

 Please turn your cameras on

APEX Continuous Improvement

Accelerating Performance Excellence

APEX Problem Solver (A3) Training



Introductions



Charging Guidance & Course Credit



Charging: Not provided by instructor for this course. Seek direction from your leadership regarding timekeeping.

Credit: Given by instructor after full attendance and participation today!



APEX Problem Solver Training Objective

Provide an Opportunity for...

- Hourly and Salary to learn the same Problem Solving Process
- An elevated team structure across the Enterprise
- Engagement across all employee levels
- Everyone to get involved and learn new skills

Why the program needs this...

- The industry challenges we face today
- How we will win and succeed for tomorrow
- Drive value across the business

"This effort is a cultural imperative. Continuous improvement should be a part of everything we do."

Mark Stewart, Senior VP Operations

Agenda



- **Accelerating Performance Excellence Introduction**
 - Overview of APEX
 - Overview of PMT
 - R&R
- **Problem Solver A3 Overview**
 - Define the Problem
 - Breakdown the Problem
 - Target Setting
 - Causal Analysis
 - Develop Countermeasures & Trystorm
 - Action Plan
 - Impact on Gap, Standardize, Share
- **Call to Action**
 - Review A3 Examples
 - Take A3 Self Assessment through LMU – earn your badge!
 - Drive Continuous Improvement – complete an A3 and take credit!



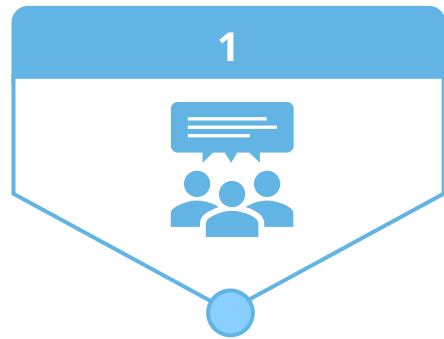
Accelerating Performance Excellence (APEX) Intro



Current Landscape and Why OneLM APEX?

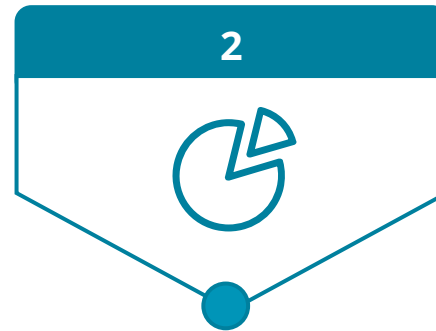
The recent shift from the DoD towards fixed price programs offers LM an opportunity to grow market share via greater agility. Achieving this requires a change in how value is driven across the enterprise.

EVOLVING LANDSCAPE



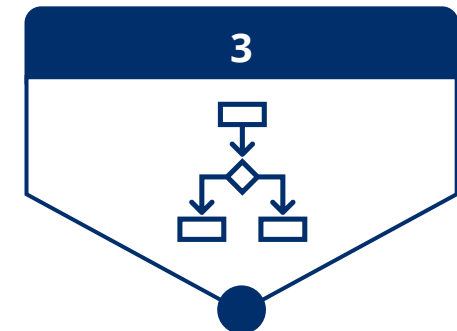
Customer

Margin pressure is mounting as customers demand shorter lead times and lower prices



Competitors

Reduced barriers to entry have led to a surge of new competitors in a historically concentrated industry



Operating Model

1LMX requirements for interoperability and commonality will demand a shift in current leadership mindsets

The dynamic landscape necessitates that LM continuously evolves through APEX to remain competitive in the marketplace and enhance LM's performance



OneLM APEX Overview

OneLM APEX (*Accelerating Performance Excellence*) is a comprehensive approach to **increasing value to Lockheed Martin’s customers, employees, and shareholders through continuous improvement (CI)**

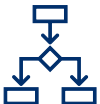
Current Challenges



Changing competitive landscapes are requiring LM to reinvigorate a CI culture



Customers are demanding more visibility (hard savings, cycle time reductions)



CI efforts are currently fractured and underperforming across the org

APEX Mission & Pillars

Establish OneLM APEX collaborative framework, utilizing digital applications to drive growth, increase speed and efficiency, and create value for customers, employees, and shareholders



Leadership Support & Commitment



OneLM Core Behavior & Values



Collaborate to win with an integrated CI Model



Accelerate change via common Tools, Processes, & Constructs

APEX is a wholistic, long-term effort to develop comprehensive continuous improvement ***capabilities, capacity, and culture*** across the enterprise



APEX is aligned to our OneLM culture, embedding fact-based problem solving into our ways of working to ***drive innovation and accelerate change***

APEX provides ***tools and resources for everyone,*** not just Lean/Six Sigma belts

APEX will produce results that improve the ***everyday experience*** across ***all aspects of our business***

APEX

is for everyone

Continuous Improvement is in Lockheed Martin's DNA:



When everyone plays a role in APEX, we increase our ability to:

➤ ***Perform*** on time and on budget

➤ ***Transform*** how we work

➤ ***Grow*** our Continuous Improvement culture in an evolving landscape



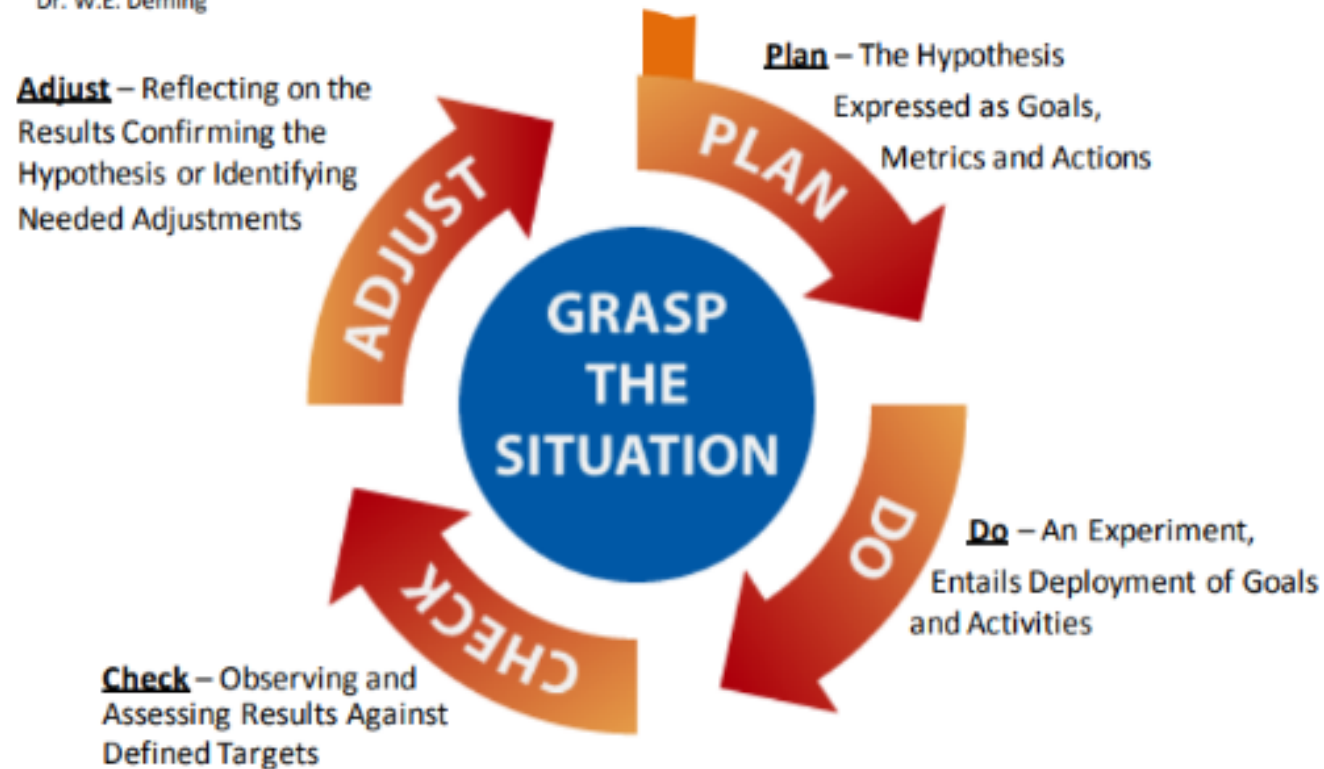
Intro to Problem Solving

Where to start



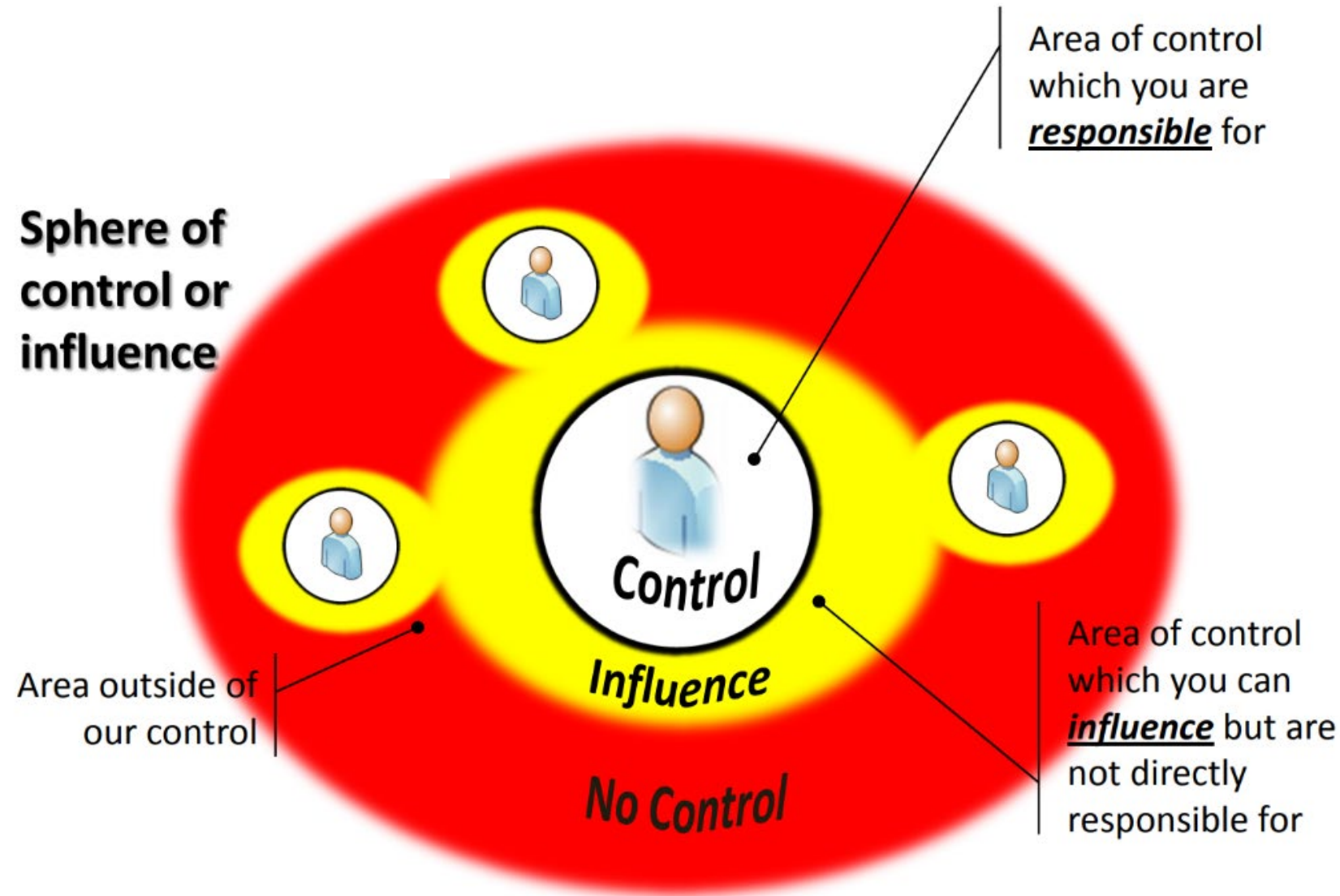
Dr. W.E. Deming

PDCA - The Scientific Method



- Begin with self-discovery
- Learn how to recognize potential opportunities
- Pay attention to potential barriers, unsafe conditions, as you work processes within your sphere of control
- Keep asking yourself...
 - Why am I doing it this way?
 - Is there an easier or safer way to do this activity?
 - Is this activity within my sphere of control to change?

Where do we find improvement opportunities?



