Six Sigma for Supply Management

Presented By:
Kevin J. Williams, C.P.M.
Director, Global Technology Solutions – Six Sigma Green Belt
American Express Corporate Services
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Today's Agenda

- What is Six Sigma?
- The Role of Change Management
- The Six Sigma Process
  1. Define
  2. Measure
  3. Analyze
  4. Improve
  5. Control
  6. Leverage
- Project Closure
- Final Q&A

What is Six Sigma?

- A statistical concept
  1. Measures process output
  2. Defined by defects per million opportunities

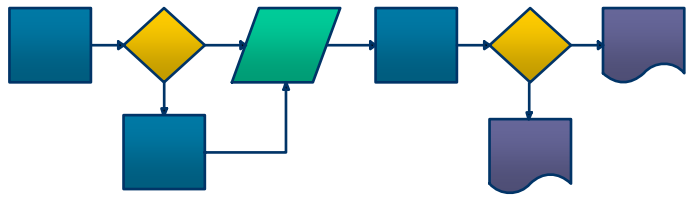
- A philosophy
  1. Focus on eliminating customer defined defects
  2. Emphasizes understanding, measuring and improving processes

Source: Greg Brue – Six Sigma for Managers

Who Leads Six Sigma?

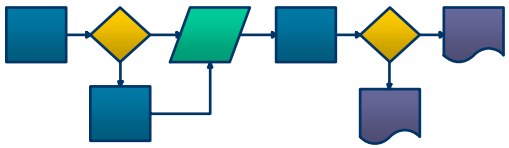
Many people are responsible for designing, analyzing, and maintaining business processes.

1. Project Sponsor
2. Project Champions
3. Process Owners
4. Master Black Belts (MBBs)
5. Black Belts (BBs)
6. Green Belts (GBs)
7. Yellow Belts (YBs)



Six Sigma Focus

Six Sigma focuses on understanding variation in our business processes.



Business Processes

Customer

In particular, we look at how the ***business is performing*** against the ***customer requirements***.

What Makes Good Coffee Service?

Supplier Perspective
(Hotel)

- Good hot coffee
- Clean china
- Clean linen
- Attractive display
- Extras - snacks

Customer Perspective
(Conference Attendees)

- Good hot coffee
- Fast line, especially for refills
- Close to high-capacity restrooms
- Close to telephones
- Room to chat

Why is there a difference in perspective?

Source: Barry Bebb & Associates

Basics of Variation

Process improvements are driven by the understanding of variation.

Center

- Is the process on target? If not, where is the process center?

Spread

- How variable are the scores around the center?

Shape

- What is the shape of the distribution?
- Is it bell-shaped, skewed, symmetric?

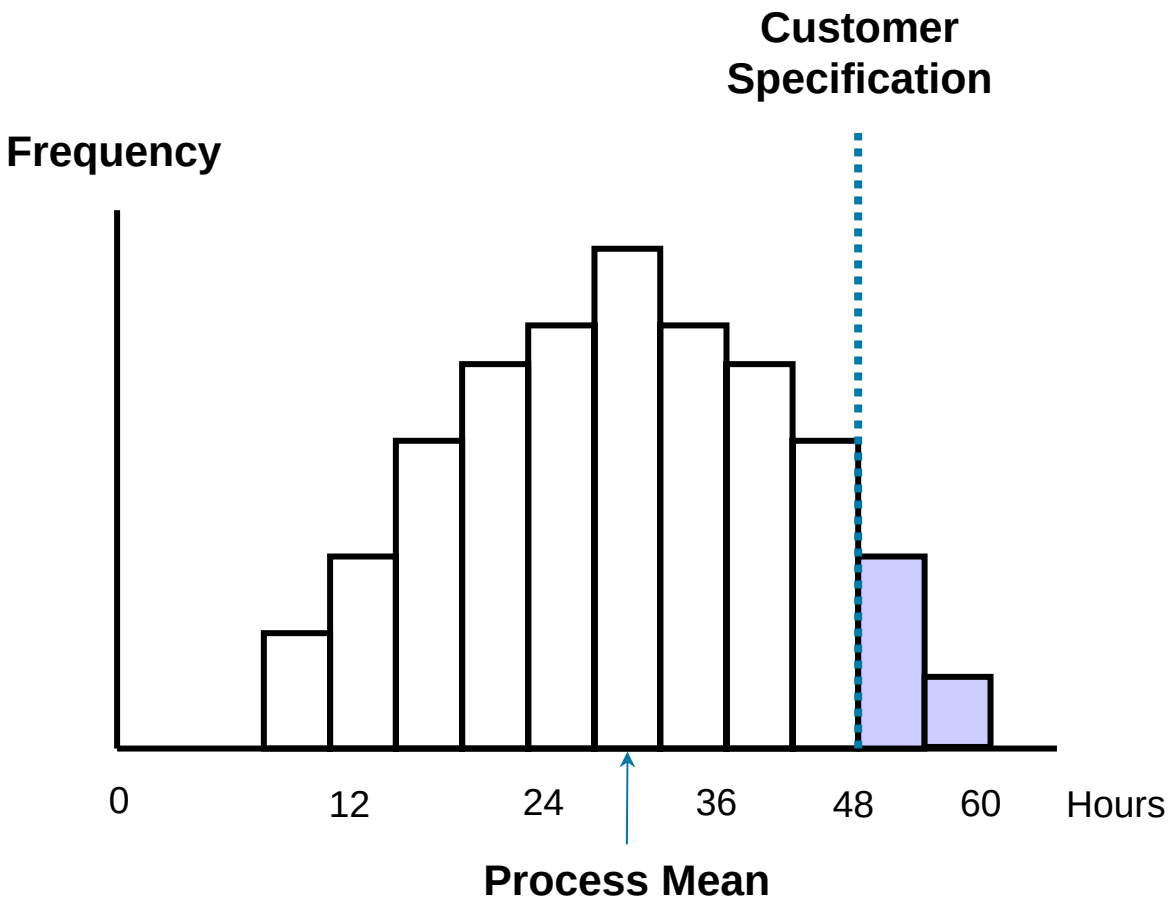
Over Time

- How does the process behave over time?

Variation = Uncertainty

Process Variation

Consider a requisitions turn around time.



You can't manage a process by the mean.

The Customer's Perspective

The results of the variation show up as:

Good or Bad?

- The order is placed for the right item
- The order is placed with the right supplier

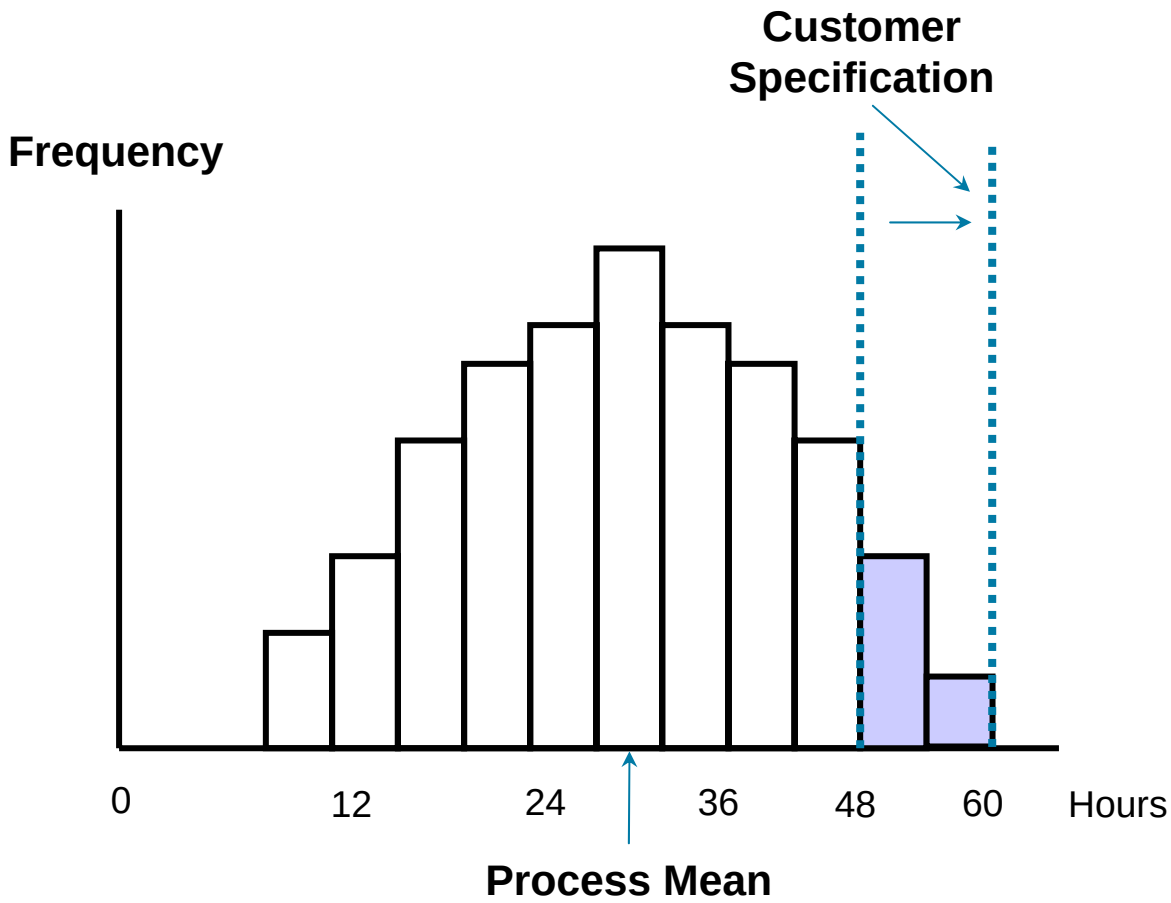
On Time or Not?

- The order is placed right on time
- The order is placed too soon/too late

So what are our options?

