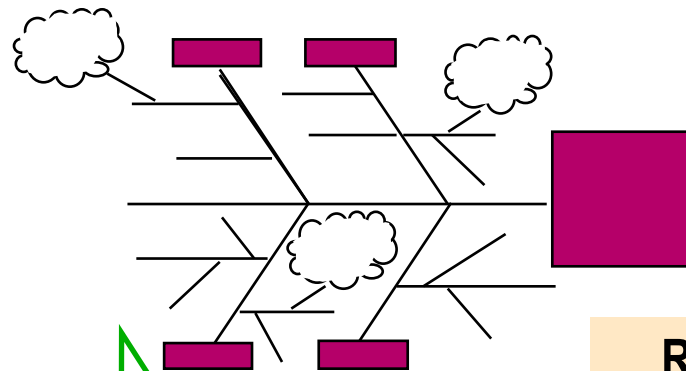
Data Analysis



“As Is” Process Map & Analysis



Root Cause Identification

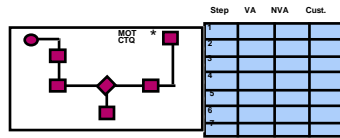


Root Cause validation with data

ANALYSE

Purpose: To identify root causes of the problem and opportunities for improvement by analysing the data and the process.

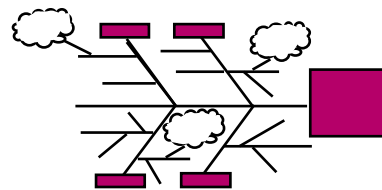
“As Is” Process Map & Analysis



Develop an “as is” process map, and analyse it using:

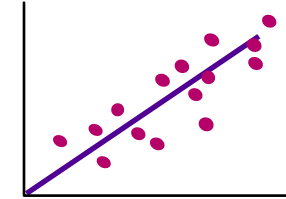
- Moments of truth (customer contact),
- Nature of work (value analysis),
- Flow of work (cycle time)

Root Cause Identification



Perform cause & effect analysis to identify potential root causes

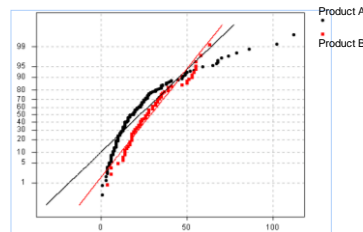
Root Cause Verification



Verify root causes through observation, statistical tools or design of experiments