Recognizing Opportunities

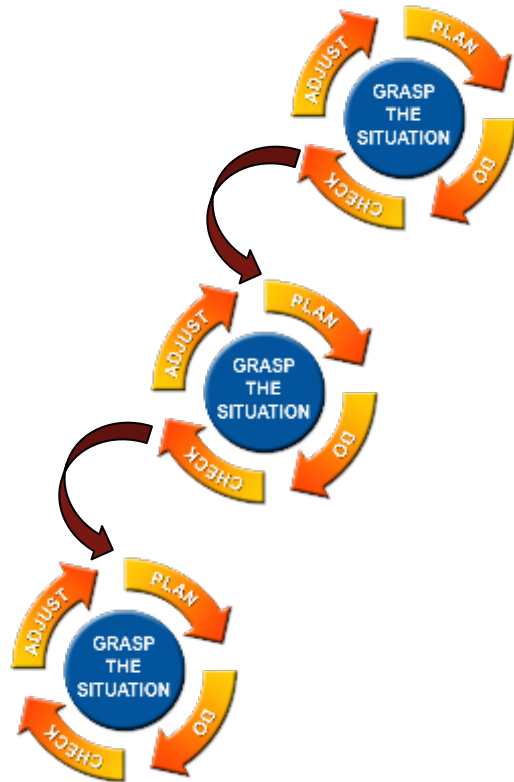


- ✓ Lost time and energy travelling to use or trying to find supplies, tools, equipment, materials, parts, forms, websites, files, documents, etc. to complete standard work
- ✓ Re-working the same issue multiple times
- ✓ Inputting the same data into multiple applications or paperwork
- ✓ Too many steps in the process or overcomplicated processes
- ✓ Repeated customer complaints or limited value to customer
- ✓ Potential personnel or product safety, ergonomic or risk issues
- ✓ Throwing away or scrapping work
- ✓ Too many variations in the process; A non-standard process
- ✓ Bottlenecks throwing me off schedule or holding up other operations
- ✓ Work or inventory piling up before I can get to it
- ✓ Lots of recordkeeping and reporting
- ✓ Excessive reviews, inspections, and approvals

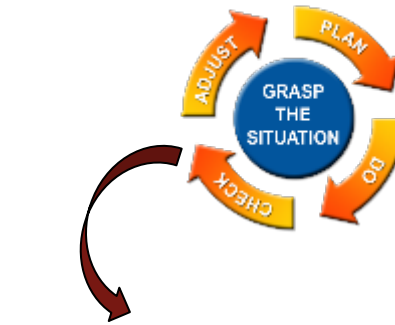


PDCA Cycle

Iterative PDCA Process



Focus of Today's Training

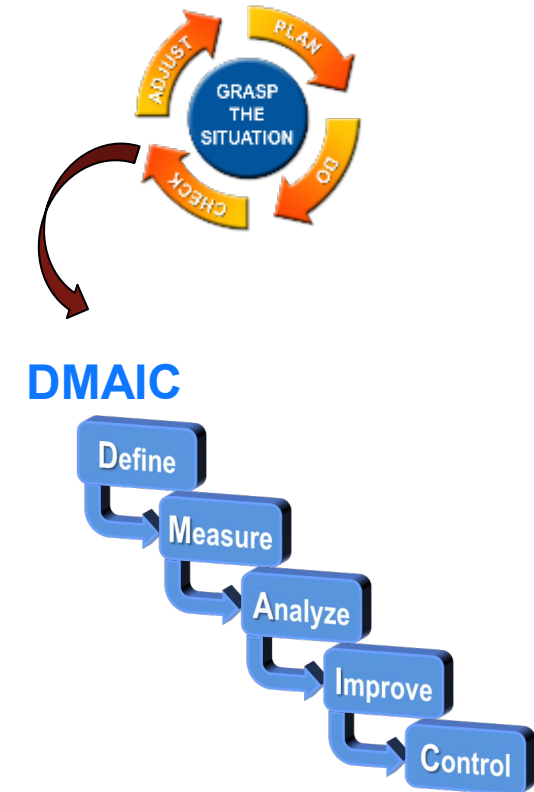


A3 Problem Solving

Title: _____

1. Define the Problem:	
Objective Goal:	Goal:
Current State:	Target State:
Problem Statement:	
2. Break down the Problem:	
3. Target Setting:	
By: _____	When: _____
Where: _____	How: _____
4. Current Analysis:	
5. Countermeasures (5Ys, 8D, etc.):	
6. Action Plan (Who, What, When):	
7. Impact on Gap, Standardize, Share:	

CI Led by LSS Practitioners



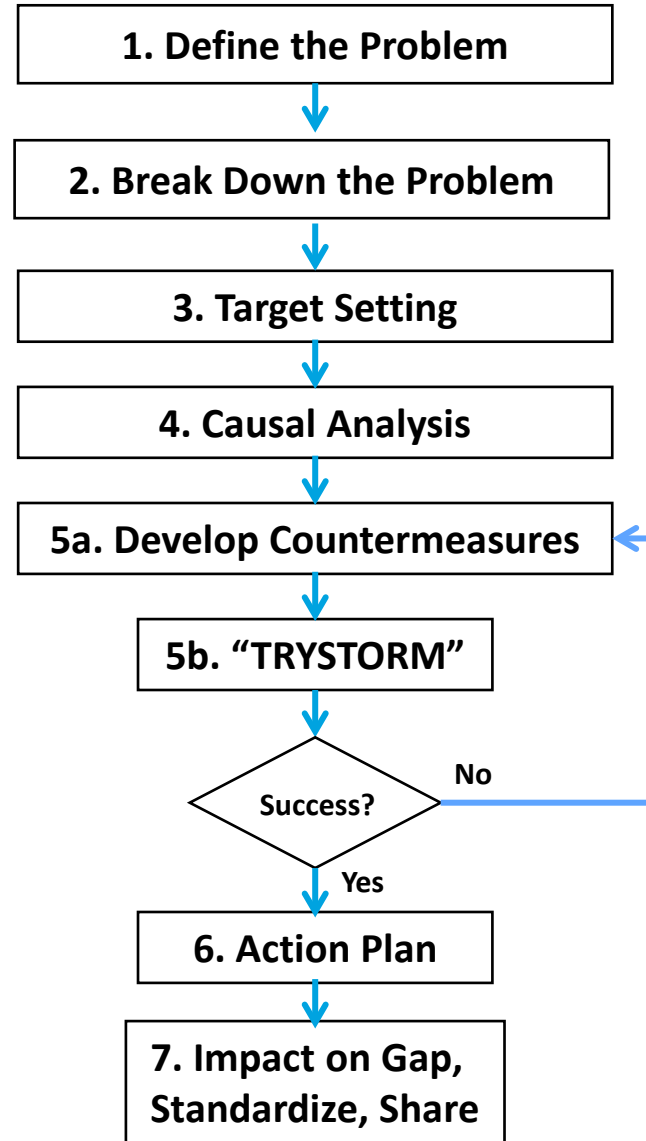
*When you “check”—if you did not get what you expected (planned) -- What’s next?
You can do a new PDCA cycle, or an A3, or a large, DMAIC project*



Intro to A3 Thinking



A3 Problem Solving Thinking



A3 Fast Facts

- Created by Toyota
- Follows the PDCA Cycle!
- Named after the largest European paper size that could be faxed – Toyota faxed their A3s to other plants to share knowledge (A3 = 11x17)
- Tells the “story” of how a problem was solved
- 7 “boxes” that guide the problem solver to solve their problem
- Serves as a mechanism for managers to teach others in scientific thinking



Title: _____

1. Define the Problem:

Ultimate Goal:

Target State:

Current State:

Gap:

Problem Statement:

2. Break down the problem

3. Target Setting

Do What		To What	
How Much		By When	
Impact on Main Gap			

4. Causal Analysis:

5a. Countermeasures / 5b. Trystorm:

6. Action Plan: (Who, What, When)

7. Impact on the Gap, Standardize, Share:

A3 Checklist



1. Define the Problem:	
Ultimate Goal: ☐ States the high level metric or goal this A3 supports and conveys why this problem is important to solve	
Target State: ☐ Describes the ideal/desired outcome in metrics. (How the process "Should Be")	Gap: ☐ Reflects the difference between the Target and Current States as a number or value
Current State: ☐ Describes the current ("As Is") process using the same unit of measure as the Target State	
Problem Statement: ☐ Restates the Gap in words	
2. Breakdown the Problem: ☐ Used one or more of the following tools if needed • Observer Check Sheet • Process Observation Form • Process Mapping • Pareto • Contributing Factor Tree	
3. Target Setting: ☐ States " Do What, To What, How Much, and By When " ☐ Describes the projected impact on the Gap in Step 1 above	
4. Causal Analysis: ☐ Included appropriate Stakeholders in root cause analysis ☐ Identified multiple potential root causes ☐ Used one or more of the root cause analysis tools such as: • Fishbone – Brainstorm potential causes and identify as Controllable/Noise • 5 Whys – Drill down for root causes • Pareto Chart – Separate out the "vital few from the trivial many" ☐ Validated potential causes by observing the work ("Go & See")	
5a. Develop Countermeasures: ☐ Multiple Ideas – Considered a wide variety of potential countermeasures ☐ Breakthrough Thinking – Considered bold, creative, out of the box countermeasures ☐ Lean Thinking – Incorporated basic lean principles (6S, Visual, Simple, etc.) into the countermeasures ☐ Prioritization – Prioritized potential countermeasures (PICK Chart)	
5b. Trystorm: ☐ Try it NOW – Tested idea(s) NOW, not in days or weeks ☐ Experiments – Validated countermeasures using rapid experiments prior to making large investments ☐ Risk – Considered potential negative consequences of the countermeasures	
6. Action Plan: ☐ Plan – Identified Who, What, When & Status for all key actions	
7. Impact on the Gap, Standardize, Share: ☐ Learn from Failure – If target was not met, used P-D-C-A to redo Steps 2-4 ☐ Impact on Gap – Described how the achieved results impacted the Gap ☐ Sustainment – Verified the results can be sustained over time ☐ Standardization – Established the new process as the new way of doing business ☐ Training – Updated Standard Operating Procedures and training ☐ Reflection – Documented lessons learned throughout the process ☐ Share – Communicated improvements and lessons learned with owners of other similar processes	

PDCA & A3 Summary



Key Points

- PDCA is a scientific method that is an iterative process to solve problems
- A3 is a paper size – and a tool for story telling to also solve problems
- A3 works in transactional and manufacturing processes
- The Problem Solving A3 allows us to think through a problem, track countermeasures, and tell the story
- Both PDCA and A3 are processes that can be used by EVERYONE

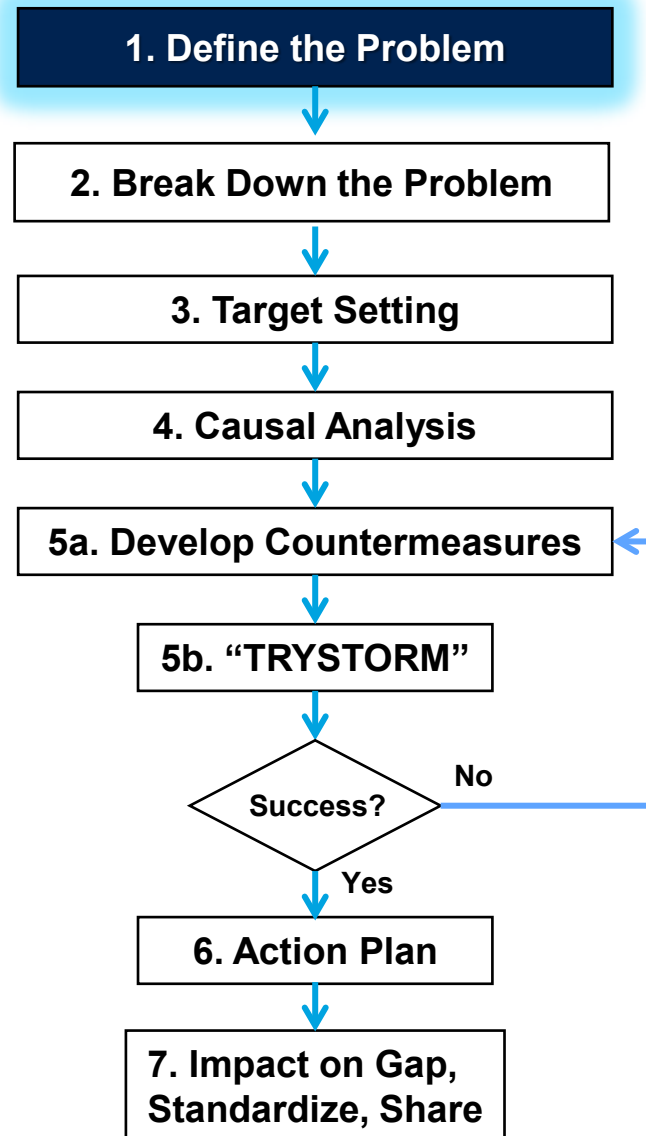
Everyone Can Improve Processes



A3 – Define the Problem



A3 Problem Solving Thinking





Objectives

- **What:** After this module, you should be able to:
 1. Identify the importance of *Grasping the Situation*
 2. Clearly and concisely articulate the problem
- **Why:** A problem understood and defined well in a numerical sense is half the battle. Well understood problems produce superior solutions.
- **“A Problem Well Stated is Half Solved”**

Charles Kettering, Head of research at General Motors from 1920 to 1947.