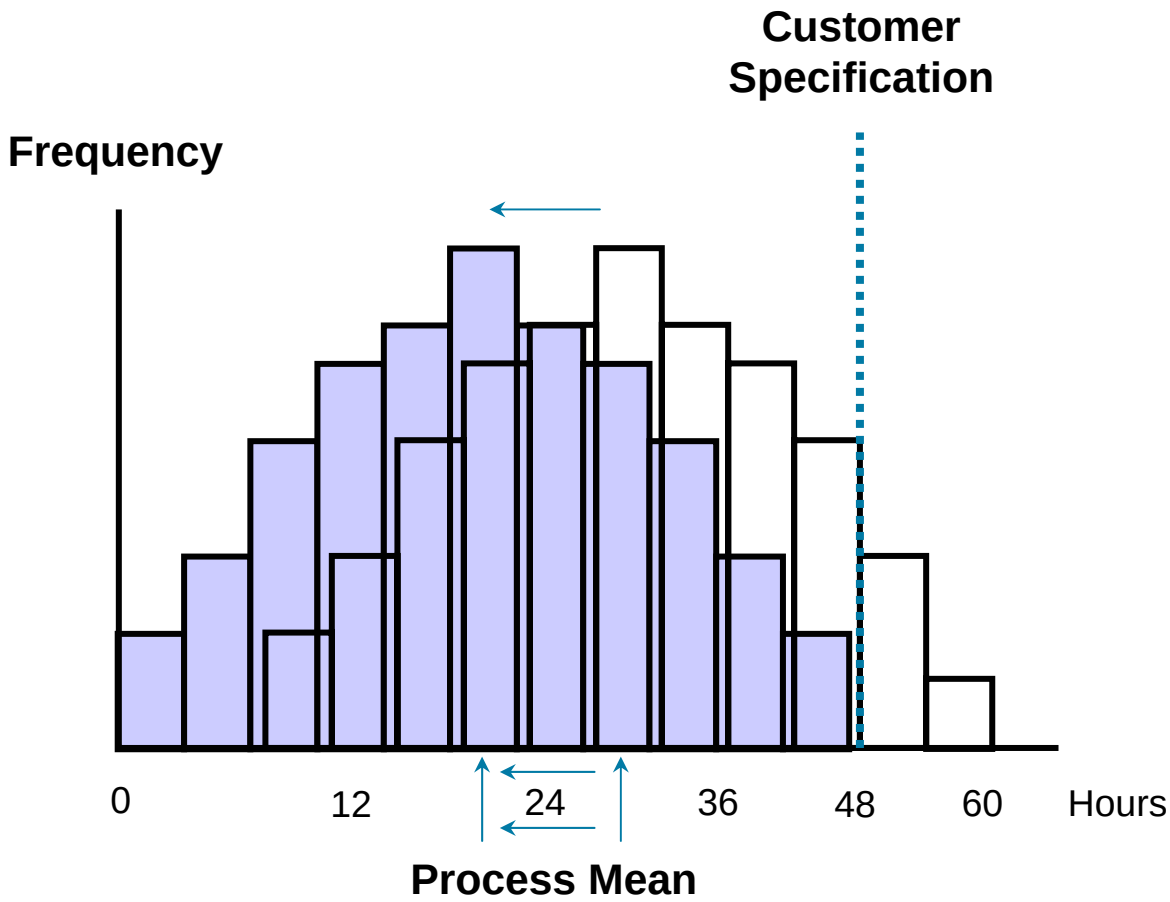
Variation = Uncertainty

Option 1: Relax Specification



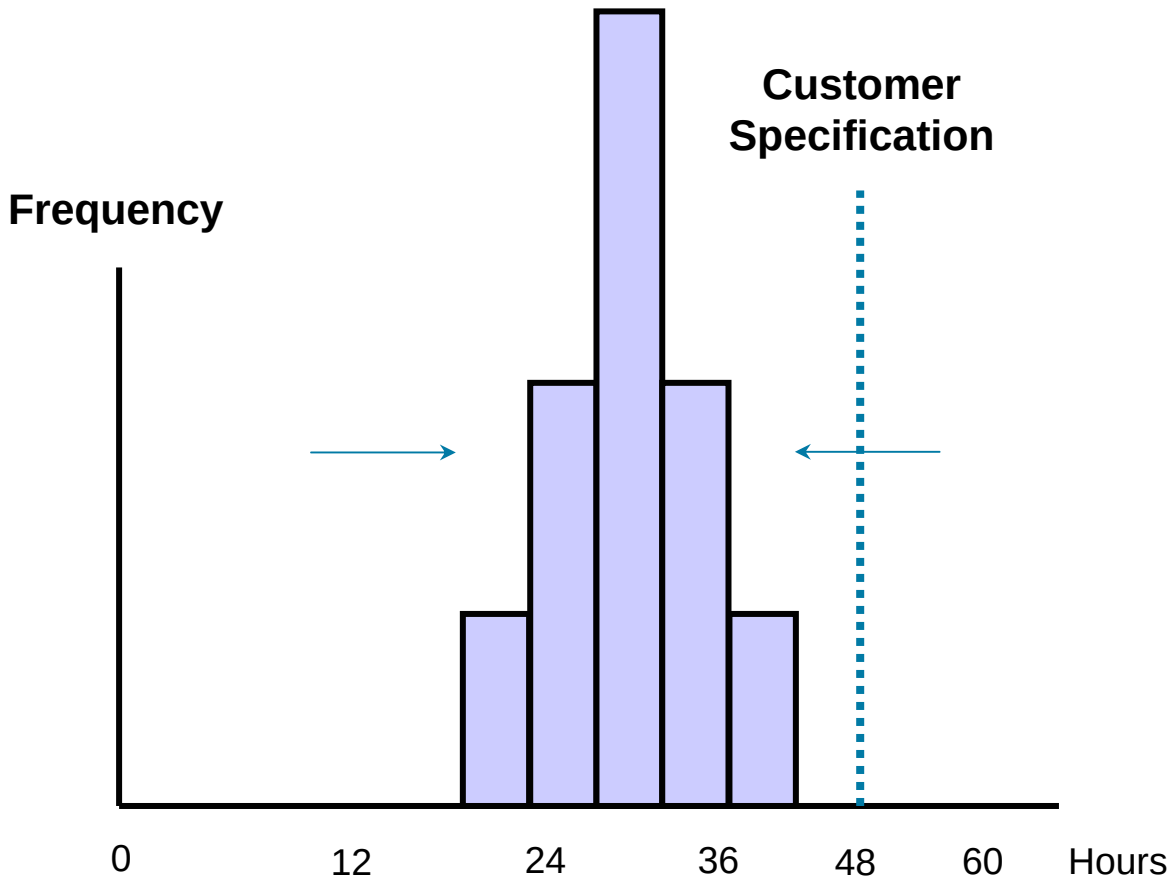
The cheapest solution… when feasible.

Option 2: Shift Mean



Reduces defects but doesn't improve predictability.

Option 3: Reduce Variation



Improves predictability and reduces defects.

The Prediction Equation

Number of Hours to Process a Requisition

Number of Approvals

$$Y = F(X)$$

Output

Input

Output Variation

Input Variation

Complex Equations

Number of Hours to Process a Requisition

$$Y = f(x_1, x_2, x_3, x_4)$$

Output

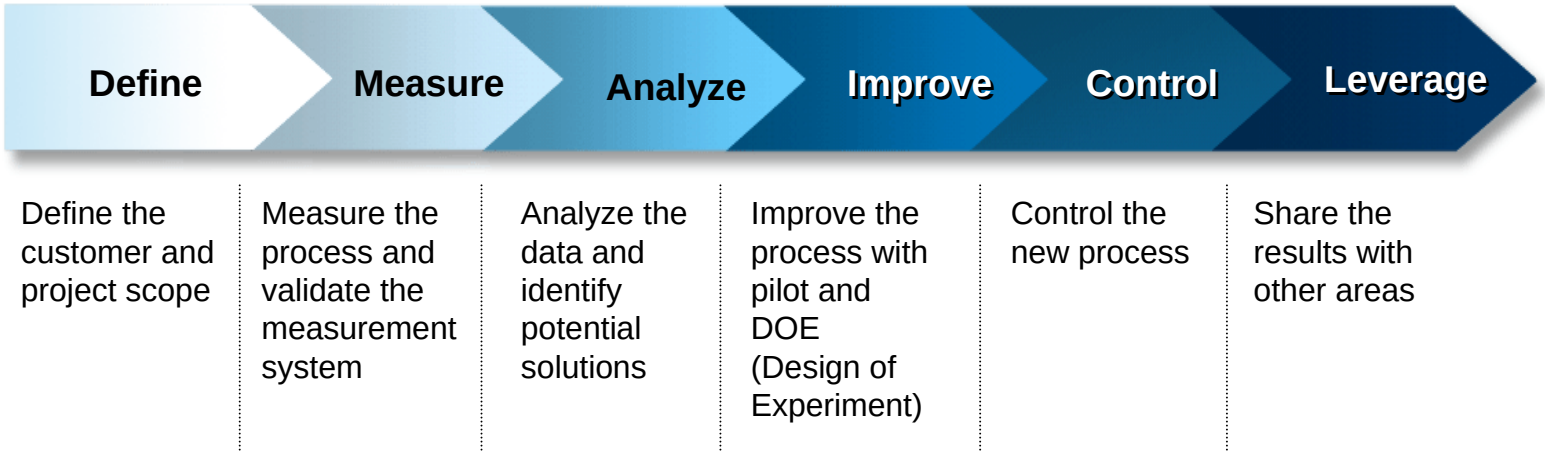
Commodity ***Dollar Amount*** ***Details Provided*** ***Time of Day***




Output Variation

DMAICL Overview

Six Sigma Improve follows a phased format.



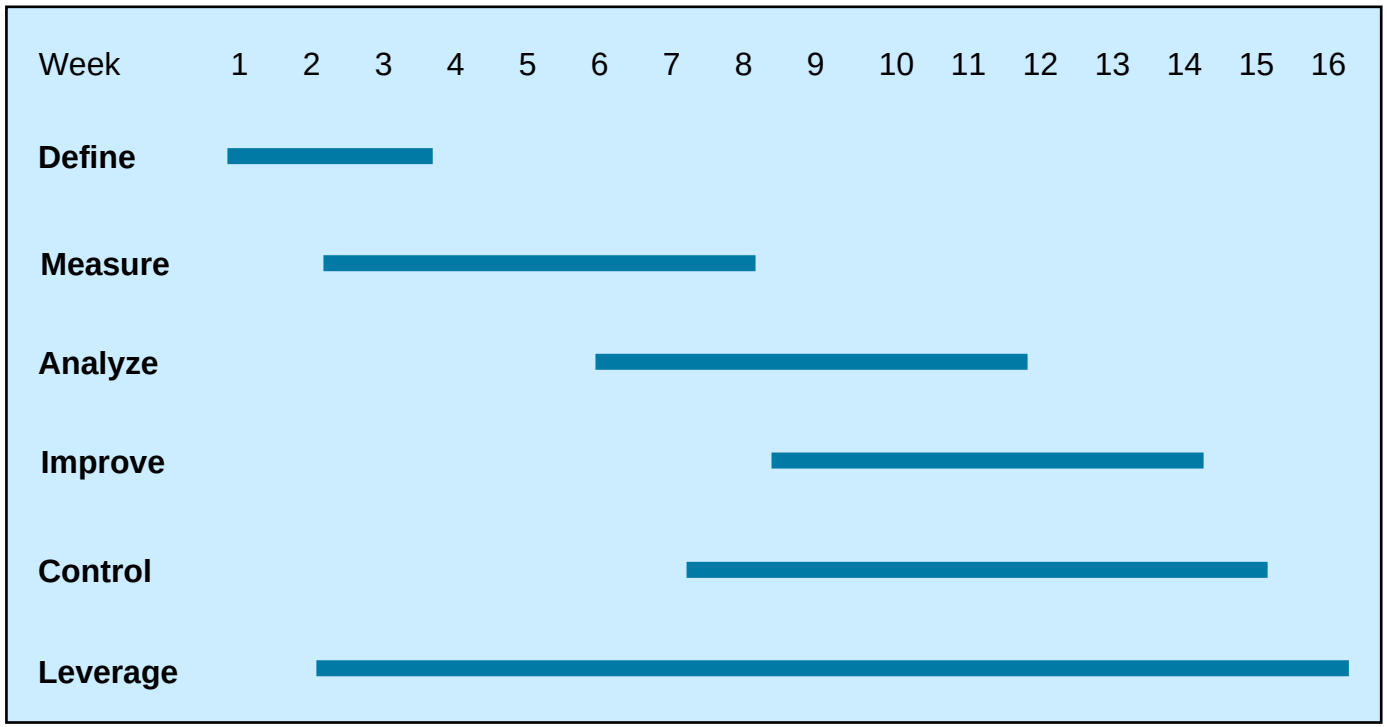
The most successful Six Sigma projects ensure key outcomes are achieved within each phase. However, it is not a linear process.

You will see the phases overlap. For example, Leverage starts in early Define.

Project Timeline

DMAICL is not a linear process.

MAIC&L start very early in your project

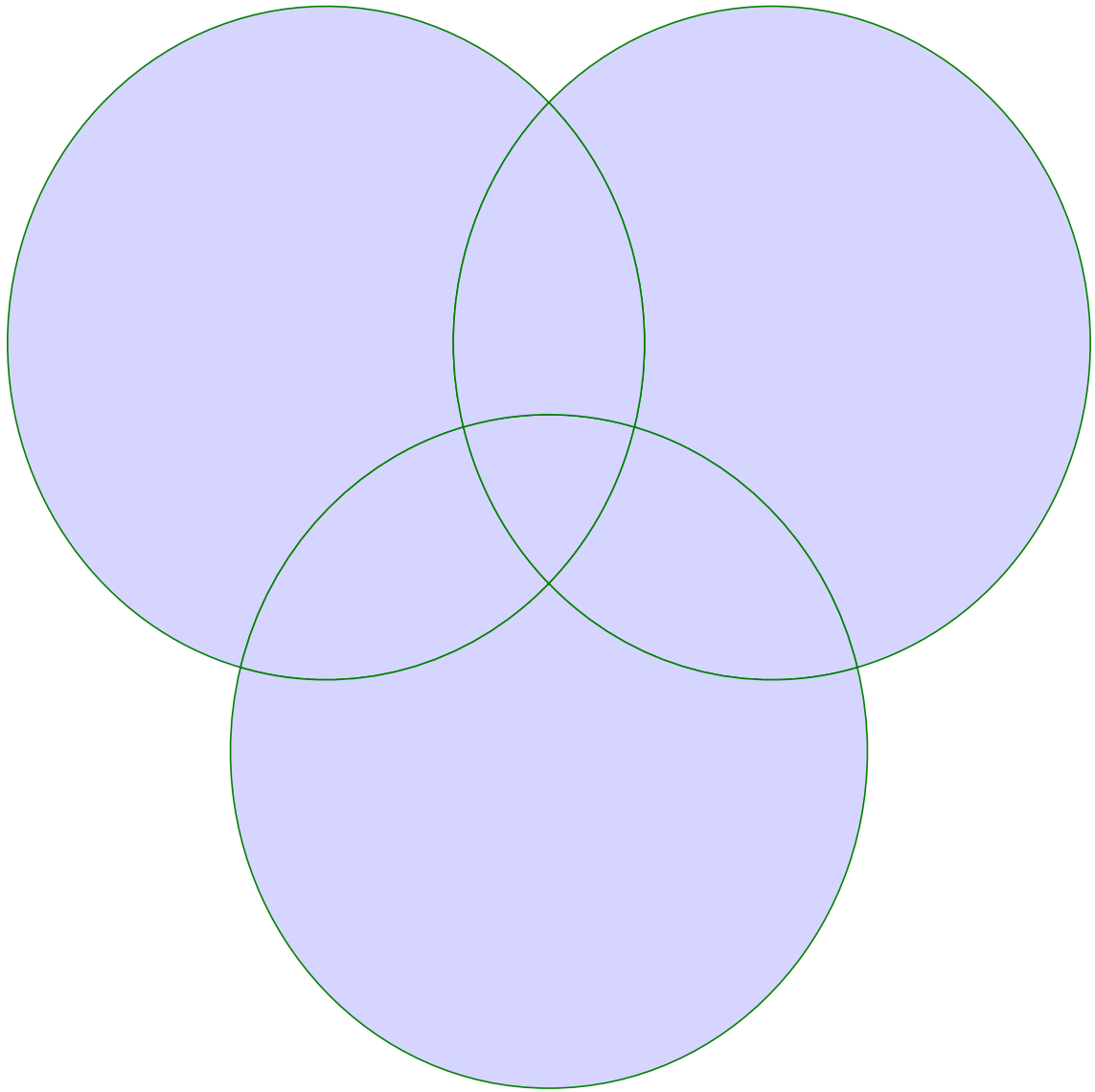


The solid bar represents how a good project should look. Draw in the timeline for your project.