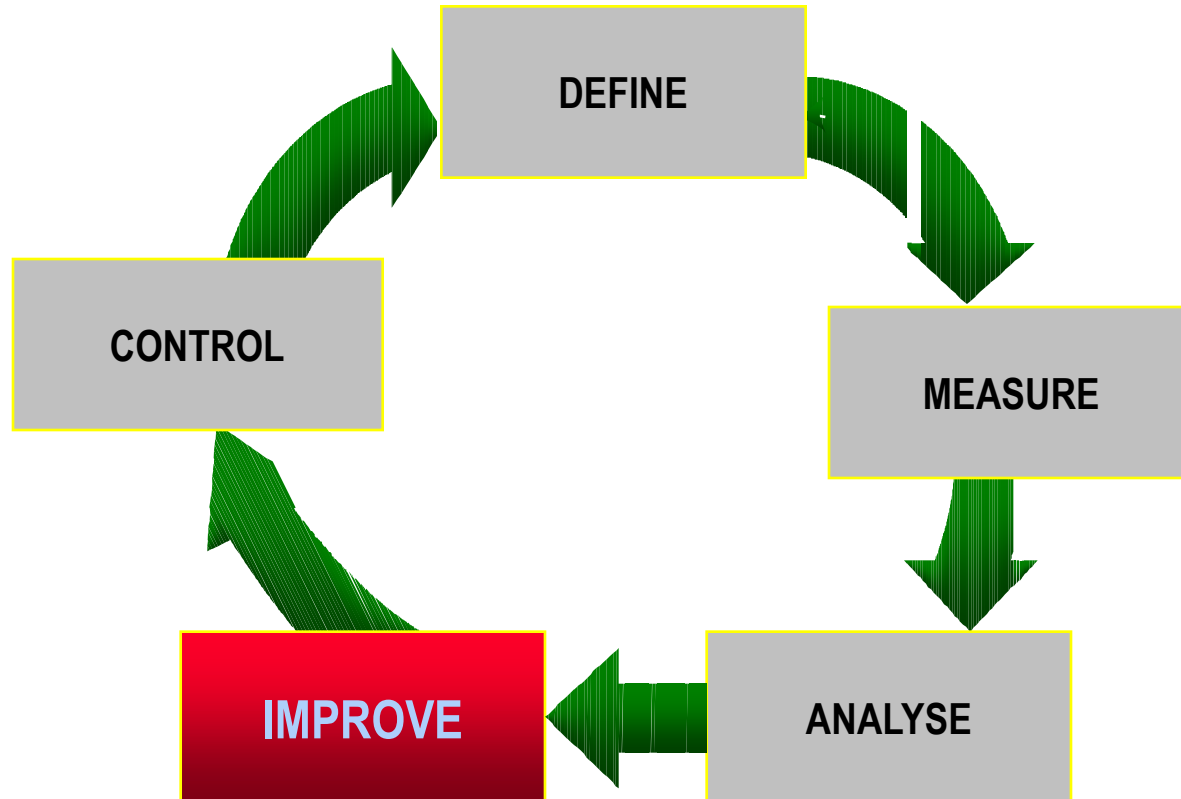
Data Stratification

Stratify / segment the data to find the vital few areas to focus improvement efforts on



Review and Finalise Problem Statement

DMAIC : An Improvement Methodology



Improve

Objective :

- Determine new improved process design

Steps :

- Generate solutions
- Select and test solutions

Idea Generation

Creativity approaches

- **Process benchmarking**
 - **Compare the performance of an existing process against other companies' "best in class" practices (same market or not)**
 - **Determine how those companies are organised to deliver these performance levels**
- **Best practices**
 - **Use company data**
- **Brainstorming**
 - **Brainstorming with post it notes, channelled brainstorming, anti-solution, etc**

IMPROVE

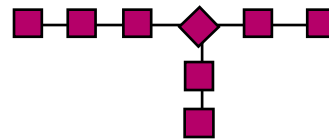
Purpose : To determine new improved process design through idea generation, selection, process design, solution testing , and improvements implementation.

Solutions Refinement



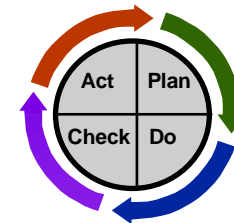
Evaluate potential problems in new process design and improve robustness of this design

New Process



Develop a "should be" process map showing the impact of the solution

Pilot



Pilot the solution on a small scale to increase buy-in and improve overall implementation

Solution generation and selection

▪Brainstorming, anti solution, brainwriting, ...