Problem Solving A3

Title: _____

1. Define the Problem

Ultimate Goal:

Target State:

Current State:

Problem Statement:

Gap:

2. Break down the Problem:

3. Target Setting:

Do What	x	To What	xx
How Much	By x	By When	x/x/xx
Impact on Main Gap	x		

4. Causal Analysis:

5a. Countermeasures / 5b. Trystorm:

6. Action Plan (Who, What, When):

7. Impact on Gap, Standardize, Share:

Author:

Version & Date:



Effective Questioning – A3 Checklist

A3 Checklist

1. Define the Problem:	
Ultimate Goal: ☐ States the high level metric or goal this A3 supports and conveys why this problem is important to solve	
Target State: ☐ Describes the ideal/desired outcome in metrics. (How the process "Should Be")	Gap: ☐ Reflects the difference between the Target and Current States as a number or value
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1. Define the Problem:

Ultimate Goal:

- *Is your ultimate goal addressing a business need?*
- *Can you link your ultimate goal to a customer requirement?*
- *Can you link it to an AIP/BTO?*

Target State:

- *What should be happening in this situation?*
- *Is there a current standard? How long has it been in place? Is it still valid?*
- *Can you create it if it doesn't exist?*

Current State:

- *How did you identify the problem?** - *How do you know? What told you there was an abnormality?*
- *Are you able to quantify this problem?*
- *What is currently happening? Where is it happening?*

Problem Statement:

- *What is the difference between the current (as is) state from the target (should be) state expressed in words and numbers?*

Gap:

*What is the **QUANTIFIABLE** gap between what is currently happening and what should be happening?*



Define the Problem

1. State Your Ultimate Goal

- **State Ultimate Goal of your work as it relates to:**
 - The Customer Delight customers by....
 - The Business Achieve an enterprise operating margin of.....
 - The Employee Improve Employee Engagement by....
- **Can you state your Ultimate Goal and align it to your organization's metric performance, strategic initiatives, etc.**
- **An example may be:**
 - Achieve Break Through Objective - Reduce SRR/COPQ to 6% by End of 20xx

Alignment – It should be easy for readers to see links between this problem and overall business objectives



Establish the Target & Current State

2. Establish Target State

- **Establish the Target State for your Problem by considering it in concrete terms such as:**
 - What should be happening?
 - What is the standard?
 - Will reaching the Target State contribute to the Ultimate Goal?
- **Example:**
 - OpCard# SRR hrs less than 2 hours

3. Document Current State

- **Document the Current State, based on fact:**
 - Match the current state metrics to the target state metrics.
 - If we don't have metrics on the current state, collect data to establish the baseline
 - Go to the Gemba to see for yourself. Do not rely on assumptions
- **Example**
 - OpCard# SRR for last 20 runs is an average of 10 hours.

Target State vs. Current State – This is the metric we are working to improve



Document the Gap & Restate

4. Define Gap

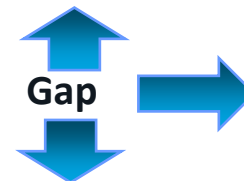
- **Gap**
 - Difference Between Target & Current

5. Restate the Problem

- **Problem Statement**
 - Summarize the Gap in words

Ultimate Goal
Improve OTD by 10%

Target State
18 of 20 monthly deliverables



Gap
2 deliverables

Current State
16 of 20 monthly deliverables

Problem Statement
*Delivery is running 10% less than desired,
resulting in missed milestones*

The problem should be evident to the reader after they review Step 1



Block #1 Example

1. Define the Problem:

Ultimate Goal: Reduce Production SRR to 6% by the end of 2025.

Target State:
SRR should be less than 2 hrs on this OpCard

Gap:
8 hrs. of SRR

Current State:
SRR is averaging 10 hrs. over the last 20 deliverables



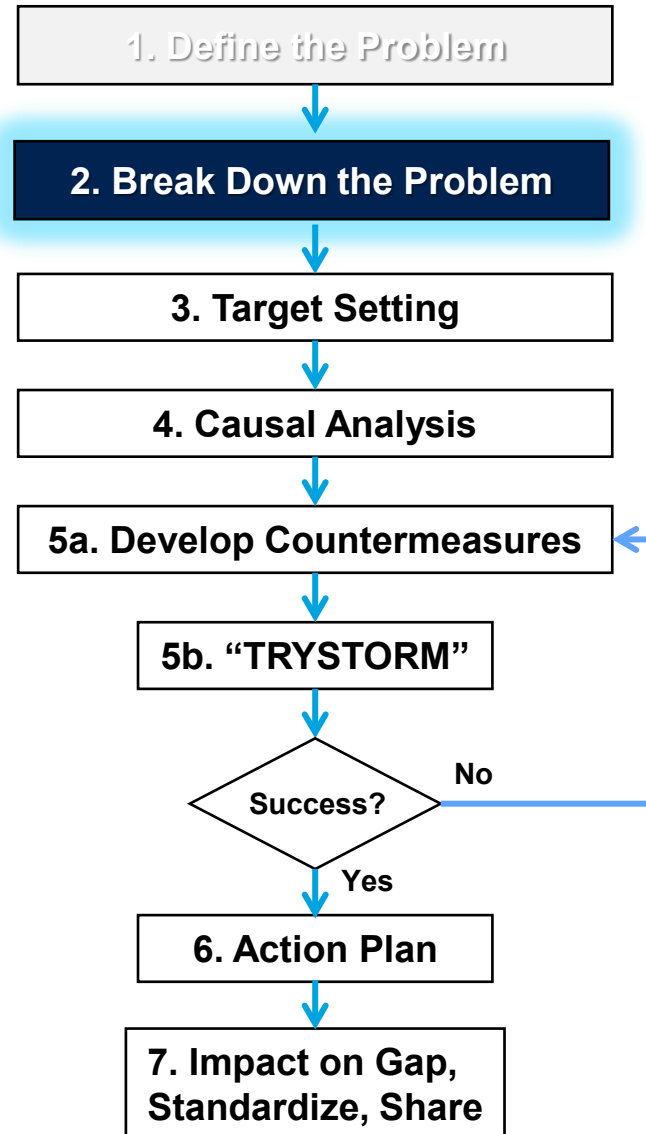
Problem Statement: For the last 20 deliverables, OpCard # is running 8hrs of SRR over target.



Break Down the Problem



A3 Problem Solving Thinking





Objectives

- **What: After this module, you should be able to:**
 1. Know how you can ***Break Down the Problem***
 2. Gather, document, and analyze process data to understand the process and identify improvement opportunities
 3. Create a visual illustration of steps in the process and how they are connected
- **Why: Process observation allows us to ‘see’ how the actual process is performed by the people doing the work**



Step 2: Breaking down the Problem

Title: _____

1. Define the Problem

Ultimate Goal:	
Target State:	Gap:
Current State:	
Problem Statement:	

2. Break down the Problem:

3. Target Setting:

Do What	x	To What	xx
How Much	By x	By When	x/x/xx
Impact on Main Gap	x		

4. Causal Analysis:

5a. Countermeasures/ 5b. Trystorm:

6. Action Plan (Who, What, When):

7. Standardize & Leverage:

Author:

Version & Date:



A3 Checklist

2. Break down the Problem:

- Use one or more of the following tools if needed
 - Pareto
 - Process Observation Form
 - Process Mapping

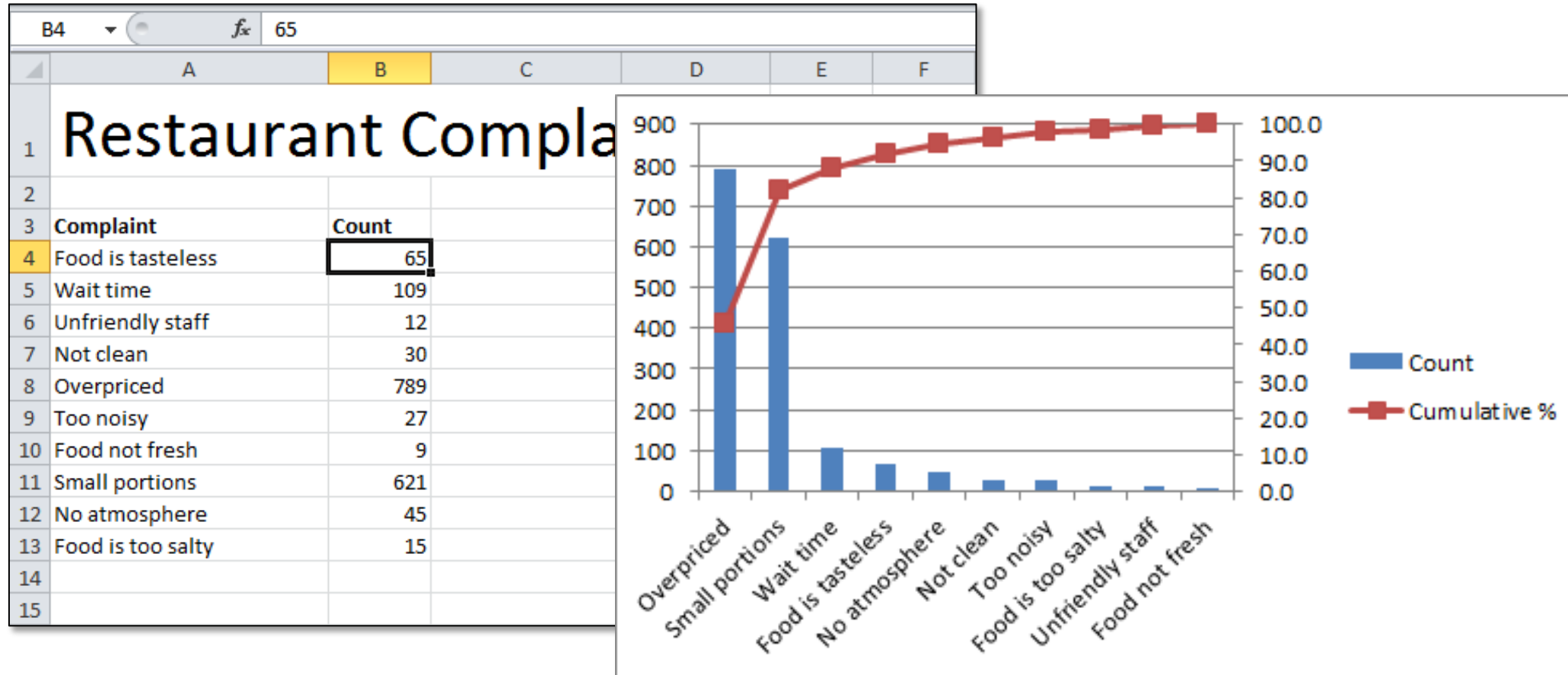
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You must break down the problem into small solvable chunks



Pareto Chart Example

A **Pareto chart** combines a column chart and a line graph. The Pareto principle states that, for many events, roughly 80% of the effects come from 20% of the causes. In this example, we will see that 80% of the complaints come from 2 out of 10 (20%) complaint types.



Conclusion: the Pareto chart shows that 80% of the complaints come from 20% of the complaint types (*Overpriced and Small portions*).



Process Observation Form

- **Purpose**

- A tool designed to collect information about the process flow of product by recording specific steps and associated data while carefully watching the process

- **How to use this tool**

- Decide where the beginning and ending steps are for the process to be observed
- Description = Use everyday terminology briefly describing each task the process worker(s) perform.
- Operator = Who is performing the task; you can note the building and room number in which tasks occur
- Distance = Use a tape measure to determine the distance, (i.e.: 11')
- Issues/Comments = Annotate any problems (e.g.: abnormal working conditions, poor layout/equip placement, defects/mistakes made, reasons for idle time, areas requiring further investigation, etc.)