The Role of Change Management

Managing Change Through Six Sigma

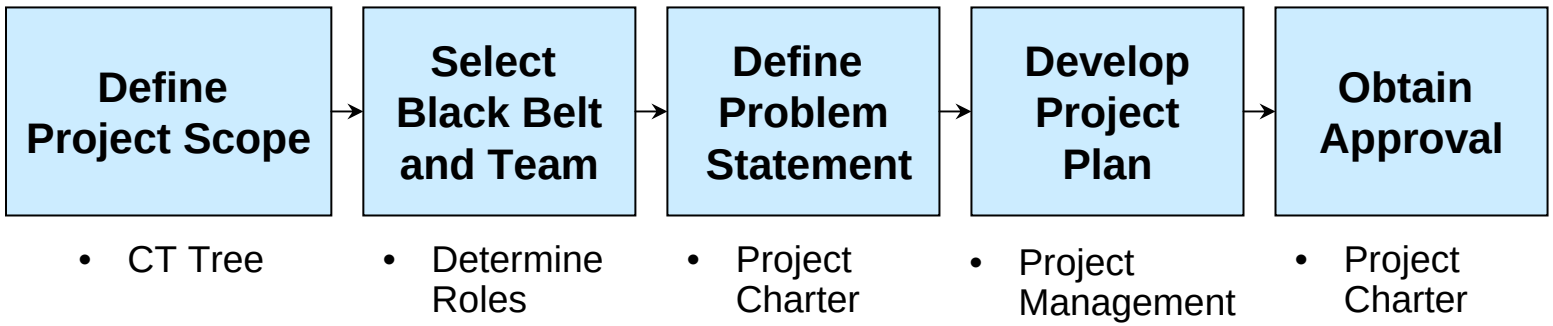
•Take the emotion out of the process through:



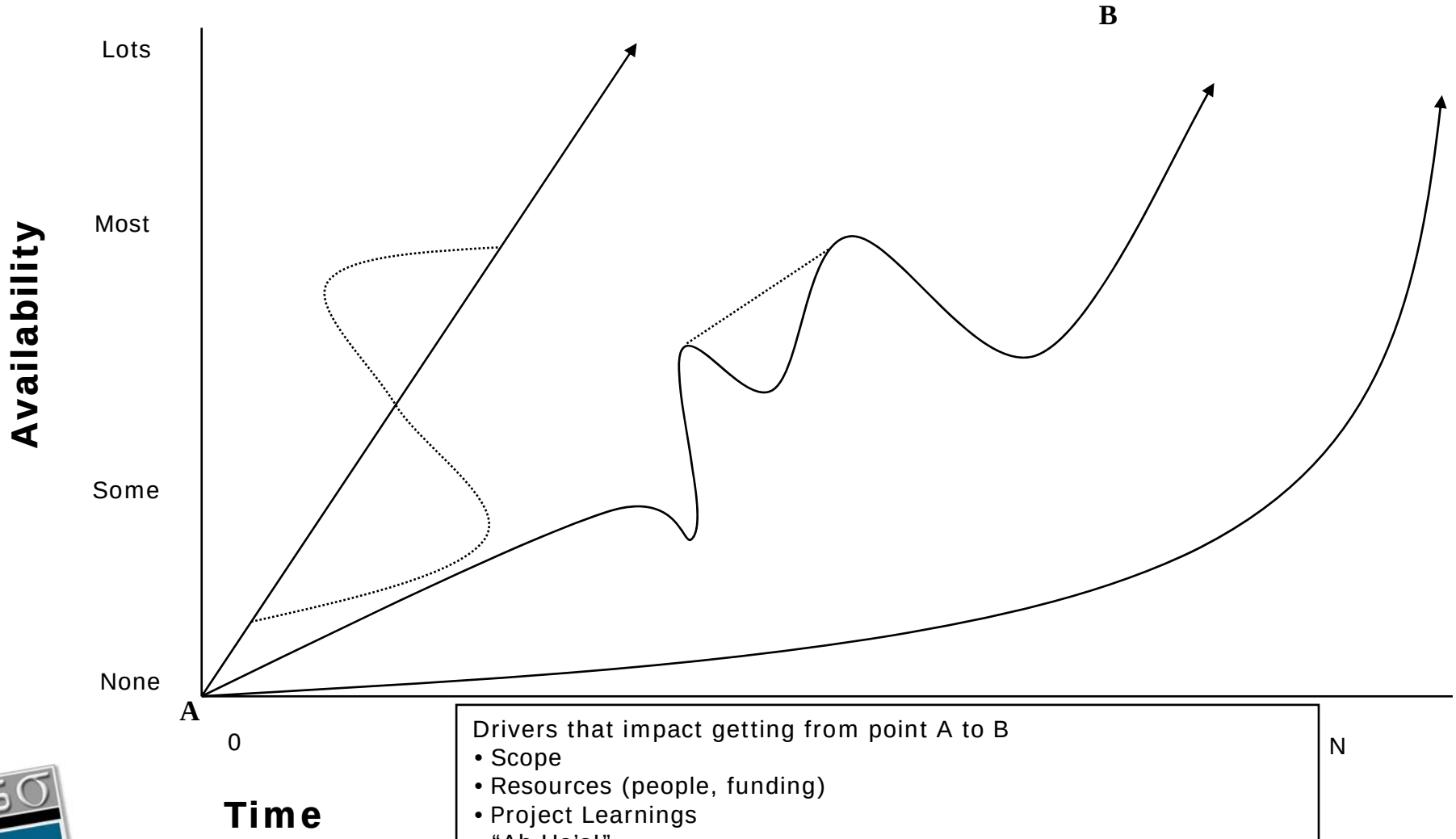
Define

Define: Process

High level process to complete the Define Phase

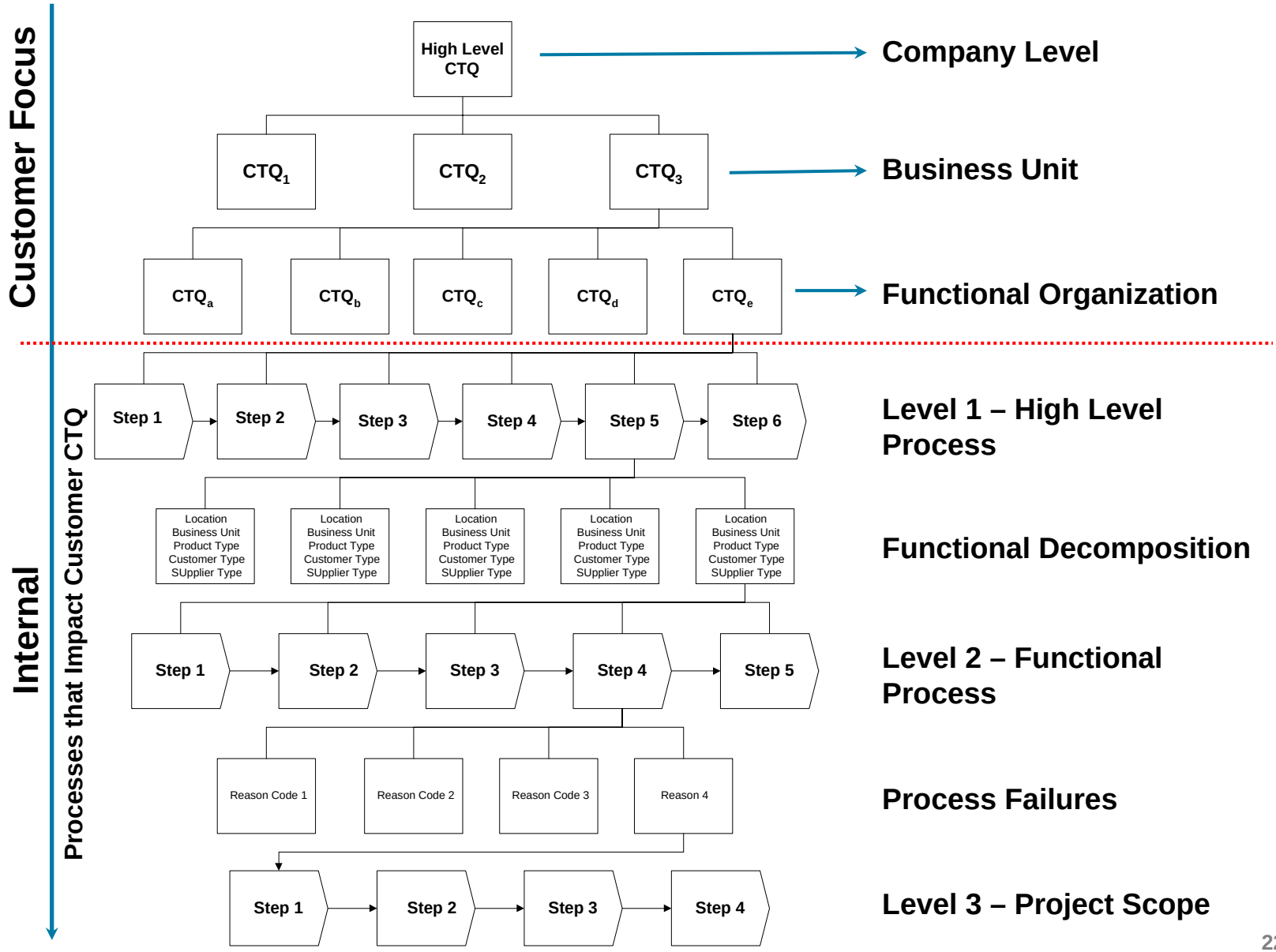


View of Product Development According to John Li



Drivers that impact getting from point A to B
- Scope
- Resources (people, funding)
- Project Learnings
- "Ah Ha's!"
- Other (prioritization shifts, field requests, etc)

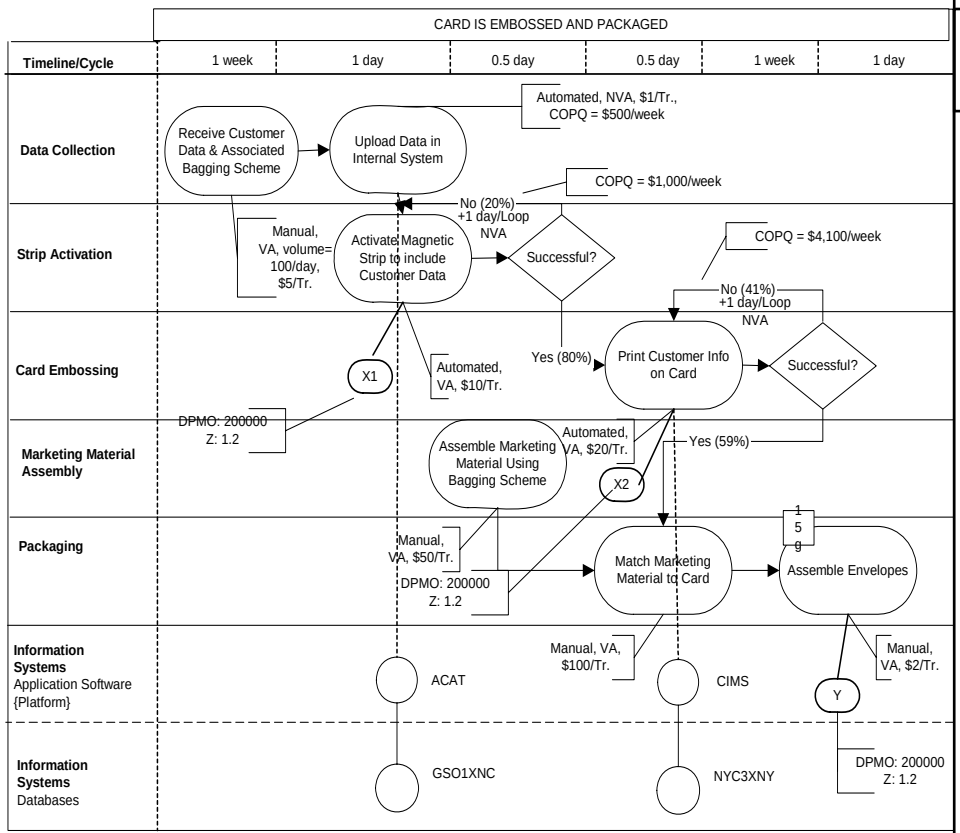
Understanding CT Trees



Process Mapping

Process Understanding System

Process Description:	Process Customer:	Customer Need(s):	Key Performance Indicator(s):
Credit Card Delivery	Consumer	Timely Delivery of Card	See Below



Critical Xs & Ys		Triggers			
Definition	Specs/ Targets	Trigger Points	Fre-quency	Respon-sibility	Contingency Plan
X_1= % Complete of Customer Data	= 100%	Time of Data Receipt	Daily	Data Collection	
X_2= # of Cards Available	> 100 Cards	Operations Meeting	Daily	Card Embossing	
Y= # of Business Days to Deliver Card	≤ 12 Days	Time of Data Receipt+6 Days	Daily	Packaging	

Rev #	Date	Revision Description	By	Appr

Project Charter

Why a Project Charter?

1. To ***set*** expectations and obtain buy-in on scope, goal, and resources (It is documented, there could be no misunderstanding).

2. To ***accelerate*** the on-boarding of new resources (It is documented, you don't need as much time explaining your project).

3. To ***avoid*** future scope creep in a project (refer back to the Project Charter at all times to ensure you are still on track).

What to Include

What to include in a Project Charter?

1. The Problem Statement

   …What is the issue from a customer perspective?

2. The Goal Statement

   …What do I need to accomplish and by when?

3. The Team

   …What resources do I need to succeed?

4. The Business Case

   …What are the financial benefits to my Business?

Make it data driven! Use it to sell your project!

Determining Sigma

Determining the Sigma Level

1. Define a Defect
2. Determine Opportunities for Defects
3. Select Sample Size
4. Count Mistakes, Errors, or Defects in Sample
5. Calculate Defects Per Million Opportunities (DPMO)
6. Correlate Number With DPMO/Sigma Conversion Table

Now you have your Sigma Level

Defects Per Million Opportunities (DPMO)

Definition

A measure of the number of defects per every million opportunities to create a defect. Defects Per Million Opportunities (DPMO) is calculated as follows:

$$\frac{\textit{\# of Defects x 1,000,000}}{\textit{\# of Opportunities for Defects}}$$

Purpose

A defect measure which provides comparability across dissimilar processes and/or those with varying degrees of complexity.

Keeps everybody on a level playing field.

Capability and DPMO

How Good Are We Today?