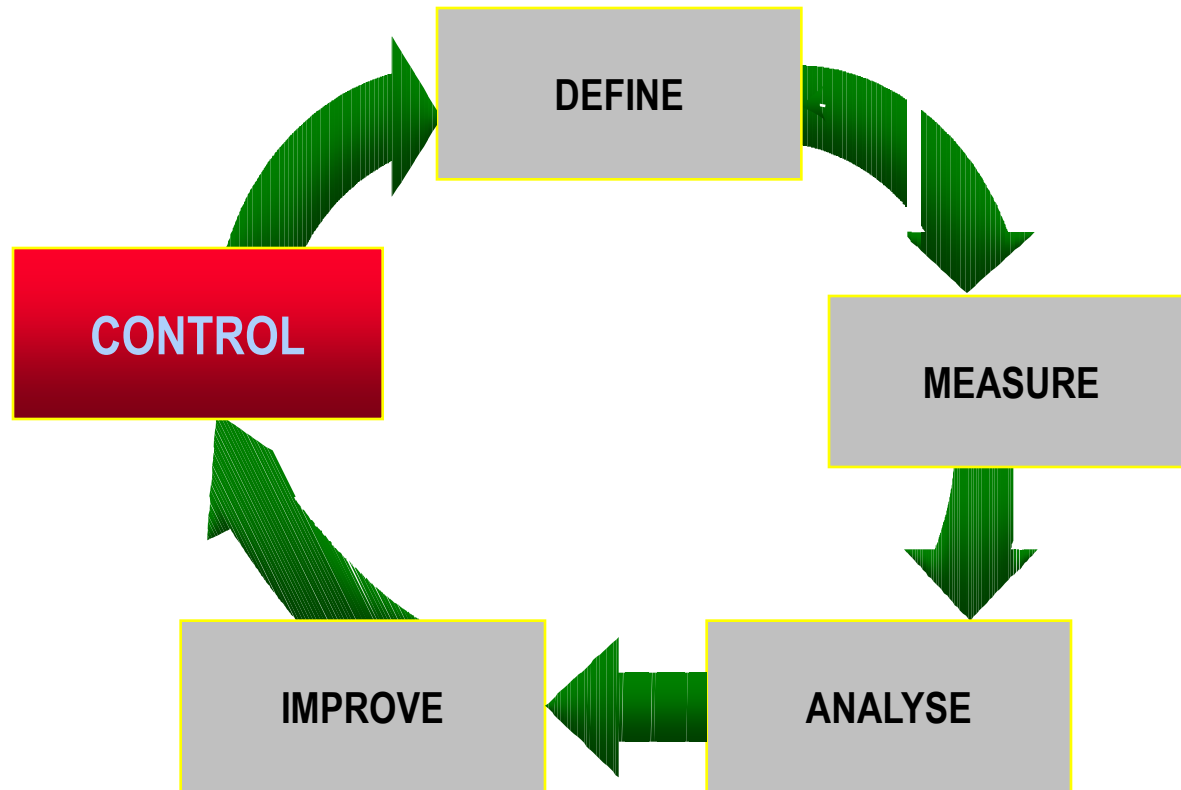


Generate solutions to address the root causes and develop criteria to screen and select solutions (including cost / benefit)