This tool may be modified to accommodate data collection for various types of processes



Observer(s):

PIRA AER201905037

Toe Panels

Observed Conditions



Process Observation Form

Process Observed: Safety Toe Board Removal/Installation

Observer(s): Bill/Bob

Step No.	Description	Operator	Distance from Last Step OR Time	Observations/Comments
	Mechanic removing Toe board	A	4 sec	
	Mechanic installing Toe board	A	6 sec	
	Mechanic removing Toe board	B	14 sec	
	Mechanic removing Toe board	C	9 sec	
	Mechanic removing Toe board	B	5 sec	
	Mechanic removing Toe board	D	1 min	panel stuck on one side
	Mechanic trips on uninstalled Toe board	E	0 sec	board laying on platform
	Mechanic removing Toe board	F	30 sec	panel stuck
	Mechanic removing Toe board	G	12 sec	
	Mechanics installing 4 Toe Boards	H, I	9 min	end of shift, boards in pile
	Mechanic attempting to remove Toe board	J	2 min	panel stuck, not removed
	Mechanic removes Toe board-breaks box	J	1 min	Breaks electrical outlet
Totals				



Introduction to Process Mapping

- **A process map is a graphical representation of the actual flow or sequence of events in a process**
- **Purpose of process mapping:**
 - A visual tool to “see” how a process functions
 - Allows a team to come to agreement on the steps of the process
 - Used to examine which activities may impact the process performance
 - Shows unexpected complexity, problem areas, redundancy, unnecessary loops, and where simplification and standardization may be possible
 - Identifies areas where additional data can be collected and investigated to uncover problems
 - Serves as a training aid to understand the complete process

How would a process map help you in your daily work?



Process Mapping Steps

1. Establish boundaries and level of detail

- What starts the process and what deliverable ends the process?
- What level of detail is needed to clearly understand the process and identify problem areas?

2. Determine the steps in the process

- Use the process observation form or time observation form

3. Sequence the steps

- Don't try to solve the problems before completing the map

4. Verify map for completeness

- Steps clearly identified?
- Every path flows ahead to or back to another step
- Validated by people who carry out the process actions

Remember: Document the Actual Process!



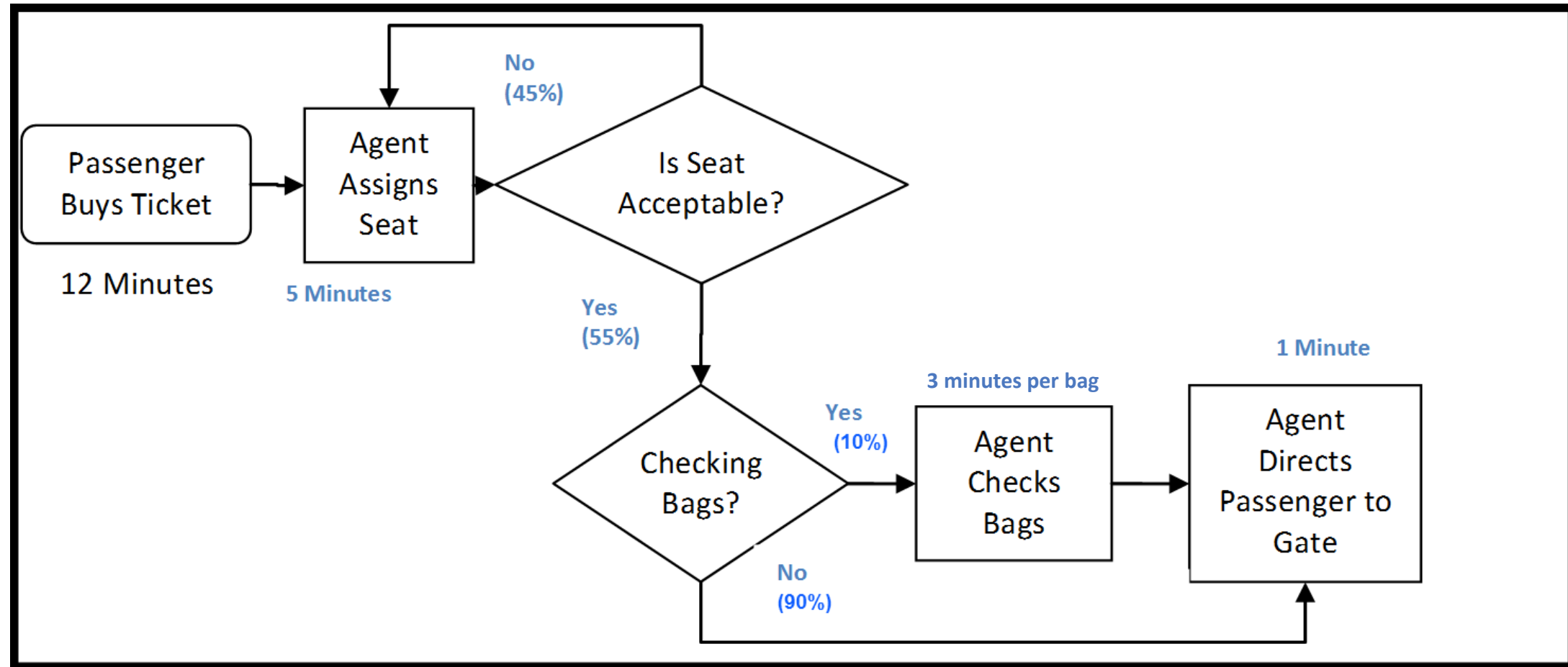
Common Flow Chart Symbols

Symbol	Description
	Identifies the beginning or end of a process
	Indicates the sequence and direction of flow within the process
	Identifies a step in the process
	Identifies a decision point in the process; each path emerging from the decision block is labeled with one of the possible answers



Example: Linear Process Flow

Linear chain of inputs, activities, decisions and outputs

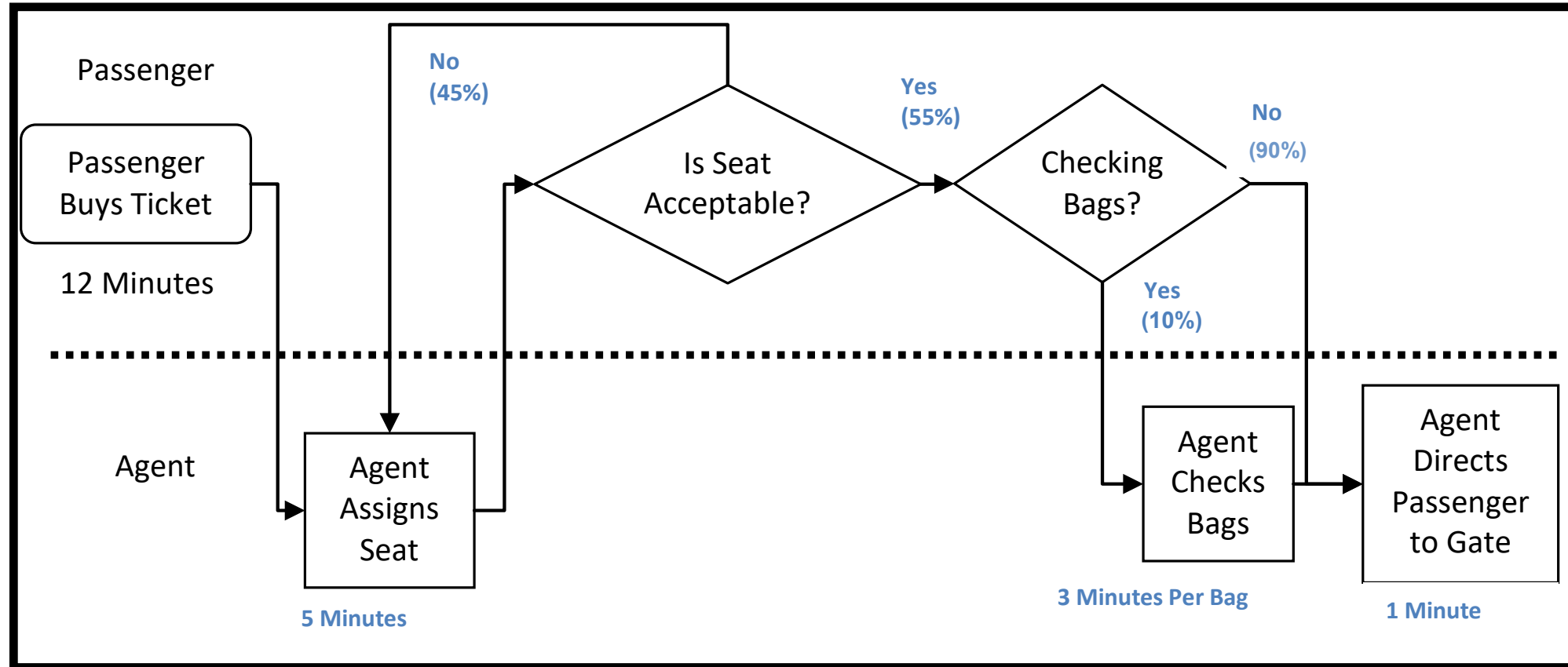


Best Case: 18 minutes

Worst Case: 32 minutes (with 3 bags)



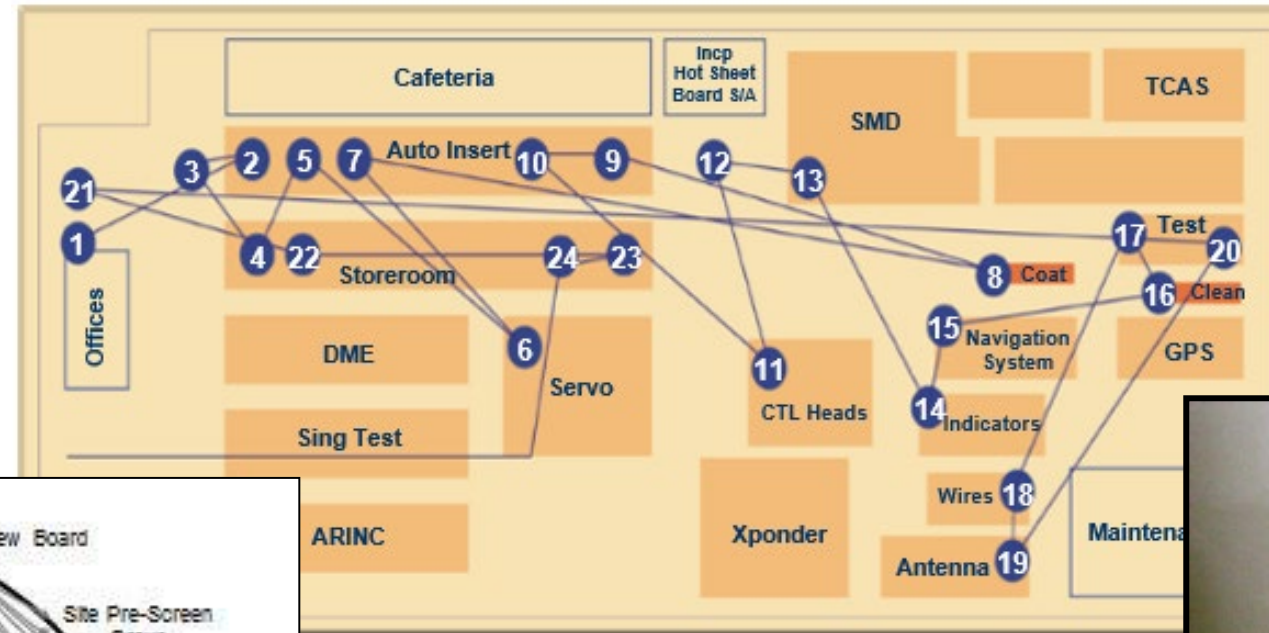
Swim Lane Process Map



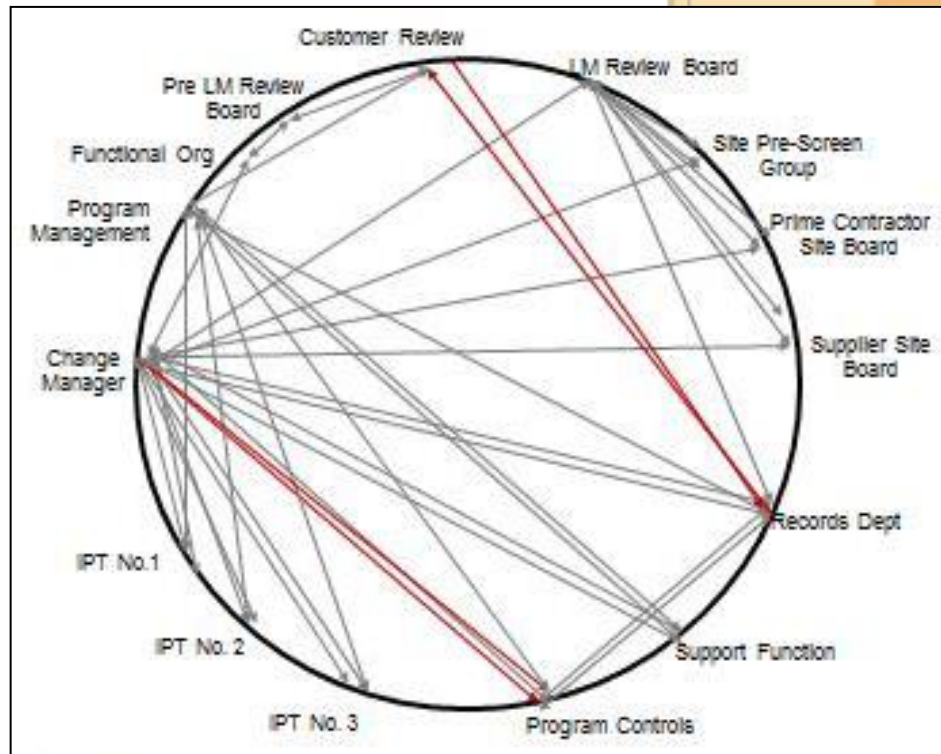
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Worst Case: 32 minutes (with 3 bags)