Process Capability	Defects per Million Opportunities	Process Yield
2σ	308,537	69.1463%
3σ	66,807	93.3193%
4σ	6,210	99.3790%
5σ	233	99.9767%
6σ	3.4	99.9997%

(Includes ± 1.5σ Mean Shift)

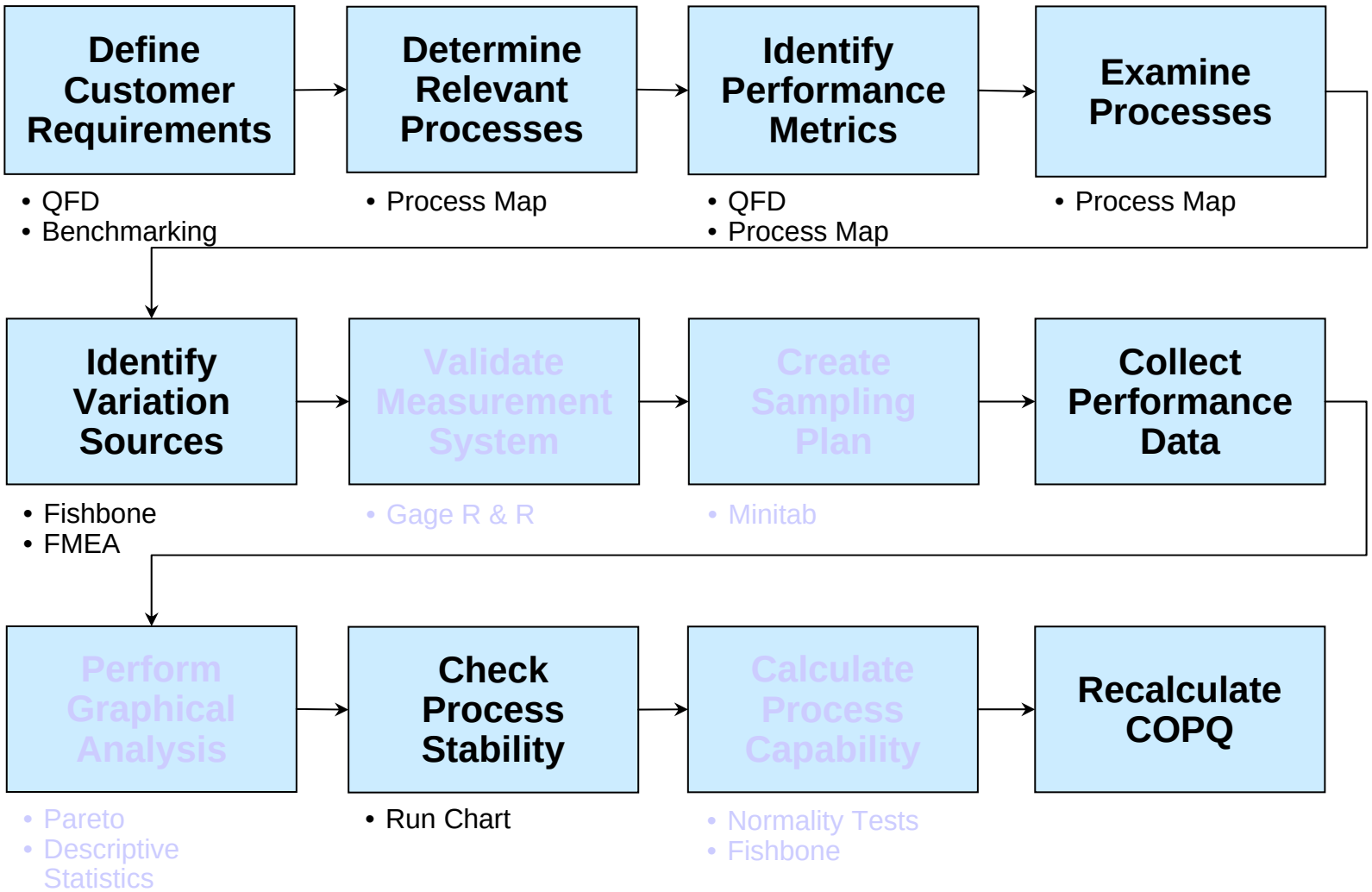
Adapted From M. Harry - The Vision of Six Sigma

What does it mean to our customers?

Measure

Measure: Process

High level process to follow during the Measure Phase



Customer Expectations and CTQ's

All measures of Customer Expectations fall into one of these categories.

Fulfillment

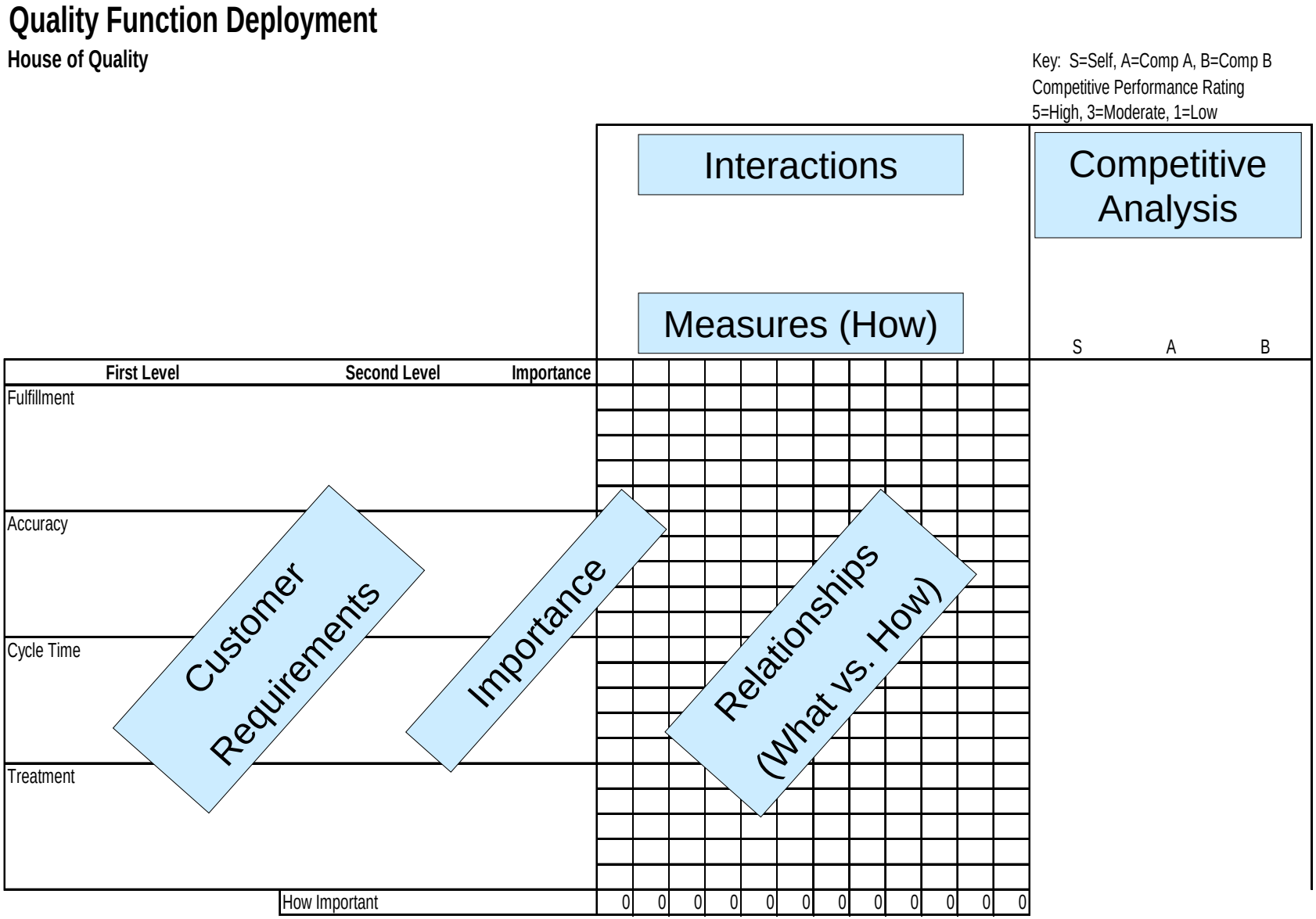
Accuracy

Cycle Time

Treatment

Document the *FACT's*

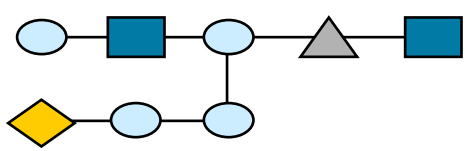
Quality Function Deployment



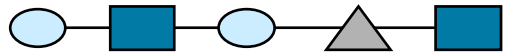
Different Perspectives

There are usually three versions of every process

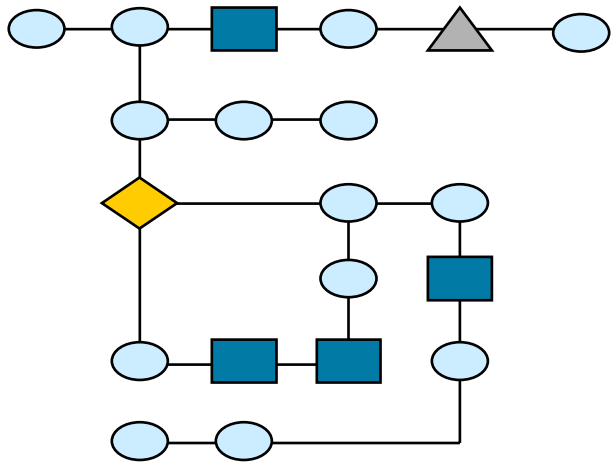
We think it is



We wish it would be



It actually is



You have to flush out how the actual process is behaving.
Once you document, “walk the process”.

Process Mapping Introduction

It is a graphical depiction of the steps in a process

Aids in Problem Solving

- Determines the sequence of events
- Shows complexity, bottlenecks, redundancy, re-work loops and control points
- Allows you to determine activities that impact process performance
- Identifies areas where data can be collected

To start building your process map

- Name your process
  - “New Hire Cell Phone Issuance”
- Identify the process customer
  - “Newly Hired Sales Force in the US”
- Identify the need you are addressing (From QFD)
  - “Delivery cycle time of activated cell phone”
- Identify the start and ending points of your process
  - Start: Application Intake from HR
  - End: Cell Phone Delivery to Desktop

Control Activities

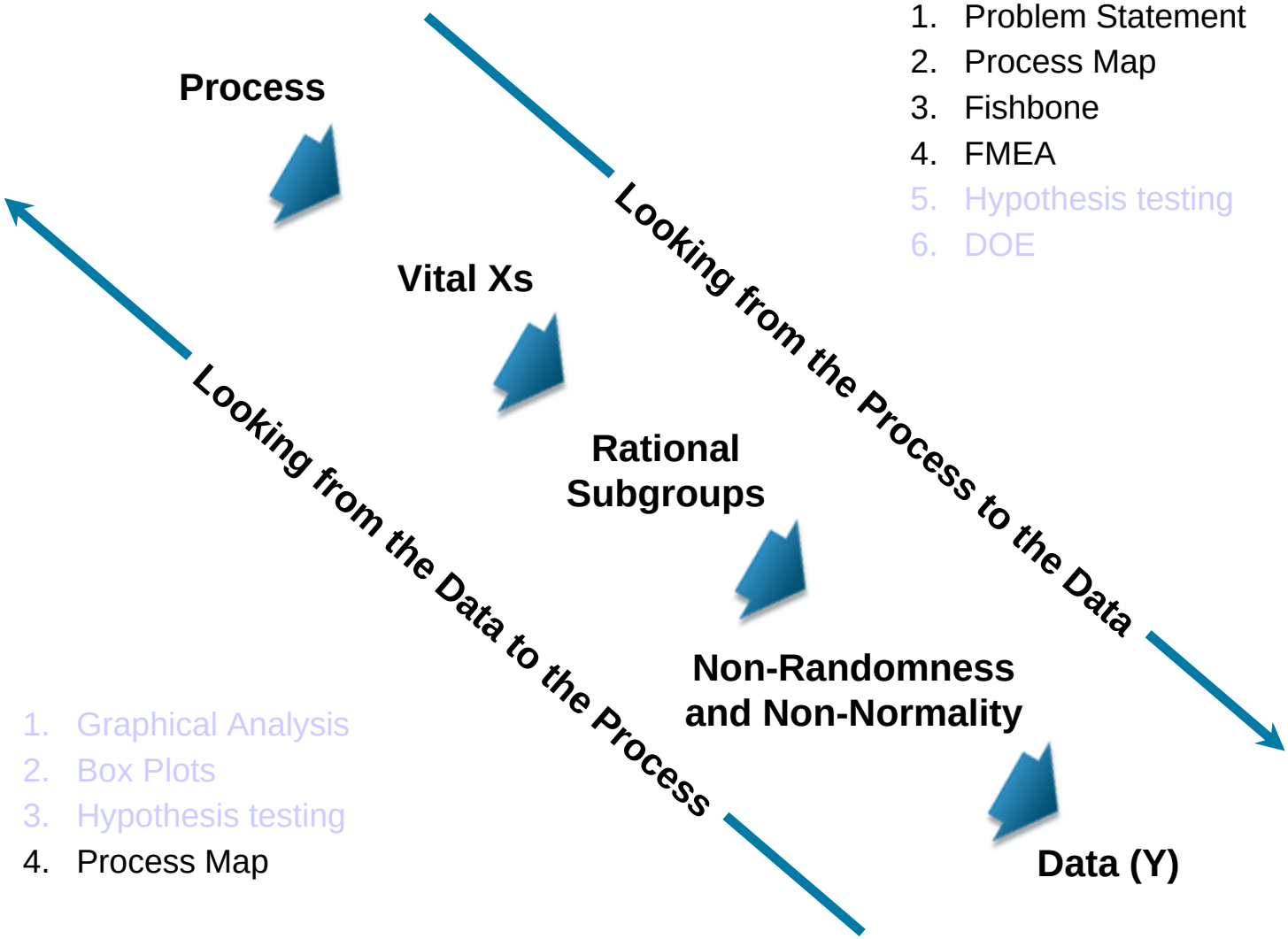
Control activities address the day to day risks inherent in our business processes in order to meet business objectives…

1. approvals
2. authorizations
3. verifications
4. reconciliations
5. reviews of operating performance
6. security of assets and segregation of duties

What Controls Can Do

- Support achievement of objectives
- Reduce probability of undesirable outcomes
- Provide feedback to management
- Help identify emerging trends
- Help detect wrongdoing
- Help ensure integrity of business reporting
- Help ensure compliance to laws and regulations

How Can We Use Data?