Perform cost / benefit analysis of proposed solution

DMAIC : An Improvement Methodology



Control

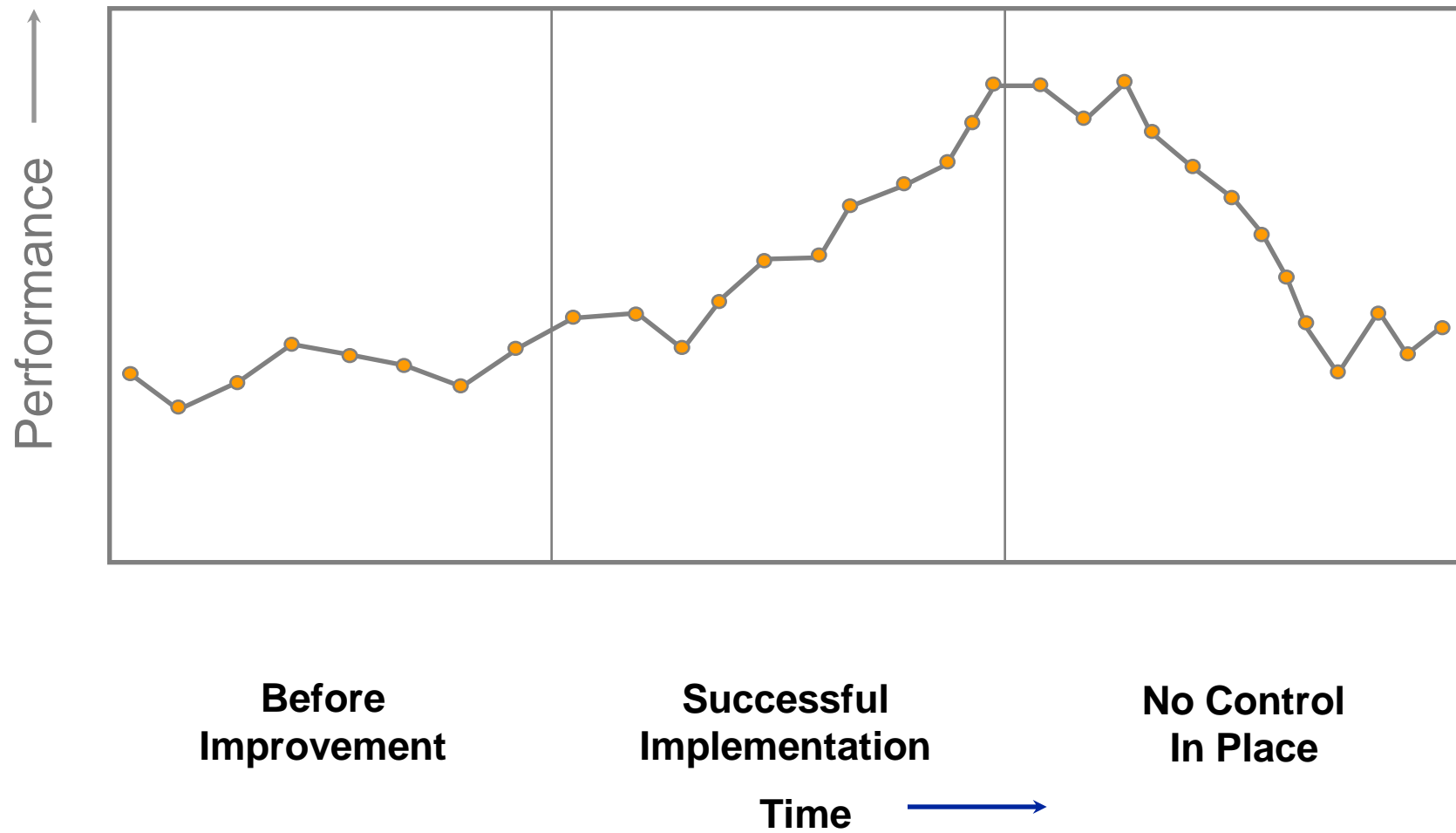
Objective :