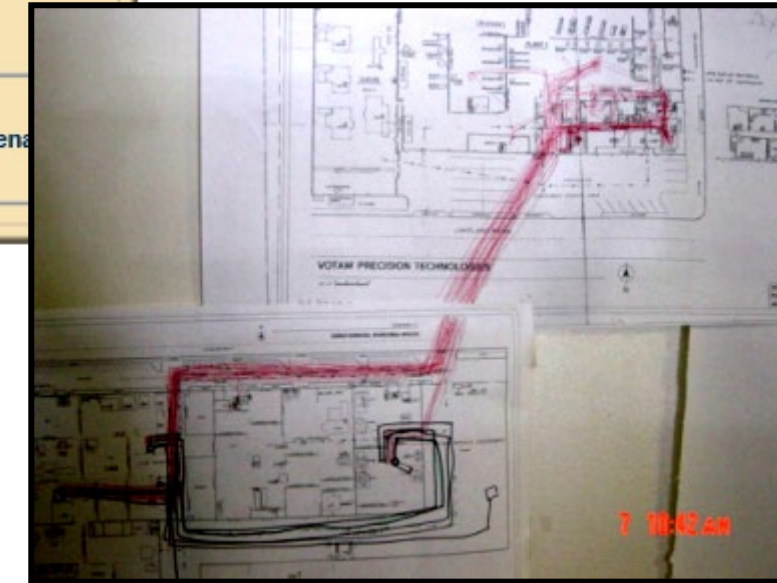
Example: Spaghetti Diagrams



Physical Process Flow

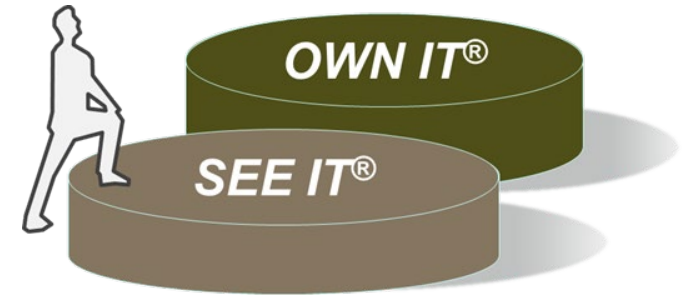


Transactional Process





Summary



- **Key points**

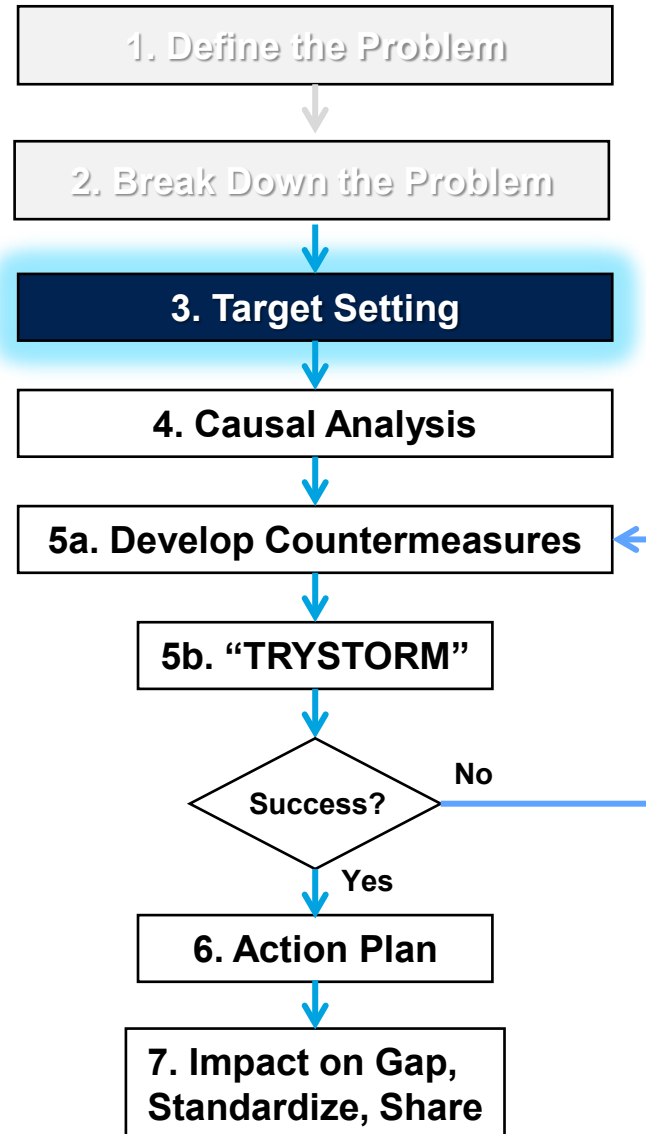
- Break Down the Problem to small solvable chunks
- Pareto Chart allows you to focus on the “biggest” factors
- Process Observation is a key step in identifying and understanding our process problems
- Process documentation helps us see important steps & handoffs
- Linear and Physical Process Maps are excellent tools
- All Problems big and small need to be broken down



Target Setting



A3 Problem Solving Thinking





Pop Quiz!

What are the 5 steps in Defining your Problem (Block #1)?

- 1. State Your Ultimate Goal**
- 2. Establish Target State**
- 3. Document Current State**
- 4. Define Gap**
- 5. Restate the Problem**

Name 3 or 4 of the optional Tools to break down your problem

Pareto Chart

Linear Process Flow

Physical Process Flow (Spaghetti Diagram)

Process Observation Form



Step 3: Target Setting

Title: _____

1. Define the Problem

Ultimate Goal:	
Target State:	Gap:
Current State:	



Problem Statement:

2. Break down the Problem:

3. Target Setting:			
Do What	x	To What	xx
How Much	By x	By When	x/x/xx
Impact on Main Gap	x		

4. Causal Analysis:

5a. Countermeasures / 5b. Trystorm:

6. Action Plan (Who, What, When):

7. Standardize & Leverage:

Author:	Version & Date:
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Step 3 – Target Setting

3. Target Setting:

- ☐ States “Do What, To What, How Much, and By When”
- ☐ Describes the projected impact on the Gap in Step 1 above

SMART Goals
Set challenging, specific, measureable, attainable, realistic,
timebound measurement guidelines



1. Define the Problem: Ultimate Goal: ☐ States the high-level metric or goal this AD supports and conveys why this problem is important to solve. Target State: ☐ Describes the idealized outcome in metrics (what the process "should" be). Current State: ☐ Describes the current state of the process using the same unit of measure as the Target State. Process Statement: ☐ Describes the Gap in words. 2. Breakdown the Problem: ☐ Used one or more of the following tools if needed: - Cause-and-Effect Diagram - Process Description Form - Process Mapping - Pareto - Scatterplot - Action Plan 3. Target Setting: ☐ States "Do What, To What, How Much, and By When" ☐ Describes the projected impact on the Gap in Step 1 above. 4. Causal Analysis: ☐ Included appropriate Stakeholders in root cause analysis. ☐ Identified multiple potential root causes. ☐ Used one or more of the root cause analysis tools such as: - Problem - Transition potential causes and identify as Countermeasures - 5 Whys - Drill down for root causes - Pareto Chart - Separate out the "vital few" from the "trivial many" ☐ Validated potential causes by observing the work (100% hourly).	5a. Develop Countermeasures: ☐ Multiple ideas - Considered a wide variety of potential countermeasures. ☐ Breakthrough Thinking - Considered best, creative, out of the box countermeasures. ☐ Lean Thinking - Incorporated basic lean principles (8S, Visual, Simple, etc.) into the countermeasures. ☐ Prioritization - Prioritized potential countermeasures (PICK Chart). 5b. Try/Implement: ☐ Try it NOW - Tested ideas NOW, not in days or weeks. ☐ Experiments - Validated countermeasures using rapid experiments prior to making large investments. ☐ Risk - Considered potential negative consequences of the countermeasures. 6. Action Plan: ☐ Plan - Identified Who, What, When & Status for all key actions. 7. Impact on the Gap, Standardize, Share: ☐ Learn from Failure - If target was not met, used P-D-C-A to resolve Steps 3-4. ☐ Impact on Gap - Described how the achieved results impacted the Gap. ☐ Sustainment - Verified the results can be sustained over time. ☐ Standardization - Established the new process as the new way of doing business. ☐ Training - Updated standard operating procedures and training. ☐ Reflection - Documented lessons learned throughout the process. ☐ Share - Communicated improvements and lessons learned with owners of other similar processes.
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How much of the gap are you going to go after?

Example: Target Setting



1. Define the Problem:	
Ultimate Goal: Meet Employment engagement targets	
Target State: Employee Score = 95%	Gap: 15%
Current State: Employee Score = 80%	
Problem Statement: Employee Score is 15% below Target	

3. Target Setting:

Do What: Increase	To What: Employee Score
How Much: 5%	By When: 12/01/2017
Impact On Gap: Gap will be 10%	

Part of the Gap

1. Define the Problem:	
Ultimate Goal: Meet Household Family Budget Each Month	
Target State: \$3000	Gap: \$1000
Current State: \$4000	
Problem Statement: We are spending \$1000 too much each month on family expenses	

3. Target Setting:

Do What: Reduce	To What: Monthly Spending
How Much: \$1000	By When: June 1, 2015
Impact On Gap: Eliminates Gap	

All of the Gap



Is there Waste in your Process?

- It is important to understand the waste in your process.
- You must know the definition of waste and the types of waste before you can set the target.
- The amount of waste and various types of waste will affect your target state.

*When Target Setting you can go after all or part of the Gap
The current waste in the process can affect your Target Setting*



What is Waste?

- **Any** activity that takes time, resources, and space, but does not address the customer's requirements



- Anything more than the **minimum** amount of time, material, equipment, information, space, and worker's time that are essential to add value to the product
- If performing more of the activity would **not** result in increased revenue from the customer

Waste comes carefully disguised as useful work!
Learn to see it through the customer's eyes



Eight Forms of Waste – TIMI WOOD

- It is important to understand the waste in your process.
- You must know the definition of waste and the types of waste before you can set the target.
- The amount of waste and various types of waste will affect your target state.

Transportation



Inventory



Motion



Injury



Waiting



Over-processing



Over-production



Defects (Corrections)



Waste = Any Activity That Does Not Add Value



Eight Forms of Waste – TIMI WOOD

Type of Waste		Type of Waste	
Transportation 	Any unnecessary material movement that does not support a Lean value stream	Waiting 	Idle time in which no value-added activities take place
Inventory 	Any unnecessary supplies or materials that do not support just in time delivery	Over-processing 	Effort which adds no value to a product or service (Work that can be combined with other processes or Enhancements that are transparent to the customer)
Motion 	Any movement of people which does not add value to the product	Over-production 	Producing more than needed (working ahead, producing at a faster pace than needed)
Injury 	Work-related personnel accidents (Two biggest causes of missed work are Ergonomics and Slips)	Defects (Corrections) 	Repair of a product or service to fulfill customer requirements



Types of Waste - Summary

Production	Types of Waste	Transactional
Long travel distances; unplanned premium freight; batch containers; multiple moves; multiple storage locations	Unnecessary Transportation	Routing for unnecessary approvals; carbon copy forms; inter-office mail; sending too many files
Make what we can, not what customer needs; high obsolescence & write-offs, extensive rework when problems arise or changes needed	Excess Inventories	Backlog of paperwork; obsolete forms, obsolete information procedures, etc. storing excessive files, sorting thru files and information
Inefficient work flow; storage of unused parts and equipment	Unnecessary Motion	Spread out when co-location is better; starting stopping
Misuse of equipment; Not following safety procedures; Electrical shocks; Cuts; Falls;	Injuries	Poor Ergonomic conditions; Stress due to...
Waiting for machines to cycle; waiting for materials/tools setup times. Machine waiting on person	Waiting/Queue Time	Inboxes; waiting in meetings; chasing/ waiting needed information or data
Running machines and making parts to keep the machines and people busy	Over-Production	Too many reports, reviews; doing more than is needed. Sending storing too many files
Incapable machines and processes. Equipment with unbalanced flow or capacity; Process bottlenecks	Over-Processing	Lack of clear customer expectations; unnecessary steps; too many handoffs; process bottlenecks
Scrap, rework, lost capacity due to mistakes; extra manpower to inspect and fix; overtime to correct	Defects	Missing information; work not meeting requirements. Overtime to do it again



Exercise: What waste do you see at work?