1. Problem Statement
2. Process Map
3. Fishbone
4. FMEA
5. Hypothesis testing
6. DOE

1. Graphical Analysis
2. Box Plots
3. Hypothesis testing
4. Process Map

If we understand the problem, we can do both!

Discrete Data

Characterizing a process based on its data type (in this case a ***Discrete Data*** type) shapes the way you measure and analyze the problem

Discrete data is information that:

- Can be categorized into a classification
- Is based on counts
- Has only a finite number of values possible
- Values cannot be subdivided meaningfully

Discrete data either “is” or “isn’t”. There are no half values.

Some examples of Discrete data include:

- Part number provided
- All required approvals included
- Contracted supplier used

With discrete data, the defect level is *counted.*

Continuous Data

Characterizing a process based on a different data type (now looking at ***Continuous Data***) allows us to use a new set of tools and draw new knowledge

Continuous data is information that:

- Can be measured on a continuum or scale
- Can have almost any numeric value
- Can be meaningfully subdivided into finer and finer increments
- Can be recorded at many different points

Some examples of Continuous data include:

- Hours to process a requisition
- Price paid per item
- Number of approvals obtained

With continuous data, the defect level is *projected* or *forecast*

Distributions

Different types of distributions give you insights into the process behavior…

Normal Distribution

Equal number of data points to the left and right of the mean with the highest point being at the mean.

Non-Normal Distribution

Most likely, more than one process is occurring and you will need to break your data down to really understand what is happening.

Common vs. Special Cause

Walter Shewhart developed the concept of separating variation into two distinct groups – ***Common Cause Variation*** and ***Special Cause Variation***. The Fishbone will help you identify the potential causes of Special Cause Variation

Common Cause Variation

- Natural to the process - "INHERENT"
- Randomly occurs
- If such a thing exists, it is "good" variation (i.e., you can live with it)

Let the Process Run

Special Cause Variation

- Causes nonrandom process performance
- Unacceptable to maintain desired process performance
- Usually caused by people (human error) or system failures

Investigate – Possible Corrective Action Necessary

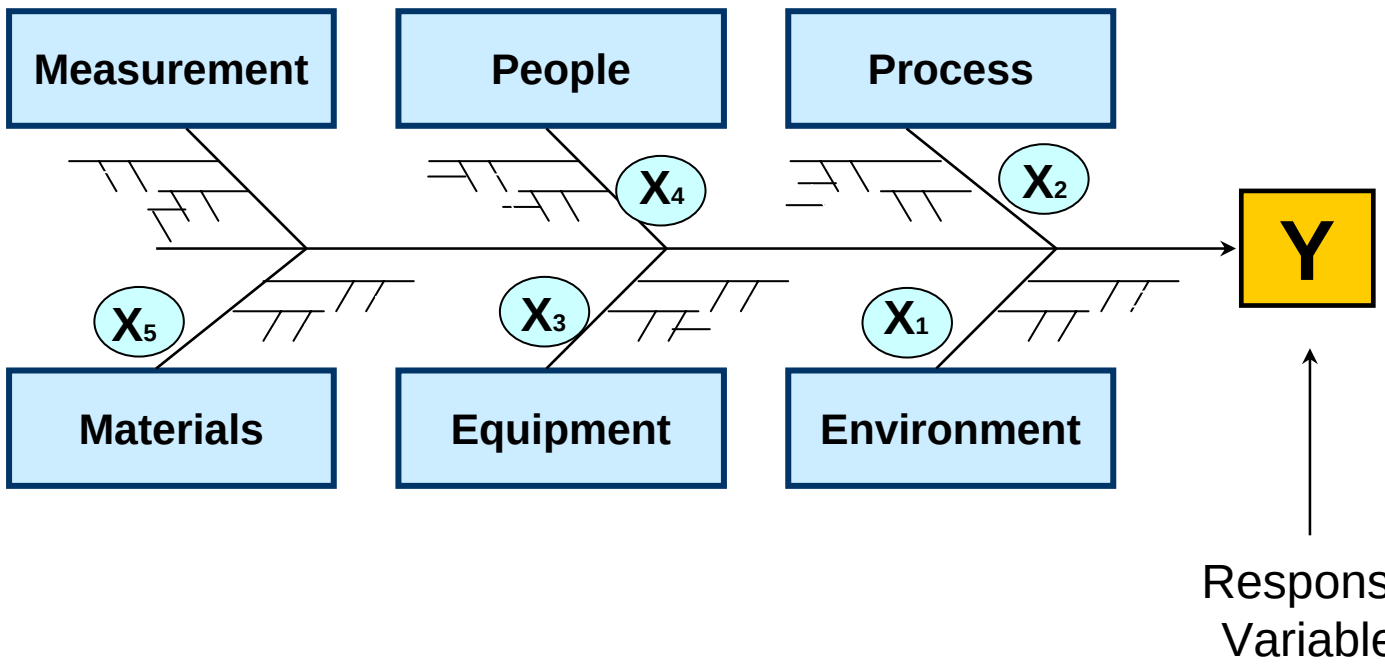
Fishbone Diagram

A Visual Tool Used to Brainstorm and Organize ***Possible Causes*** (Xs) for a ***Specific Problem*** (Y)

- Summarizes potential Xs
- Provides graphical display of potential Xs
- Stimulate group brainstorming and hence the identification of other potential Xs
- Start in the Measure Phase and update throughout the project as you learn more

Fishbone Overview

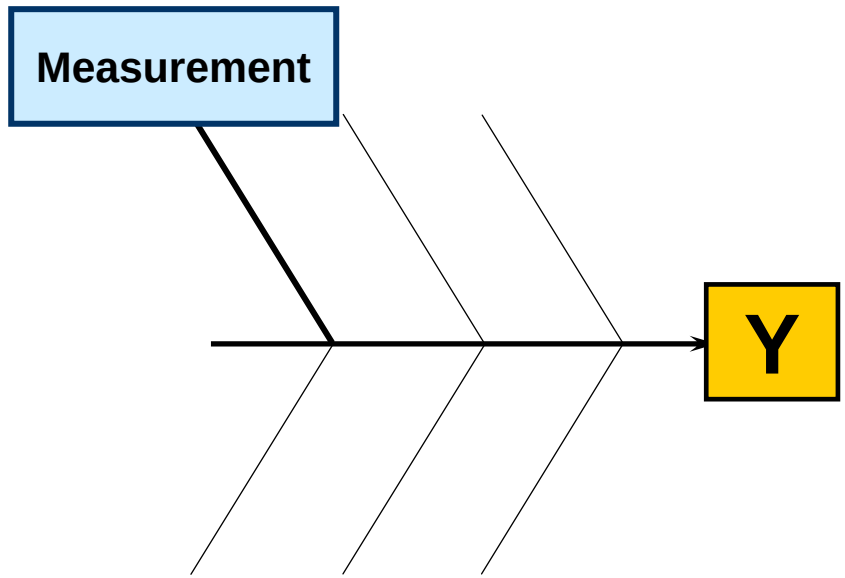
The tool will help you find potential X's at the lowest level of the Fishbone. Keep drilling down ***(Why? Why? Why?)*** until you find out the root causes of the problem. Your root causes will be grouped in six categories.



Measurement

The ***Measurement*** category groups root causes related to process measurements

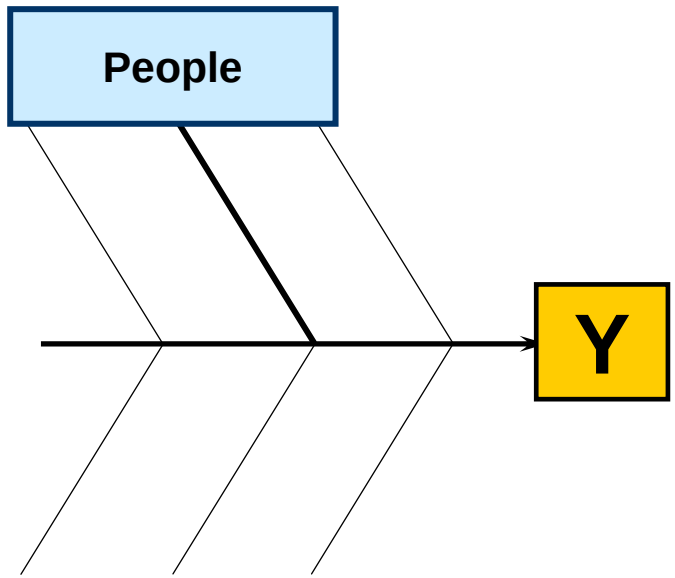
- Examples of questions to ask:
  1. Do we have a metric issue?
  2. Do we have a valid measurement system?
  3. Is data readily available? Etc.
- Keep asking ***Why? Why? Why?***



People

The ***People*** category groups root causes related to people and organizations

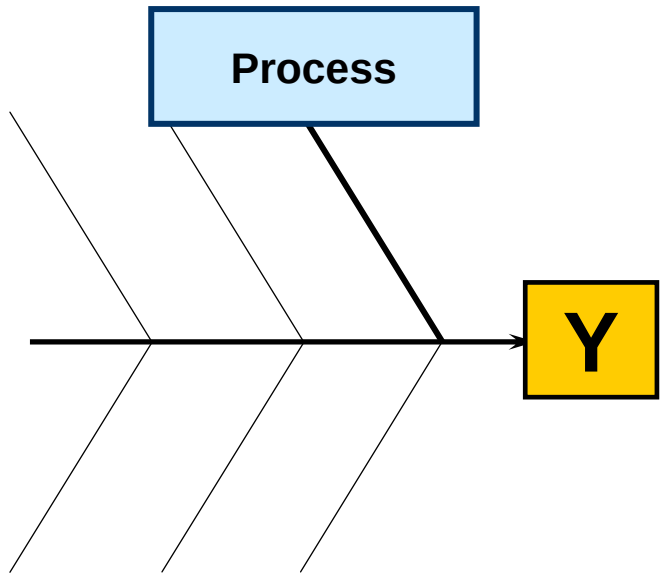
- Examples of questions you can ask:
  1. Are people trained?
  2. Is there a shortage of talent?
  3. Are people over-worked? Etc.
- Keep asking ***Why? Why? Why?***



Process

The ***Process*** category groups root causes related to procedures, hand-offs, input/output Issues.

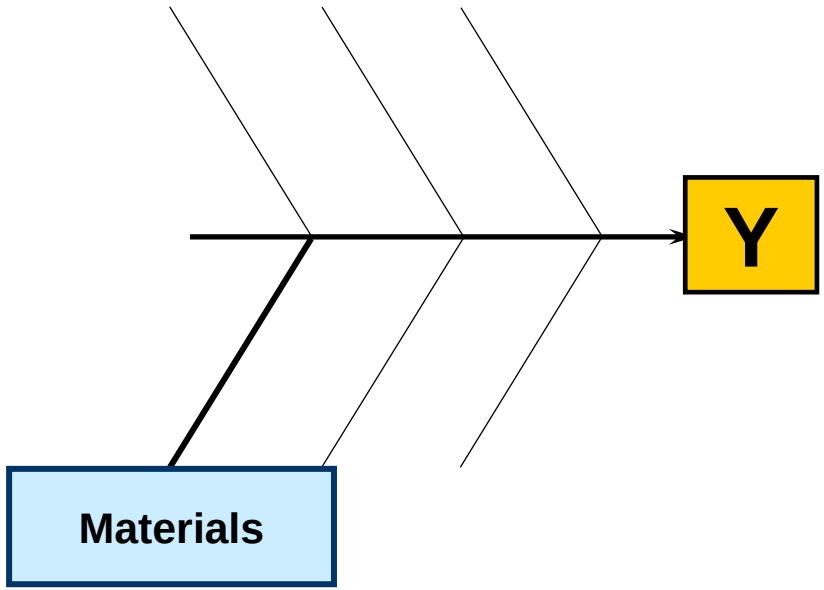
- Examples of questions to ask:
  1. Do we have a process?
  2. Do we follow our procedures?
  3. Are there too many hand-offs? etc.
- Keep asking ***Why? Why? Why?***



Materials

The ***Materials*** category mainly groups root causes related to information and forms needed to execute a process.

- Examples of questions to ask:
  1. Are the catalogs we use out of date?
  2. Is the information we receive correct? etc.
- Keep asking ***Why? Why? Why?***



Equipment

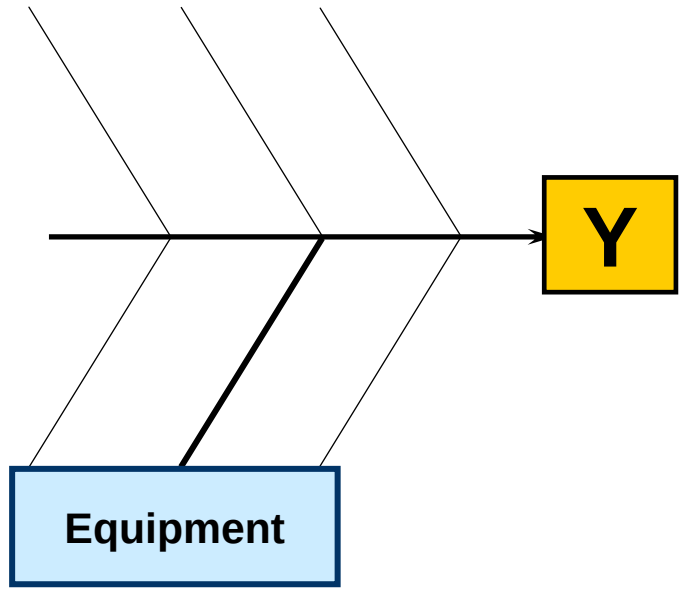
The ***Equipment*** Category Groups Root Causes Related to Tools Used To Execute The Process.