- Ensure improvement over time

Steps :

- Create control tools
(documentation and dashboard)
- Organise process reviews by
Process Owner

Control = ensure gains over time



CONTROL = ensure gains over time

The CONTROL phase naturally leads to Process Management as the purpose of that phase is to deliver the tool set for ongoing management of the process performance by Process Owner.

Process Management Chart

Example

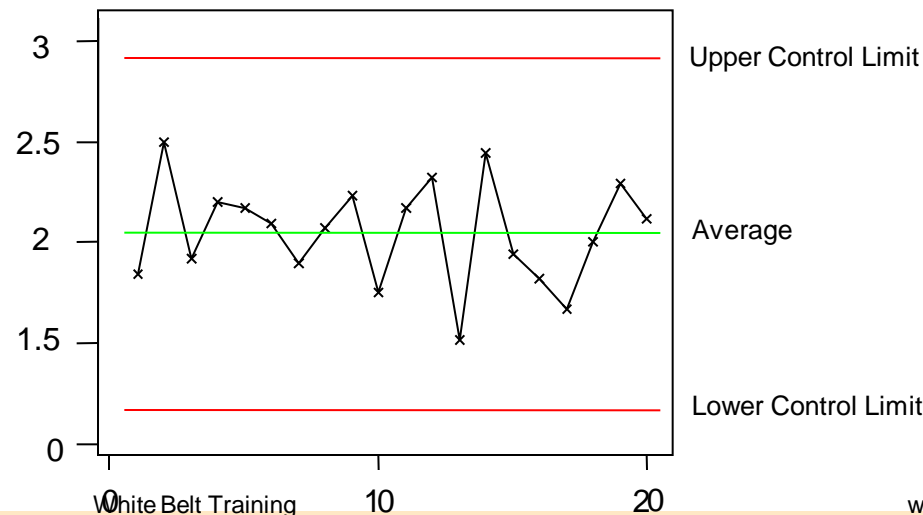
Process Name: **New Account Opening**

Process Owner Name: _____

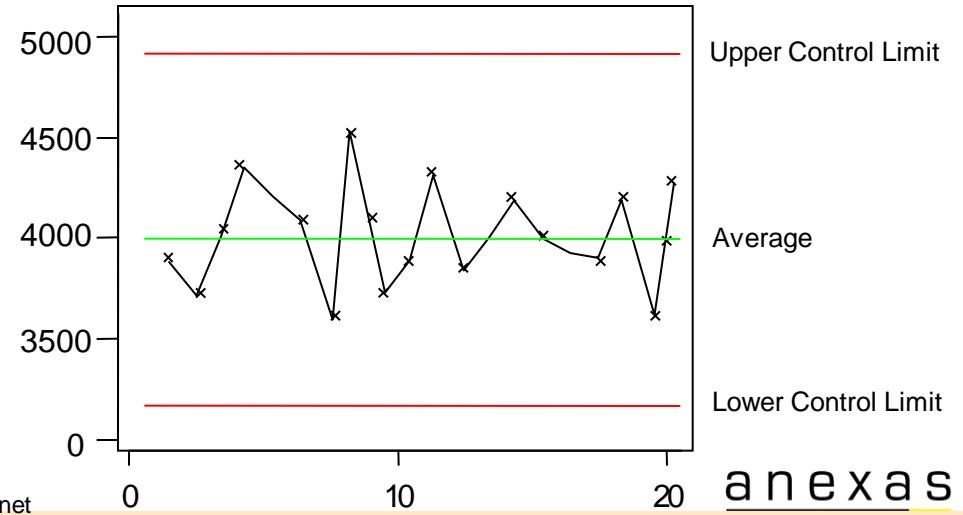
Date: _____

Process Map			Check The Process			Act/Fix Problem	
Area 1	Area 2	Area 3	Output, Process or Input Measure	Target	Data collection method	Immediate Control/Fix	Process/System Improvement
			<ul style="list-style-type: none"> •TAT on credit decision •% of approvals •# of applications per day •# Store team meetings / month •# of training sessions / store staff 	<ul style="list-style-type: none"> • < 2.5 min. • > 85% • > 3500 • > 3 • > 3 		<ul style="list-style-type: none"> •Analyse if common cause or special cause variation. Make sure process is in control (within control limits) and capable (within customer specification limits) 	<ul style="list-style-type: none"> •When process not in control, analyse variation and fix issues. •When process in control but no more capable, launch a new improvement project.

Output measure : TAT on credit decision



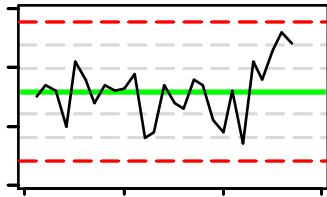
Input measure : # of applications per day



CONTROL

Purpose: To ensure improvement effectiveness over time by institutionalisation of the improvement and implementation of ongoing monitoring and reviews.

Monitoring Plan



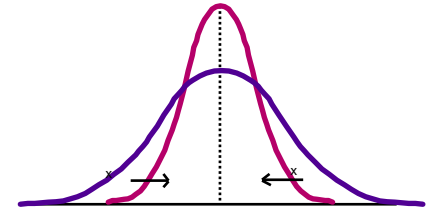
Develop a monitoring plan to insure gains are held over the long term

Implementation Plan

Q x A = E

Who	What	Where	When
#####	#####	#####	#####
#####	#####	#####	#####
#####	#####	#####	#####

Develop a full implementation plan including project and change management elements



Process Capability

Monitor the process according to plan. Chart data as evidence that process is in control and meeting customer specifications

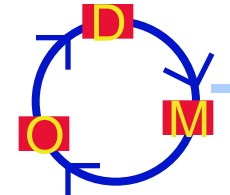


Documentation / Standardization

Document the process with process maps & procedures to assure the solution becomes part of daily work

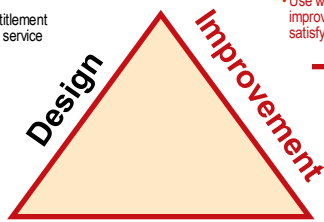
Address appropriate changes to broader systems and structures to institutionalise the improvement

Continuous Improvement



- Process ownership to Process Owner (Process Management chart to facilitate transfer)
- Process Owner to held regular process reviews based on dashboards.
- Process Owner to take action when process does not deliver what is expected
- Process has entered Process Management = Define, Measure, Operate.