Type of Waste		Type of Waste	
Transportation 		Waiting 	
Inventory 		Over-processing 	
Motion 		Over-production 	
Injury 		Defects (Corrections) 	



Summary

- **Key points**

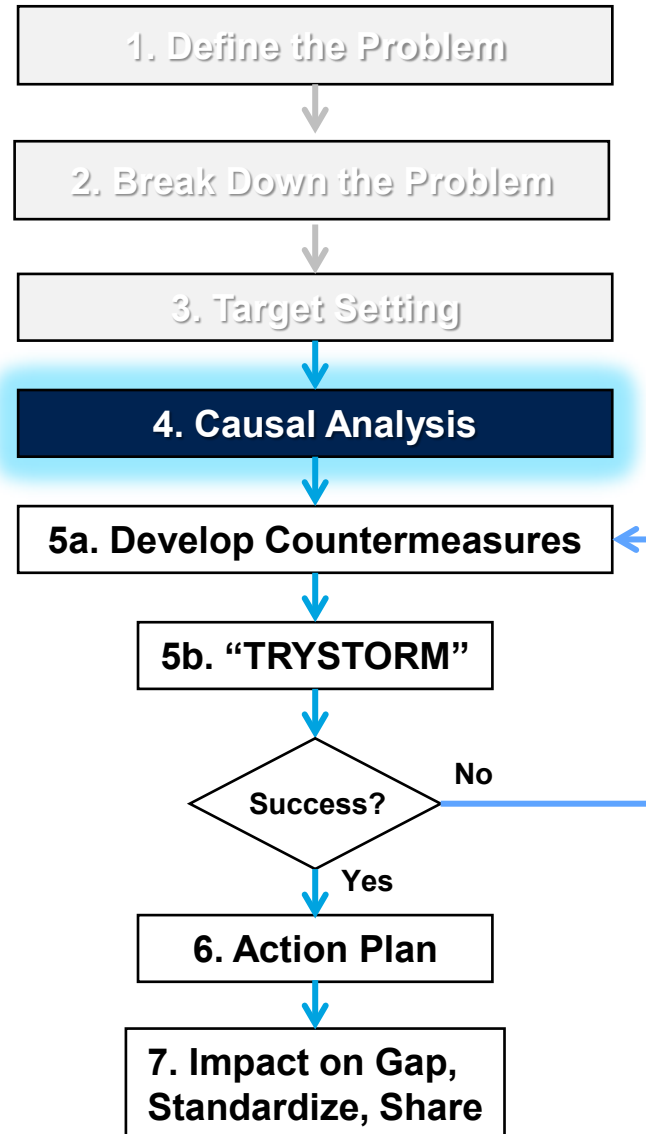
- Waste is everywhere...Can you see it?
- Understand Waste before you set targets.
- Set clear targets – do what, to what, how much, by when.
- Targets can be all or part of the Gap.



Causal Analysis



A3 Problem Solving Thinking





Objectives

What: After this module, you should be able to:

1. Be able to perform a Root Cause Analysis using the **5 Whys** or a **Cause and Effect Diagram**
2. Understand the criteria associated with effective **countermeasures** and mistake proofing

Why: Identifying the true root causes of problems helps prevent recurrence of those problems in your work area

- Fewer problems
- Less frustration
- Sense of accomplishment



Solving Problems

1. You Grasped the Situation
2. You've started filling out a Problem Solving A3
3. You Observed or Documented the process
4. You're pretty sure you have a problem now

What Do You Do Next?



Step 4: Causal Analysis

Title: _____

1. Define the Problem

Ultimate Goal:	
Target State:	Gap:
Current State:	



Problem Statement:

2. Break down the Problem:

3. Target Setting:			
Do What	x	To What	xx
How Much	By x	By When	x/x/xx
Impact on Main Gap	x		

4. Causal Analysis:

5a. Countermeasures / 5b. Trystorm:

6. Action Plan (Who, What, When):

7. Standardize & Leverage:

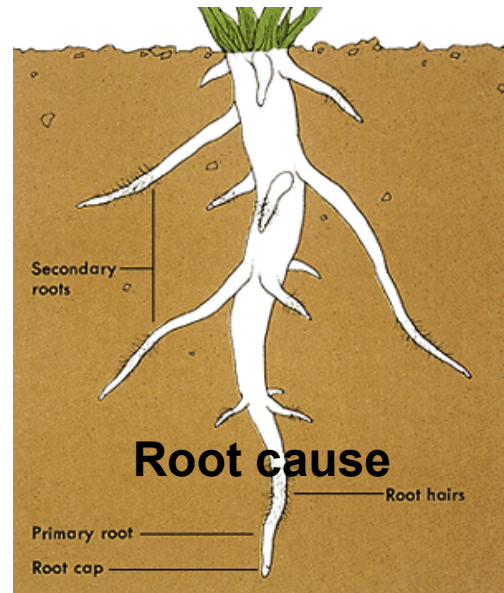
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Step 4: Causal Analysis

4. Causal Analysis:

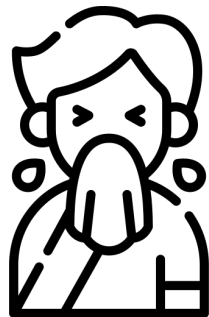
- ☐ Included appropriate Stakeholders in root cause analysis
- ☐ Identified multiple potential root causes
- ☐ Used one or more of the root cause analysis tools such as:
 - Fishbone – Brainstorm potential causes and identify as Controllable/Noise
 - 5 Whys – Drill down for root causes
- ☐ Validated potential causes by observing the work (“Go & See”)



1. Define the Problem: Ultimate Goal: ☐ States the high level metric or goal this AJ supports and conveys why this problem is important to solve Target State: ☐ Describes the idealized outcome in metrics. (How the process "Should Be") Current State: ☐ Describes the current ("As Is") process using the same unit of measure as the Target State Problem Statement: ☐ Restates the Gap in words 2. Breakdown the Problem: ☐ Used one or more of the following tools if needed: • Discover Check Sheet • Process Flowchart (as is) • Process Mapping • Pareto • Contributing Factor Tree 3. Target Setting: ☐ States "Do What, To What, How Much, and By When" ☐ Describes the projected impact on the Gap in Step 1 above 4. Causal Analysis: ☐ Included appropriate Stakeholders in root cause analysis ☐ Identified multiple potential root causes ☐ Used one or more of the root cause analysis tools such as: • Fishbone – Brainstorm potential causes and identify as Controllable/Noise • 5 Whys – Drill down for root causes • Pareto Chart – Separate out the "vital few from the trivial many" ☐ Validated potential causes by observing the work ("Go & See")	Gap: ☐ Reflects the difference between the Target and Current States as a number or value 5a. Develop Countermeasures: ☐ Multiple Ideas – Considered a wide variety of potential countermeasures ☐ Breakthrough Thinking – Considered bold, creative, out of the box countermeasures ☐ Lean Thinking – Incorporated basic lean principles (8S, Visual, Simple, etc.) into the countermeasures ☐ Prioritization – Prioritized potential countermeasures (PICK Chart) 5b. Trystorm: ☐ Try it NOW – Tested idea(s) NOW, not in days or weeks ☐ Experiments – Validated countermeasures using rapid experiments prior to making large investments ☐ Risk – Considered potential negative consequences of the countermeasures 6. Action Plan: ☐ Plan – Identified Who, What, When & Status for all key actions 7. Impact on the Gap, Standardize, Share: ☐ Learn from Failure – If target was not met, used P-D-C-A to redo Steps 2-4 ☐ Impact on Gap – Described how the achieved results impacted the Gap ☐ Standardization – Established the new process as the new way of doing business ☐ Training – Updated Standard Operating Procedures and training ☐ Reflection – Documented lessons learned throughout the process ☐ Share – Communicated improvements and lessons learned with owners of other similar processes
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Why Look at Root Causes?



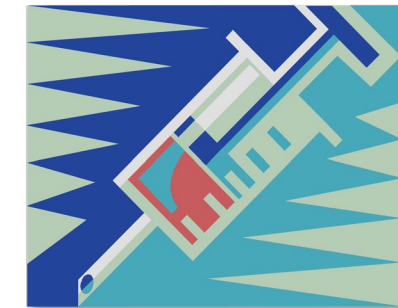
What factors are causing
our key pain points?

Treating Symptoms



VS.

Treating Causes





Do I know the cause?

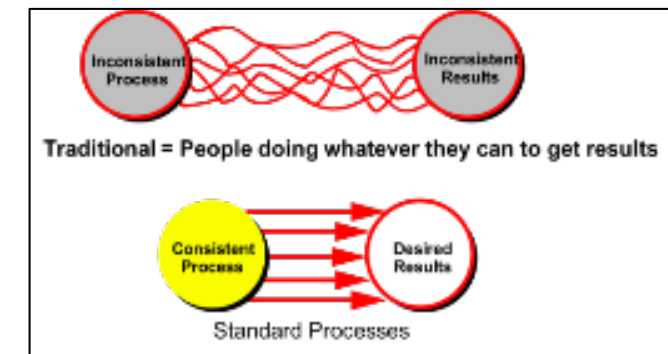
- I observed the process, asked questions, got the facts
- I know how the process flows
- I know how long the process takes
- **Now I need to understand the root cause of the problem!**
 - The 3 types of causes
 - Point of cause: Where was the physical location of the problem?
 - Direct cause: What factors contributed to the problem?
 - Ask 5 Whys to get to the . . .
 - Root cause: What are the factors that if corrected, would prevent recurrence of the incident

Three Root Causes

- No standard
- Standard not being followed
- Ineffective standard

Standard:

- **Best known way**
- **Everyone performs the same way, every time**
- **Same outcome**



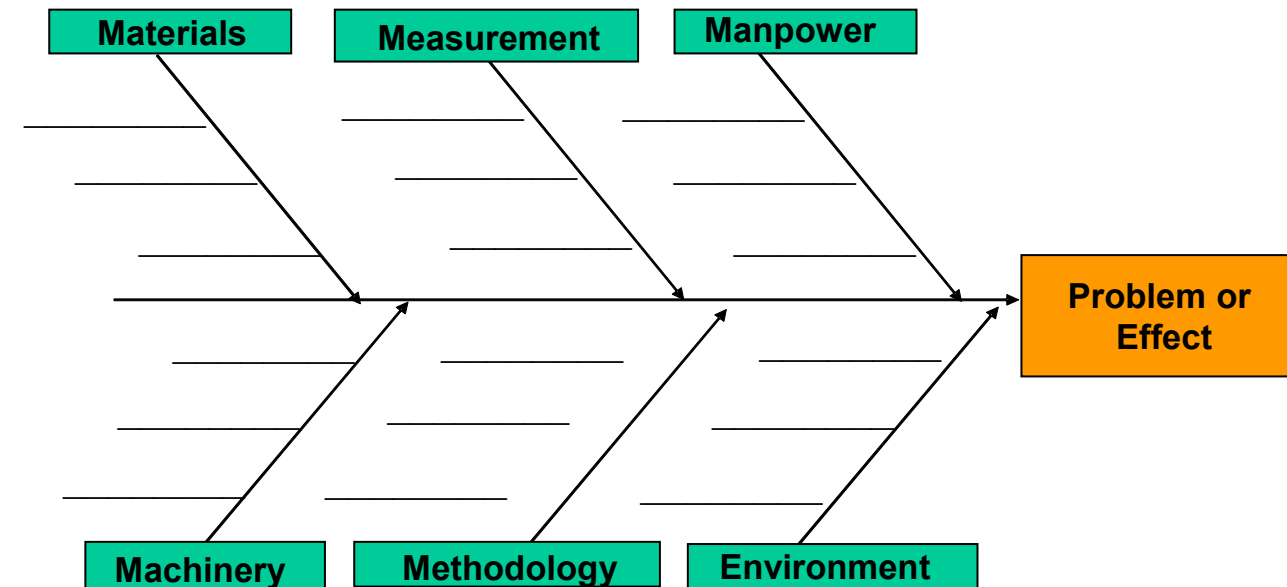


Cause & Effect Diagram (Fishbone)