- Examples of questions to ask:

  1. Do computers have enough memory to run the required applications?

  2. Do headsets work properly? etc.

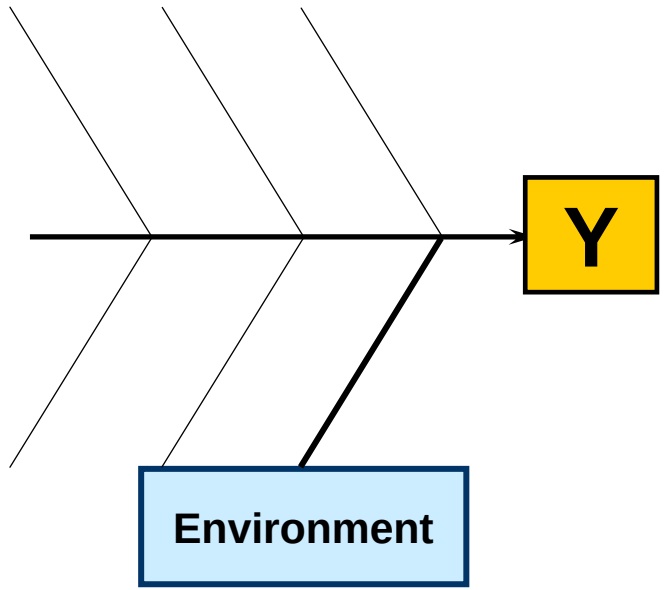
- Keep asking ***Why? Why? Why?***



Environment

The ***Environment*** category groups root causes related to our work environment, market conditions, and regulatory issues.

- Examples of questions to ask:
  1. Is our call center facility designed to help associates share information easily?
  2. Are regulatory conditions impacting the competitiveness of our services? etc.
- Keep asking ***Why? Why? Why?***



The Rules of a Fishbone

1. The head of the Fishbone is a detailed problem statement.

2. Build at least a level-3 Fishbone (ask ***Why? Why? Why?***)

3. If you can't fit it all on 1 page, your project is too big: change your scope!

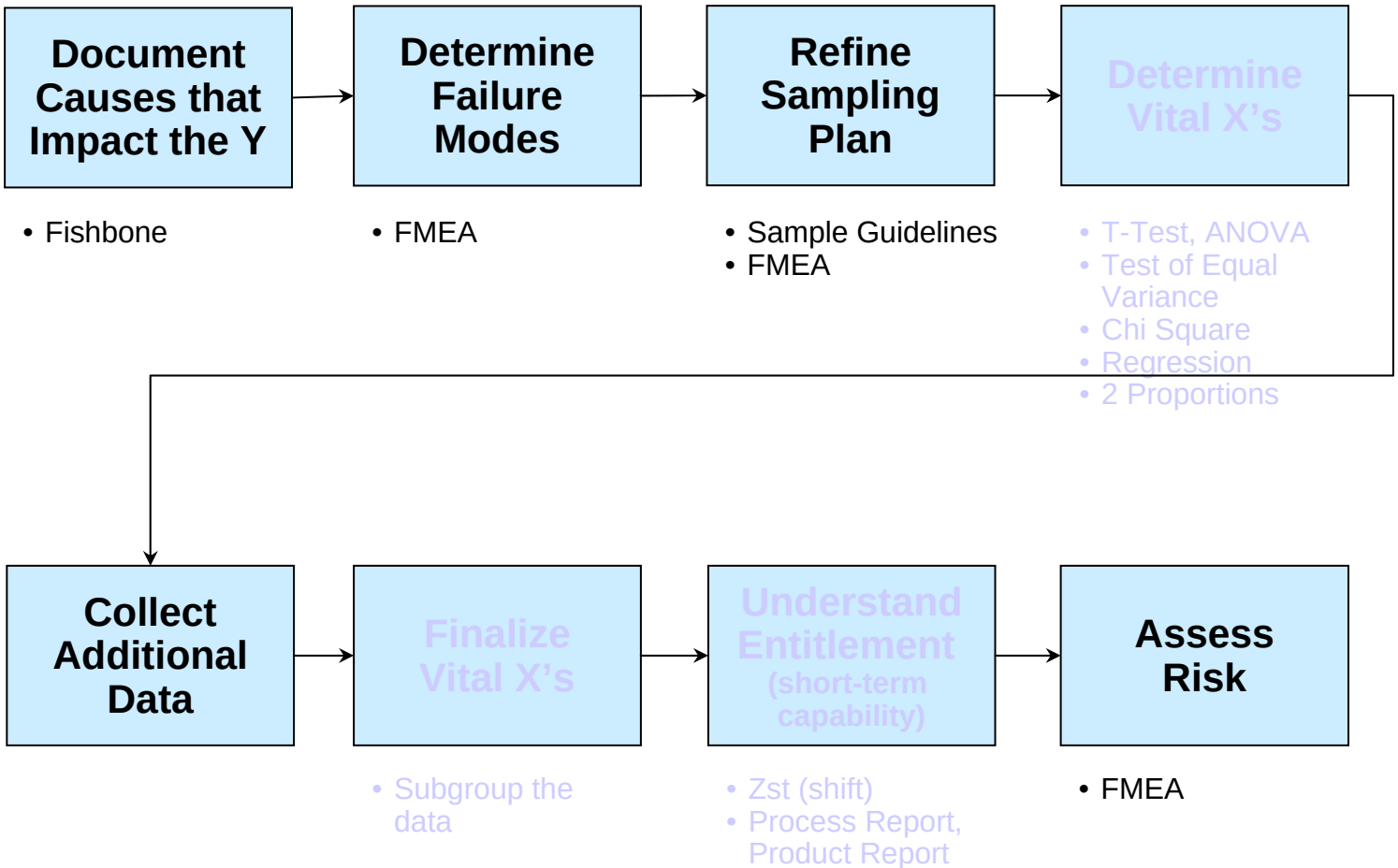
4. All of the bottom-level bones are hypotheses to be tested.

5. Use the six major bones provided – do not change them!

Analyze

Analyze: Process

High level process to complete the Analyze Phase

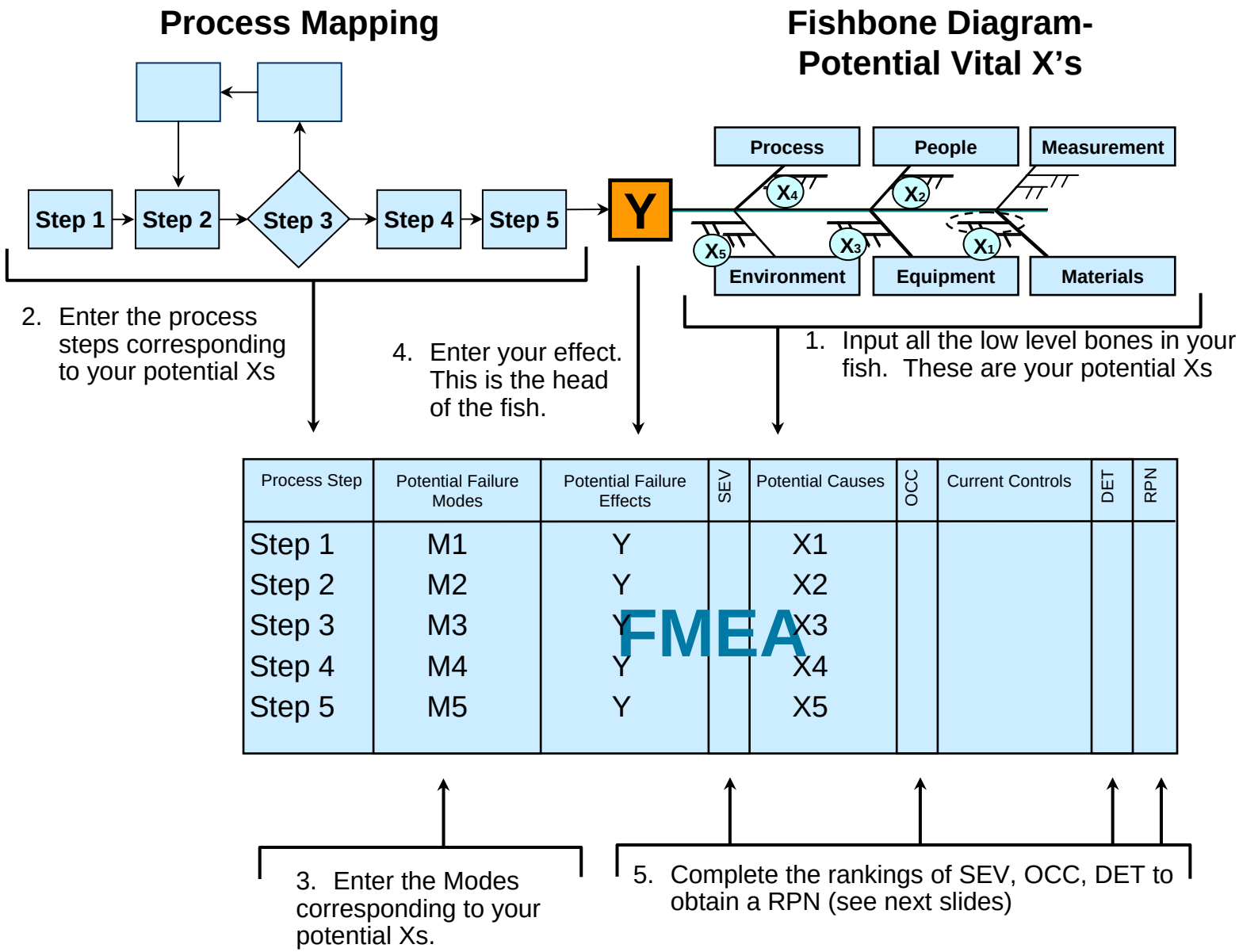


Why Use FMEA?

Failure Modes and Effects Analysis

1. Identify how a process, product or service could fail (Modes)
2. Identify the impact of failure on customer needs (Effects or Y)
3. Understand the causes of failure (Xs) and how they link a Control/Mitigation Plan
4. Plan how to identify these failures and implement actions to mitigate them
5. Summarize potential Xs & results of associated hypothesis testing

Building the FMEA



Severity

Severity (SEV): Determine How significant is the impact of the Effect to the customer

RATING	DEGREE OF SEVERITY
1	Customer will not notice the adverse effect or it is insignificant
2	Customer will probably experience slight annoyance
3	Customer will experience annoyance as a result of poor service
4	Customer dissatisfaction as a result of poor service
5	Customer is made uncomfortable or their productivity is reduced by the continued poor service.
6	Customer complaint as a result of service issue
7	High degree of customer dissatisfaction due to loss of being able to use a portion of the service.
8	Very high degree of dissatisfaction due to the loss of service.
9	Customer has lost total use of service
10	Customer has lost total use of service and will never return

Occurrence

Occurrence (OCC): Determine How likely is the Cause of the Failure Mode to occur

RATING	LIKELIHOOD OF OCCURRENCE
1	Likelihood of occurrence is remote
2	Low failure rate with supporting documentation
3	Low failure rate without supporting documentation
4	Occasional failures
5	Relatively moderate failure rate with supporting documentation
6	Moderate failure rate without supporting documentation
7	Relatively high failure rate with supporting documentation
8	High failure rate without supporting documentation
9	Failure is almost certain based on data
10	Assured of failure based on data

Detection

Detection (DET): Determine How Likely will the current system detect the Cause or Failure Mode if it occurs

RATING	ABILITY TO DETECT
1	Sure that the potential failure will be found or prevented before reaching the next customer
2	Almost certain that the potential failure will be found or prevented before reaching the next customer
3	Low likelihood that the potential failure will reach the next customer undetected
4	Controls may detect or prevent the potential failure from reaching the next customer
5	Moderate likelihood that the potential failure will reach the next customer
6	Controls are unlikely to detect or prevent the potential failure from reaching the next customer
7	Poor likelihood that the potential failure will be detected or prevented before reaching the next customer
8	Very poor likelihood that the potential failure will be detected or prevented before reaching the next customer
9	Current controls probably will not even detect the potential failure
10	Absolute certainty that the current controls will not detect the potential failure

Risk Priority Number

Risk Rating

Once you identified your modes, effect, and causes, using the severity, occurrence, and detection ratings, determine an overall risk priority number (RPN)

- A numerical calculation of the relative risk of a particular failure mode
- RPN = SEV x OCC x DET
- Use the RPN to prioritize your failure modes. Higher RPNs require immediate focus and a solid control plan (use Mistake Proofing if possible)

Refining the Sampling Plan

	Process Step	Potential Failure Modes	Potential Failure Effects	SEV	Potential Causes	Null Hypothesis	P-Value	OCC	Current Controls	DET	RPN	COPQ
X6	Technical Support on Site	Rework originated from initial problem reported	Elongated Resolution Time for Severity2 Desktop problems	7	Different levels of expertise in technicians	There is no difference in performance regarding technical expertise		6	After customer complains	6	252	116000
X5	Technical Support on Site	Not all technicians can fix any type of problem	Elongated Resolution Time for Severity2 Desktop problems	7	different technical profiles in technicians	There is no difference in performance regarding problem type		6	monthly reports	5	210	82000
X4	Technical Support on Site	Specialization groups exist to solve different types of problems	Elongated Resolution Time for Severity2 Desktop problems	6	different technical profiles in technicians	There is no difference in performance regarding support group		5	monthly reports/ customer complains	6	180	