The Three Dimensions Of Process Focus



Management Process Management System

- Ongoing Management Of Process
- Use to manage a business process using CTQ measurements

- Use when:
 - Process does not exist
 - Process is broken
 - Process has reached entitlement
 - Designing new product / service

Optimise Design Across Customer Critical To Quality requirements (CTQs) And Sub process

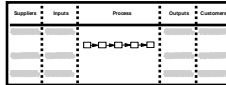
- Use when incremental improvement is needed to satisfy Customer CTQs

Focus On Root Causes That Drive Customer Critical To Quality requirements (CTQ) Performance

Define

Purpose: To set set direction for improvement project by developing a team charter. To defining the customers and their requirements (Critical To Quality = CTQs), mapping the high level business process to be improved.

High Level Map - SIPOC



Use Survey or Focus Groups?

VOC	Key Issues	Requirements

- Complete high level "as-is" process map, identifying suppliers, inputs, 5-7 high level activities, outputs & customers

- Gather and display data verifying customer requirements (CTQs)

Project Charter

Problem Statement: _____
 Goal: _____
 Business opportunity: _____
 Scope: _____
 Cost Benefit Projection: _____
 Milestones: _____

- Develop charter to include:
 - Problem statement
 - Goal for improvement
 - Business opportunity
 - Scope of project
 - Milestones for completion
 - Roles

Measure

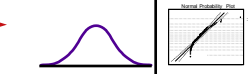
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Data Collection

What	Who	Where	Formula

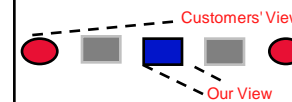
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 - Operational definition
 - Sampling
 - Measurement System Analysis (MSA including Gage R&R)

Graphical Display



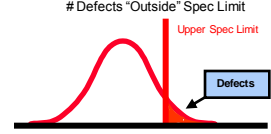
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 - Normal Distribution described by Mean and Standard deviation
 - Skewed Distribution described by Q1 (or Q3) and Inter Quartile Range
 - Long tailed distribution described by Median and Span 5-95

Customer oriented mindset



- Select the measure your customer uses to judge your performance (Key Output Measure Y)
- Plan to collect CONTINUOUS data to measure your Key Output Measure Y

Calculate Process Sigma



- Compute baseline sigma

Analyse

Purpose: To identify root causes of the problem and opportunities for improvement by analysing the data and the process.

"As Is" Process Map & Analysis



- Develop an "as is" process map or sub-process map, and analyze it using:
 - Moments of truth (customer contact)
 - Nature of work (value analysis),
 - Flow of work (cycle time)

Root Cause Identification



- Perform cause & effect analysis to identify potential root causes

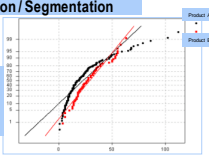
Root Cause Verification



- Verify root causes through statistical tools or design of experiments

Data Stratification / Segmentation

- Stratify / Segment the data to find the vital few areas to focus improvement efforts on.



Review and Finalise Problem Statement

Improve

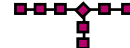
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Solutions Refinement

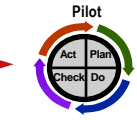


- Evaluate potential problems in new process design and improve robustness of this design

New Process

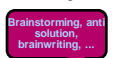


- Develop a refined "should be" process map showing the impact of the solution



- Pilot the solution on a small scale to increase buy-in and improve overall implementation

Solution generation and selection



- Generate solutions to address the root causes
- Develop criteria to screen and select solutions including a Cost / Benefit approach to assess solutions.



- Finalise cost / benefit analysis of proposed solution

Control

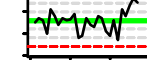
Purpose: To ensure improvement effectiveness over time by institutionalisation of the improvement and implementation of ongoing monitoring and reviews.

Implementation Plan

Who	What	Where	When

- Develop a full implementation plan including project and change management elements

Monitoring Plan

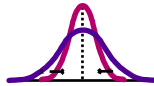


- Develop a monitoring plan to insure gains are held over the long term

Documentation / Standardisation

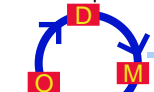
- Document the process with process maps & procedures to assure the solution becomes part of daily work
- Address appropriate changes to broader systems and structures to institutionalize the improvement

Process Capability



- Chart data as evidence that process is in control and meeting customer specifications (variation reduces and process sigma improves)

Continuous Improvement



- Process ownership to Process Owner (Process Management chart to facilitate transfer)
- Process Owner to held regular process reviews based on dashboards.
- Process Owner to take action when process does not deliver what is expected

Question Time