- A structured visual brainstorming tool used to isolate ONE specific defect, problem, or undesirable condition and determine the potential causes
- Advantages
 - Predefined categories stimulate thinking
 - Classifies variables as Controllable or Noise

Four Ps for Service/Transactional

- Plant/technology
- Policies
- Procedures
- People



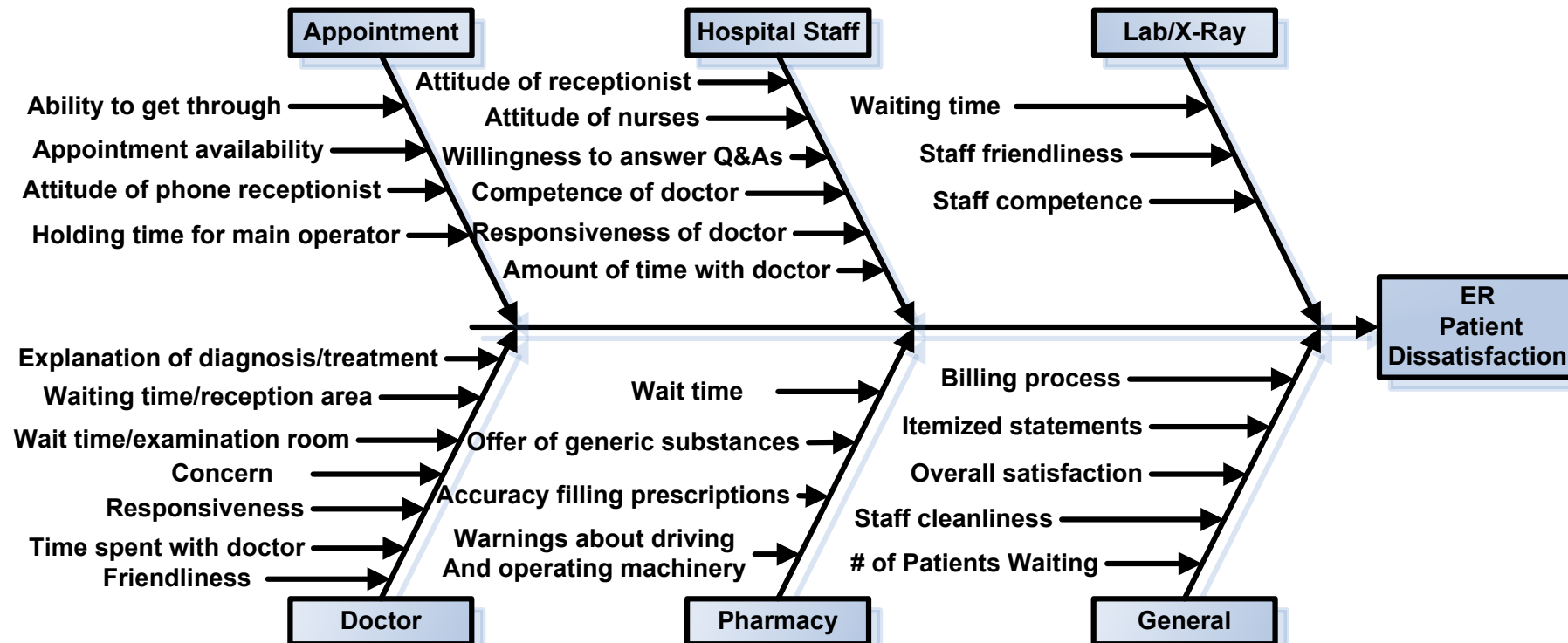
You Can Also Customize Categories to Fit Your Specific Requirements



Cause and Effect Step by Step

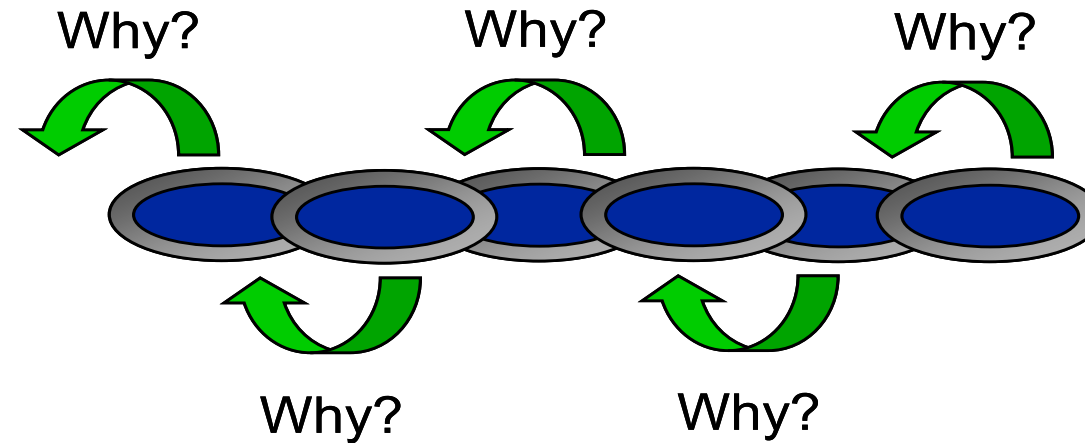
1. Choose Categories
2. Brainstorm Causes
3. Classify as “Controllable” (C) or “Noise” (N)
4. Choose top “Controllable” Causes using data

Exercise: Add (C) or (N) beside each Cause





5 Whys



- Useful for less complex problems
- Used to generate causes for use in other RCA methods
- Advantages
 - Easy to use
 - Identifies more than one cause
 - Identifies causal relationships

*Asking Why 5 Times Often Brings You To The “Real” Root Cause(s)
...One You May Have Never Noticed*



5 Whys

How to use it

- Asking Why simply involves repeatedly asking 'why' until the answer is 'because that's the way it is'!
- At this point, it is likely that you have identified a root cause of the problem
 - If tackled and removed, the observed symptoms of the problem should also disappear
- Although called 'Asking Why Five Times,' or 'the 5 Whys', five is a rule of thumb....there may be fewer or more questions depending on the particular situation.
- It is important to beware of channelling your analysis down one avenue and completely ignoring other contributing root causes of the same problem

Root Cause (5 Whys) Example



Taiichi Ohno, the creator of the 5-Why technique, is quoted using the following example to demonstrate using 5-Why's for root cause analysis:

1. “Why did the robot stop?”

The circuit has overloaded, causing a fuse to blow.

2. “Why is the circuit overloaded?”

There was insufficient lubrication on the bearings, so they locked up.

3. “Why was there insufficient lubrication on the bearings?”

The oil pump on the robot is not circulating sufficient oil.

4. “Why is the pump not circulating sufficient oil?”

The pump intake is clogged with metal shavings.

5. “Why is the intake clogged with metal shavings?”

Because there is no filter on the pump.





Summary

Key Points

- Three main root causes
- Several ways to identify causes
 - Fishbone
 - 5 Whys
- Ask why until you reach a logical stopping point

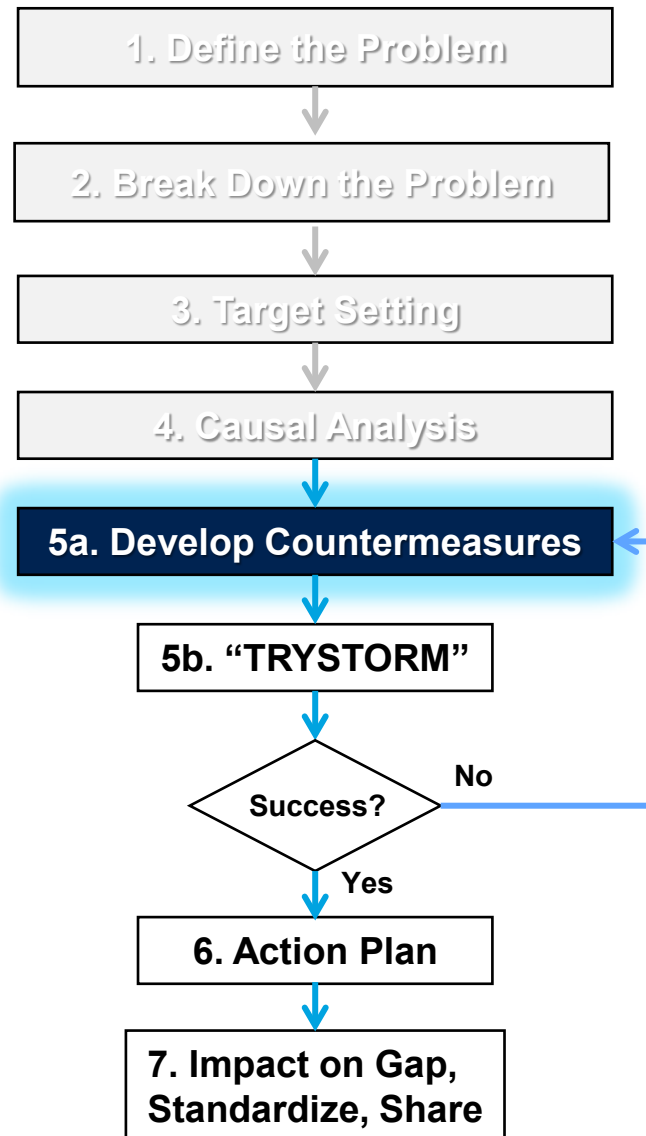




Problem Solving



A3 Problem Solving Thinking



Step 4 & 5a: The Connection



Title: _____

1. Define the Problem

Ultimate Goal:			
Target State:		Gap:	
Current State:			
Problem Statement:			
2. Break down the Problem:			
3. Target Setting:			
Do What	x	To What	xx
How Much	By x	By When	x/x/xx
Impact on Main Gap	x		
4. Causal Analysis:			

5a. Countermeasures / 5b. Trystorm:

Action Plan (Who, What, When):

7. Standardize & Leverage:

Author: _____ **Version & Date:** _____



Step 5a: Develop Countermeasures

5a. Develop Countermeasures:

1. Multiple Ideas – Considered a wide variety of potential countermeasures
2. Breakthrough Thinking – Considered bold, creative, out of the box countermeasures
3. Lean Thinking – Incorporated basic lean principles (6S, Visual, Simple, etc.) into the countermeasures
4. Prioritization – Prioritized potential countermeasures (PICK Chart)

- Brainstorm to develop as many potential countermeasures as possible.
- Reach out to extended team members to get diverse thoughts and ideas from inside and outside the sector/business/group.
- This is an opportunity to use break-through thinking and generate bold and creative ideas.

1. Define the Problem: Ultimate Goal: - Identify the high level metrics or goal that ALL supports and explains why this problem is important to solve Target State: - Describes the desired outcome in metrics (how the process "Should Be") Current State: - Describes the current (As Is) process using the same unit of measure as the Target State Problem Statement: - Describes the Gap in words 2. Breakdown the Problem: - Use one or more of the following tools to break down the problem: - Customer Check Sheet - Process Flowchart/Fishbone - Process Mapping - Failure Mode and Effects Analysis (FMEA) - Confounding Factor Tree 3. Target Setting: - States "Do What, To What, How Much, and By When" - Describes the projected impact on the Gap in Step 1 above 4. Causal Analysis: - Isolate appropriate stakeholders in root cause analysis - Identified multiple potential root causes - Used one or more of the root cause analysis tools such as: - Fishbone - Brainstorm potential causes and identify as Controllable/Uncontrollable - 5 Whys - Drill down for root causes - Ishikawa Chart - Separate and find "what has been the bad money" - Validated potential causes by observing the work (Go & Stop)	5a. Develop Countermeasures: - Multiple Ideas – Considered a wide variety of potential countermeasures - Breakthrough Thinking – Considered bold, creative, out of the box countermeasures - Lean Thinking – Incorporated basic lean principles (6S, Visual, Simple, etc.) into the countermeasures - Prioritized – Prioritized potential countermeasures (PICK Chart) 5b. Inform: - The 4 NOW – Tested ideas NOW, not in days or weeks - Experiments – Validated countermeasures using rapid experiments prior to making large investments - Risk – Considered potential negative consequences of the countermeasures 6. Action Plan: - Plan – Identified who, what, when & status for all key actions 7. Impact on the Gap, Standardize, Share: - Learn from Failure – If target was not met, used PICO-A to redo Steps 2-4 - Impact on Gap – Described how the achieved results impacted the Gap - Standardization – Verified the results can be sustained over time - Standardization – Established the new process as the new way of doing business - Training – Updated Standard Operating Procedures and training - Reliability – Documented lessons learned throughout the process - Share – Communicated improvements and lessons learned with owners of other similar processes
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Developing Countermeasures

- **Countermeasures Defined**

- An action aimed at a root cause of the problem to prevent recurrence

- **Goal of Countermeasures**

- Using wisdom and ingenuity to create devices and methods that allow you to do your job 100% defect free 100% of the time – mistake proof your countermeasures!