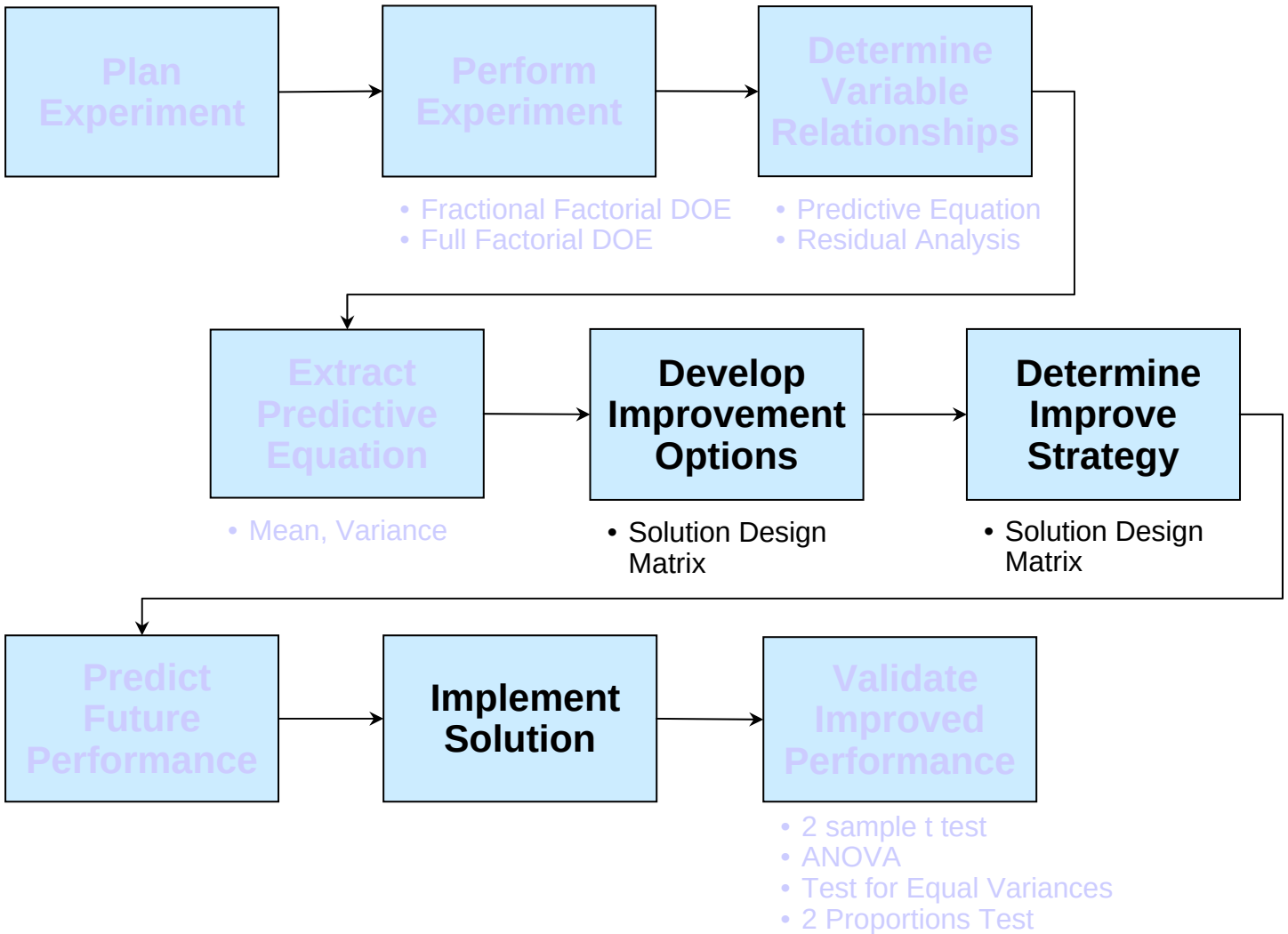
Test and fill-in p-values

The **Significant Failure Modes** will be highlighted by a high RPN. Build your data collection plan around this information. **TEST** all your assumptions (Null Hypothesis) and record your p-values in the FMEA.

Improve

Improve: Process

High level process to complete the Improve Phase



Preventing Defects

Errors ≠ Defects

Errors Cause Defects That Impact the Customer!

Human Error →	**Inspection Point** →	**Defect**
Cause →	**Mode** →	**Effect**
What we need to fix -	**Error becomes visible -**	**Customer Impact -**

Eliminate the Errors and You Prevent the Defect From Ever Happening in the First Place.

Once your Black Belt has completed the DOE, what are the improvements to the process? Incorporate Mistake Proofing principles to drive the solution design.

Extending the FMEA

	Process Step	Potential Failure Modes	Potential Failure Effects	SEV	Potential Causes	Null Hypothesis (Ho)	P-Value	OCC	Current Controls	DET	RPN	COPQ	Risk Mitigation	SEV	OCC	DET	RPN
★	X6	Technical Support on Site	Rework originated from initial problem reported	**Elongated Resolution Time for Sev 2 Desktop Problems**	7	Different levels of expertise in technicians	There is no difference in performance regarding technical expertise	0.039 (Mean) 0.037 (Spread)	6	After customer complains	6	252	116,000	Train Technicians in continuous basis.	7	2	3	42
★	X5	Technical Support on Site	Not all technicians can fix any type of problem	**Elongated Resolution Time for Sev 2 Desktop Problems**	7	Different technical profile in technicians	There is no difference in performance regarding problem type	0.031 (Mean) 0.029 (Spread)	6	Monthly reports	5	210	82,000	Train Technicians in resolution of both Hardware and Software	7	2	3	42
	X4	Technical Support on Site	Specialization Groups exist to solve different type of problems	**Elongated Resolution Time for Sev 2 Desktop Problems**	6	Different technical profile in technicians	There is no difference in performance regarding support group	0.067 (Mean) 0.065 (Spread)	5	Monthly reports / customer complains	6	180		Better resource management if having a pool of technicians for any type of problem.	6	2	3	36
	X1	Help Desk gathers Customer/Problem Information	Tickets lacking complete customer/problem information	**Elongated Resolution Time for Sev 2 Desktop Problems**	5	Some HD analysts are more experienced than others	There is no difference in resolution time regarding HD analysts experience	0.866 (Mean) 0.841 (Spread)	5	After Ticket is Rejected	7	175		Training to analysts. Update and publish SOP.	5	2	3	30
	X2	Help Desk classify and assign ticket to appropriate 2nd level support group	Not all analysts use same criteria to classify problem records	**Elongated Resolution Time for Sev 2 Desktop Problems**	5	Some HD analysts don´t follow same criteria to classify problems	There is no difference in cycle time in miss-routed tickets	0.900 (Mean) 0.962 (Spread)	5	After Ticket is Rejected	6	150		Develop Scripts to standardize criteria.	5	2	3	30
	X3	Help Desk classify and assign ticket to appropriate 2nd level support group	Tickets Rejected by support groups	**Elongated Resolution Time for Sev 2 Desktop Problems**	5	No further analysis performed before rejecting tickets	There is no difference in cycle time in tickets rejected at least once	0.264 (Mean) 0.295 (Spread)	5	After Ticket is Rejected	6	150		No tickets rejected without a valid documented reason. Specify valid reasons.	5	2	3	30
★	X9	Document and Close Problem Record	Calls Back to Help Desk	**Elongated Resolution Time for Sev 2 Desktop Problems**	5	Root Cause not fixed or times agreed not accomplished	There is no difference in cycle time in tickets that had rework (call backs)	0.000 (Mean) 0.000 (Spread)	4	Problem Tracking system	5	100	24,000	Document Root Cause. Define how should it be documented.Commit to agreed times.	5	2	3	30
	X7	Document and Close Problem Record	Tickets not closed upon completion	**Elongated Resolution Time for Sev 2 Desktop Problems**	1	Technicians provide support to other problems before closing the ones already solved	There is no difference in resolution time related to actual time vs system timestamp	0.880 (Mean) 0.829 (Spread)	9	Work Order vs System Time stamped	9	81		Provisional solution to measure how much this impacts reported time.	1	5	1	5
★	X8	Help Desk classify and assign ticket to appropriate 2nd level support group	Some tickets remain open during weekends, increasing average resolution time	**Elongated Resolution Time for Sev 2 Desktop Problems**	3	Desktop support service level is not the same during weekends	There is no difference in average resolution time in tickets opened on weekends	0.023 (Mean) 0.021 (Spread)	4	Problem Tracking system	6	72	31,000	Develop and communicate SLA´s to customers.	3	5	3	45
	X10	Track and Report Performance	Errors detected in Performance Report	**Elongated Resolution Time for Sev 2 Desktop Problems**	1	Report was obtained from a wrong field	There is no difference in resolution time regarding field used to report time	0.923 (Mean) 0.926 (Spread)	10	Monthly reports	4	40		This error was detected and corrected.	1	1	1	1
													253,000					

List the Solutions in terms of Risk Mitigation Plans

Update Solution Design Matrix

Concept Selection Legend	
1	Better
0	Same
-1	Worse

Solution Design Matrix

Importance Rating	
1	Not Important
5	Very Important

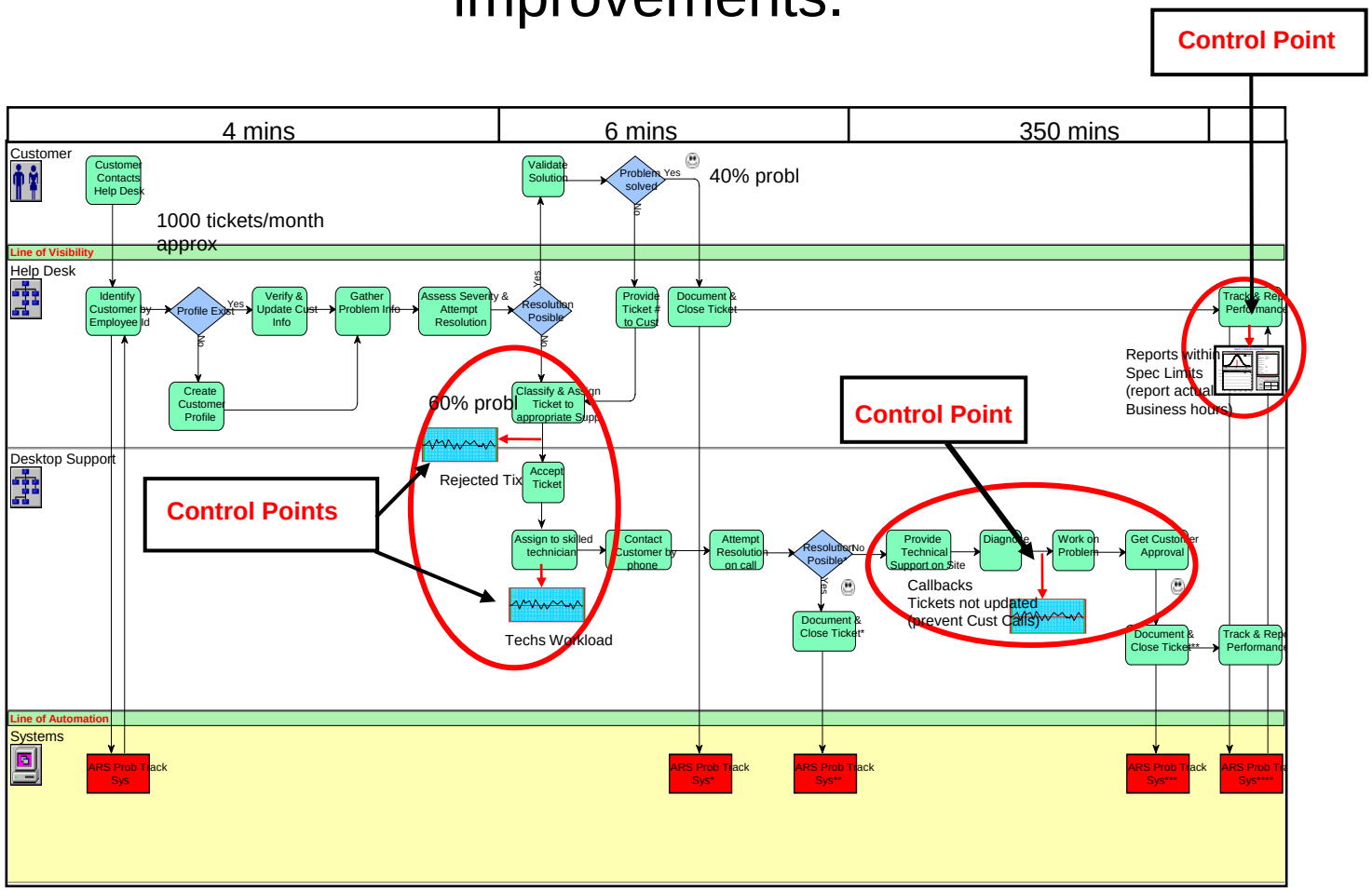
Key Criteria		Concept 1 New Design	Concept 2 Existing Design (Status Quo)	Concept 3 Benchmark: AMEX Sydney Desktop Operations	Concept 4	Concept 5	Concept 6	Concept 7	*Importance rating*
1	Reduce Number of Rejected tickets, due to incomplete information	1	0	-1					**3**
2	Improve support by developing same skills in all technicians	1	0	0					**5**
3	Reduce unproductive time in technicians due to specialization	1	0	0					**5**
4	Consistent service	1	0	0					**5**
5	Improved knowledge of the new problem tracking tool	-1	0	1					**3**
6	Reduce escalated problems for not providing timely support	0	0	0					**5**
7	Reduce callbacks to Help Desk for problems not being solved either timely or correctly	1	0	-1					**5**
8	Improve quality of documentation in problem tracking tool	-1	0	1					**4**
9	Reduce unproductive time in customers, increasing spare equipment	1	0	0					**4**
10	Standardize versions of software installed by having a unique repository to be used by all technicians	1	0	0					**5**
11	Reduce Hardware problems reported by providing preventive maintenance to equipment	1	0	-1					**4**
12	Reduce unproductive time in customers, by improving support process	1	0	0					**5**
13	Improve customer satisfaction	1	0	-1					**5**
Sum Of Positives		10	0	2					
Sum Of Negatives		2	0	4					
Sum Of Sames		1	13	7					
Weighted Sum Of Positives		46	0	7					
Weighted Sum Of Negatives		-7	0	-17					

The New Design is far superior than our status quo.

Has the risk decreased with the new design?

Update Process Map

The Process Map is updated to include all improvements.



The new Process Map eliminates Rework, as Control Points are set to avoid defects.

Verify Solutions

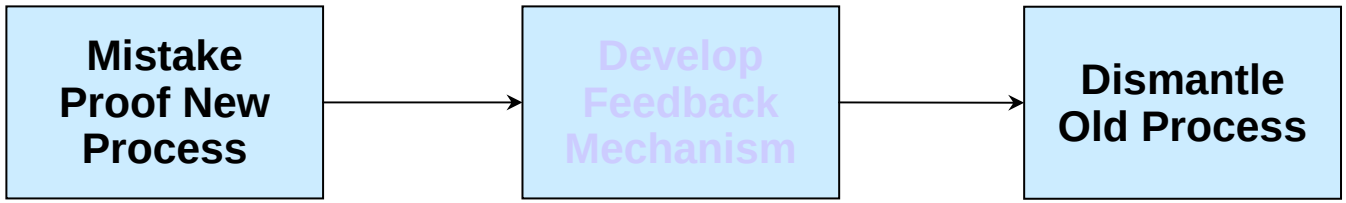
To conduct and verify a pilot, you should take the following steps:

- Develop data collection plan
- Run the Pilot
- Analyze results using Hypothesis Testing
- Implement solutions if the pilot is successful

Control

Control: Process

High Level Process to Complete the Control Phase



- Fishbone
- FMEA
- Mistake Proofing
- SOPs

- Statistics
- Scorecard

The Gold Standards For Improve and Control

IMPROVE

Have I fixed the problem so that it will

NEVER HAPPEN AGAIN?

CONTROL

If a defect were to occur,
have I prevented it from
EVER REACHING THE CUSTOMER?

Which Is Your Project?

My Solution is Sustainable …

Analysis

- "The p-value shows this is the cause."
- "My solution will remove 88.3% of the defects."

Solution Design

- "The new software makes it impossible to do it wrong."
- "I have turned off the old computer system."

Ownership

- "If a defect occurs, managers and employees know how to analyze and correct the problem."
- "The manager's paycheck is tied to this defect."

I'll Revisit This Again …

Analysis

- "The cause of the problem is apparent to me."
- "My solution will remove 50 – 75% of the defects."

Solution Design

- "I'm training the people to do it right."
- "Most people will do it the new way."

Ownership

- "If a defect occurs, people will call me."
- "The manager has supported projects like this in the past.'

On which side of the line is your project?

Sustaining Process Improvements

Key elements to consider in sustaining a desired state:

- Make the **PROCESS** independent of the **PEOPLE**
- Make the **OUTCOME** robust to variation from the **INPUTS**
- **DESIGN OUT** other potential sources of variation

HOW can you ensure your process has attained the "SYSTEM KNOWLEDGE" state?

Updating Process Maps

The starting point for your SOPs is your updated Process Map.

Update flow charts to include:

- ✓ Different levels (I.e., sub-processes)
- ✓ Volumes and rates of transactions
- ✓ New cycle times for critical steps
- ✓ Critical Control Points… who's responsible
- ✓ Hand-offs: which steps are still prone to defects
- ✓ Steps that require manual intervention… triggers
- ✓ Constraints and critical paths… throughput
- ✓ Data sources… input/output
- ✓ Reporting output and decision points

Automating Control Mechanisms

Six Sigma's Control phase uses control mechanisms to alert responsible parties in the process to identify when action needs to be taken to resolve issues.

Scorecards

- Daily, weekly, monthly, quarterly reports that monitor process capability, stability, and control.
- Include financial data in terms of account balances, costs, benefits to date, variances.
- Linking of financial metrics to process metrics is very effective.
- Alerts used to notify responsible individual that process is out of control and requires corrective action. Type of corrective action should be documented.

Process Flows

- Use of alerts to notify responsible individual that process is out of control and requires corrective action.
- Spell out the type of corrective action required.

Workflow

- Use workflow programs to escalate issues to ensure out of control points are resolved.
- Workflow distributes documents electronically through various mechanisms (e-mail, document management system, etc) to gain sign-off.
- These mechanisms can be leveraged to effectively communicate process breakdowns and produce c corrective action.

Control Charts

- Produce a mechanized feed into an SPC software package that will publish control chart output visible to the right process owners.
- There are many packages on the market that do this effectively. For example, at American Express – CCM: Centralized Call Management" is used .

Responsibility for Control

Evaluate your project and address the following:

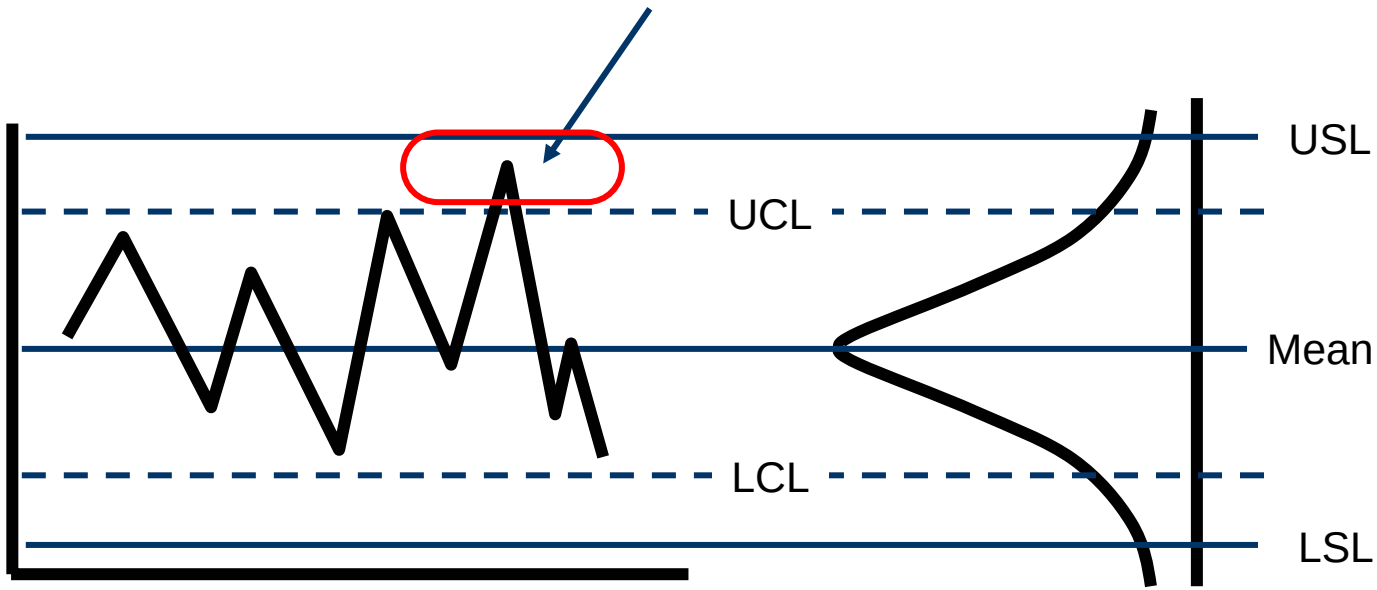
Stability: (Run Chart)	***Does Special Cause variation exist? If so, who owns it and what should they do?***
Capability: (Process & Product Charts)	***Is the process capable of meeting Customer needs?*** ***All the time? If not, who owns it and what should they do?***
Control:	***Is the process in control? All the time? If not, who owns it and what should they do?***
Leverage: (CT Tree)	***Is there an opportunity within AMEX to use this process knowledge? If so, who will document all areas?*** ***Who will drive this across the organization to ensure maximum benefit is realized?***

Control Limits vs. Spec Limits

Control Limits are not the same as Specification Limits.

Just because the process may drift out of control, it doesn't mean the process is no longer capable of meeting Customer expectations.

An out of control Point indicates a change has occurred in the process. We need to investigate the event before it impacts the Customer.



Taking Corrective Actions

Triggers are used in control to alert operators and management of a potential problem. When a trigger occurs, an operator either resolves the issue or escalates to management for resolution.

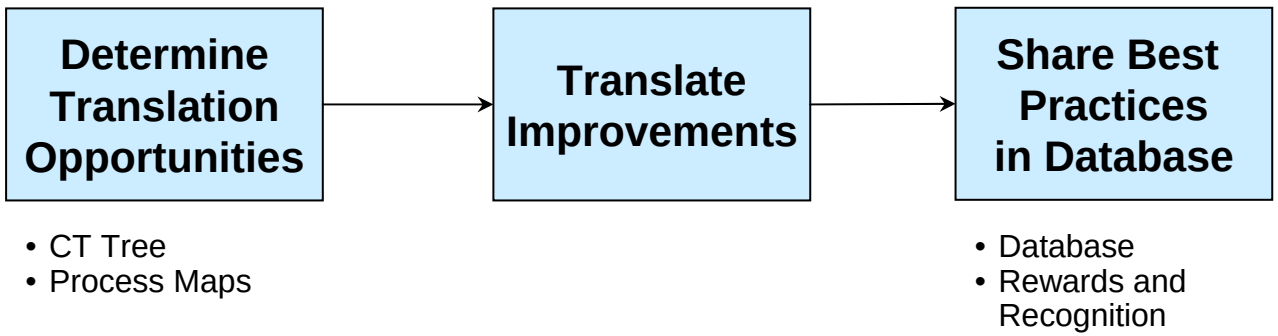
How do you know when the issue has been resolved?

- ***Process Scorecards***
- ***Control Charts***

Leverage

Leverage: Process

High level process to complete the Leverage Phase

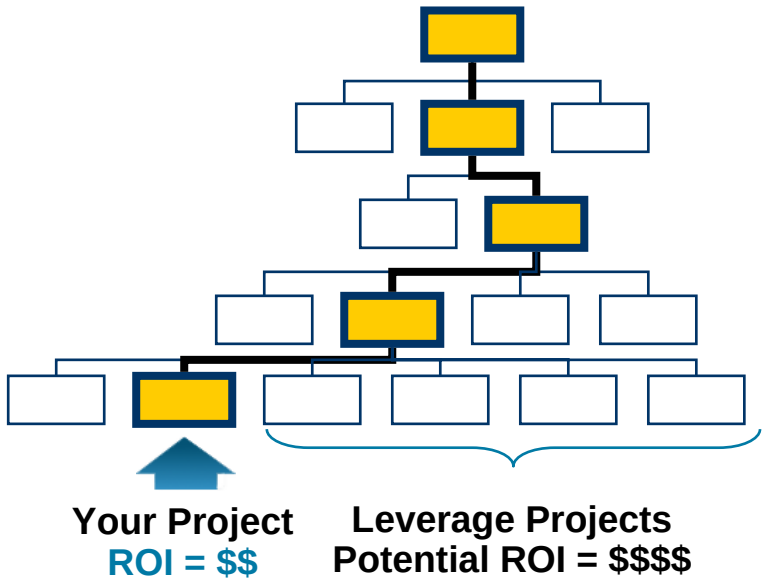


Use ***Six Sigma Databases*** to find pertinent research that can be leveraged for your own project.

CT Tree: A Source of Leverage

There are two types of Leverage projects:

- Same business problem; different business segment
- Same business and major process; different sub-process



Translating Improvements

Discuss with your Finance representative what the full potential benefits are based on what is both within and out of scope for your project. The improvements you make in your project have a high probability of supporting other Leverage projects across the organization.

Project Closure

Removing Old Forms

The Six Sigma Project Team must ensure that all old forms are removed. The updated Process Maps and SOPs should only reference the new forms used in the new process. Part of the control plan will be turning off the use of all sub-system routines that require manual intervention.

- Excel Spreadsheets
- Access Databases
- Word Documents

Update Project ROI

Based on the project cost (i.e., investment in equipment, software, etc. = Assets), what benefits have been derived and will be realized in the future (i.e., what's your return)?

Project Cost

Labor: Resources applied to project

Technology: software/hardware expenditures

Supplies: Vendor Costs

Facilities: Plant & Equipment

How will you record them in your project?

Will Finance approve?

Cost Savings

Cost Reduction: Variable or Base cost

Incremental Revenue: Increased Sales and CM

Cost Avoidance: Cost Prevention

Labor Productivity: Time savings

Cash Flow

Sources: Collections and Payables

Uses: Receivables and Inventory

Document Control

The six Sigma Project Team must prove to Finance that the new process is sustainable. Showing that the process is in control will help the Team prove financial savings are real. How long do you have to sample to show improvement & stay in control?

If the process occurs…	**Monitor Control for**
…hourly	1-2 weeks
…daily	2-3 weeks
…weekly	3-4 weeks
…monthly	see Project Strategist
…annually	see Project Strategist

Project Closure Documentation

Before a project is closed, an update must be made to project documentation including:

- ✓ **Project Charter**
- ✓ **Process Maps**
- ✓ **Fishbone**
- ✓ **FMEA**
- ✓ **Solution Design Matrix**
- ✓ **Control Charts**
- ✓ **Financial Saves**

Updating the project documentation helps support the Leverage strategy.

Final Q&A