- **What are the two kinds of countermeasures?**

- Temporary (short-term)
- Permanent (long term)

Aim for Solutions that Make the Right Way Easy and the Wrong Way Hard!



Countermeasure Criteria

Your goal should be to answer yes to all these questions:

- Involves the right people?
- Prevents recurrence?
- Inexpensive?
- Made with wisdom and ingenuity?
- Simple to use?
- Easy to implement?
- Durable?
- Easy to maintain?
- Does not hinder operator?
- Reliable?
- Safe?





What Is 6S?

The 6-S Methodology:

1. **Sort** - Separate the needed from the unneeded
2. **Straighten** - A place for everything & everything in its place
3. **Shine** - Clean everything and clean everywhere
4. **Standardize** - Make it easy to see NORMAL v. ABNORMAL
5. **Safety** - Free of hazards
6. **Sustain** - Make 6S a way of life

6S ≠ Just Cleaning



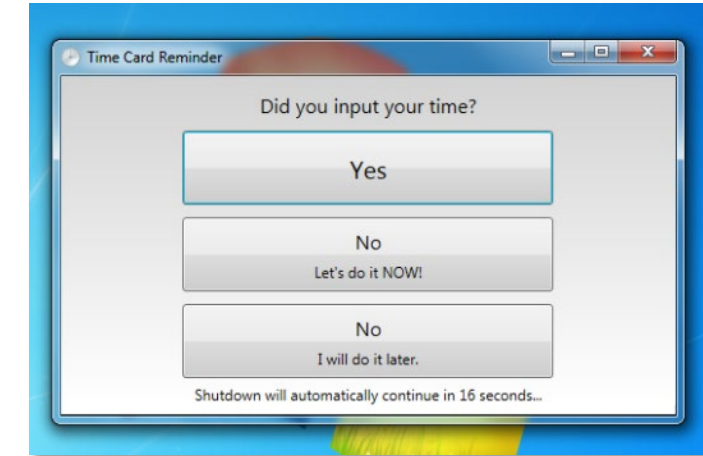
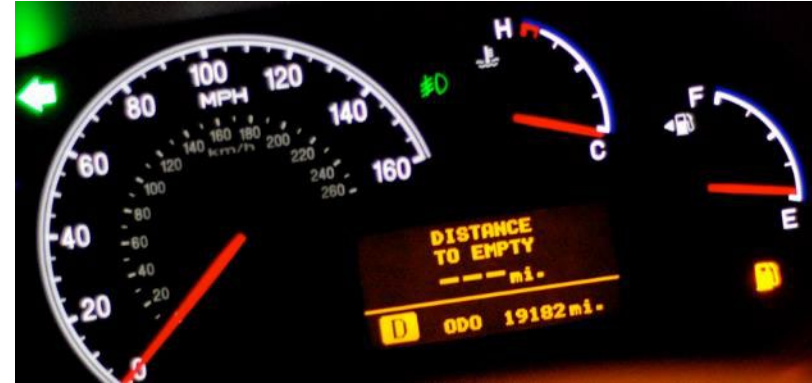
Promote an Environment Where Things Happen On Time, Every Time, and Flow is Optimized



Types of Mistake Proofing

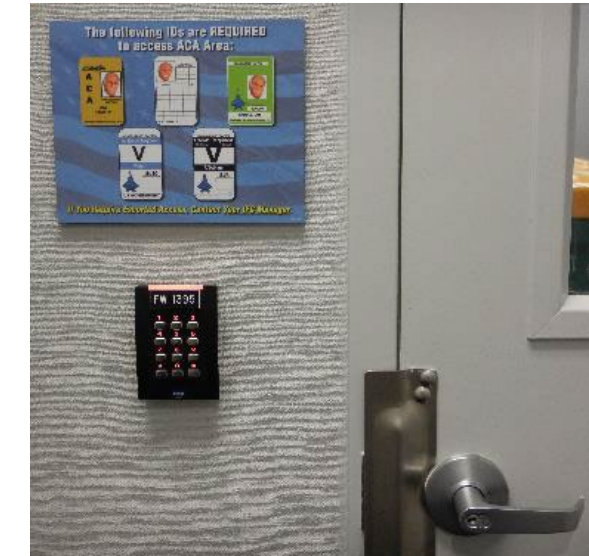
- **Warning**

- Warns you the mistake may occur



- **Prevention**

- Stops the possible mistake from occurring



Prevention is better than Warning



Everyday Countermeasures

- **What are the mistake proofed devices you have seen for:**
 - Gas Station
 - Lawn Mower
 - Family Car
 - Airport

Is it a warning or prevention ?

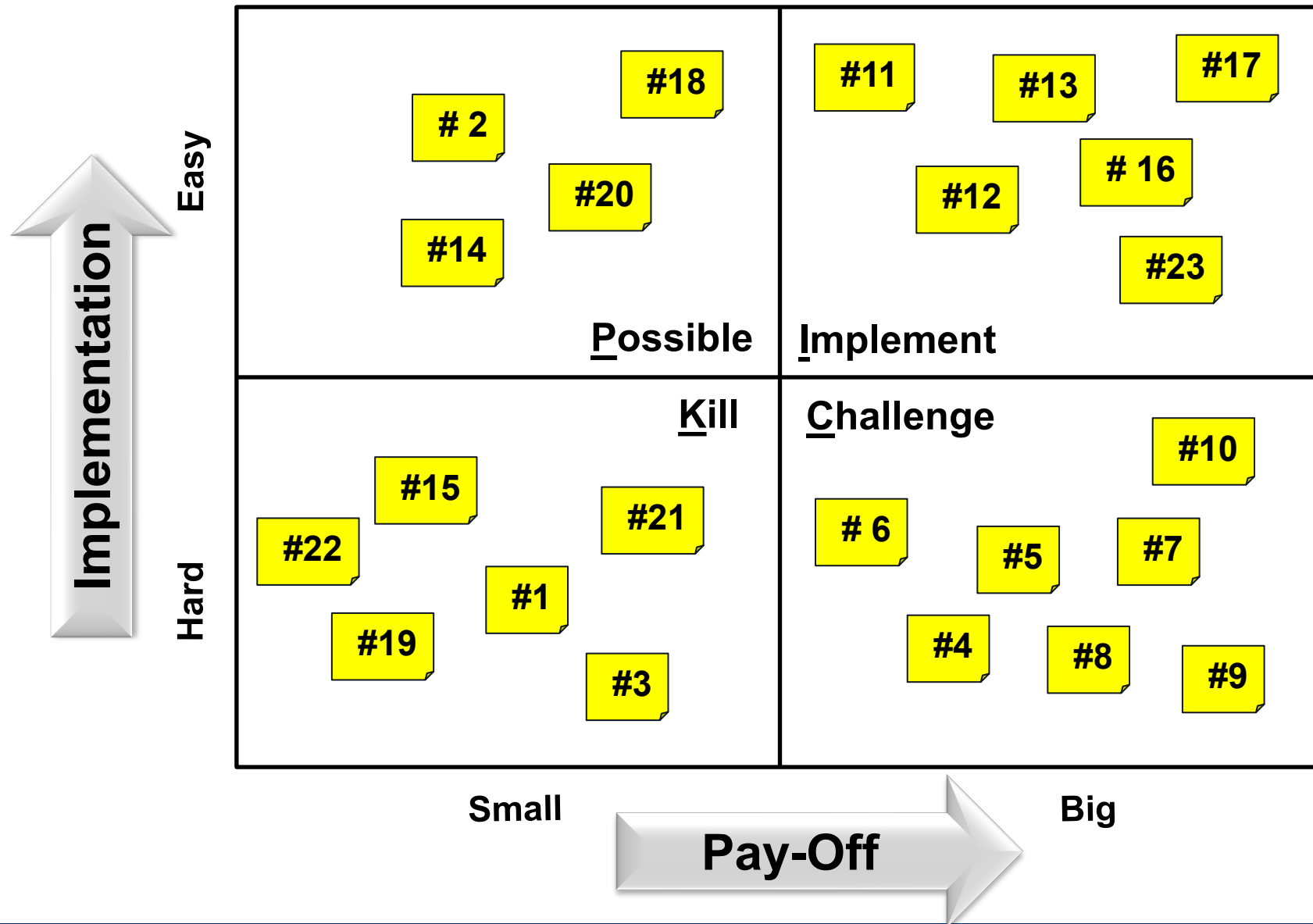


PICK Chart

- **Purpose**
 - A PICK chart is used to help determine and prioritize which ideas will get you the most return.
- **How to complete this form**
 - Create a grid with Easy/Hard in one direction and Big Payoff, Small Payoff in the other.
 - If post Its are being used, physically move them into the right quadrant.
 - Focus on the Easy to Do, Big Payoff tasks first. Try to avoid doing the Hard to Do, Small Payoff ones.

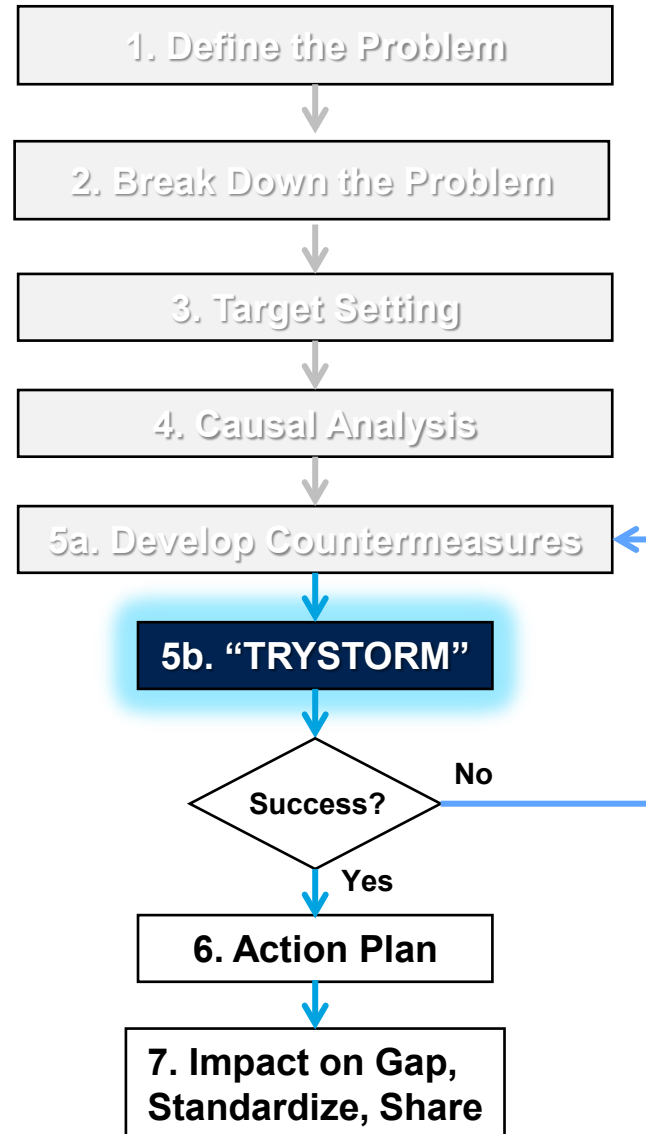


PICK Chart





A3 Problem Solving Thinking



Step 5B: TryStorm



Title: _____

1. Define the Problem

Ultimate Goal:

Target State:

Current State:

Problem Statement:

Gap:

2. Break down the Problem:

3. Target Setting:

Do What	x	To What	xx
How Much	By x	By When	x/x/xx
Impact on Main Gap	x		

4. Causal Analysis:

5a. Countermeasures / 5b. Trystorm:

6. Action Plan (Who, What, When):

7. Standardize & Leverage:

Author:

Version & Date:



Step 5B: TryStorm

5b. Trystorm:

- ☐ Try it NOW – Tested idea(s) NOW, not in days or weeks
- ☐ Experiments – Validated countermeasures using rapid experiments prior to making large investments
- ☐ Risk – Considered potential negative consequences of the countermeasures



1. Define the Problem: ☐ Ultimate Goal: States the high level metric or goal the A2 support team conveys why this problem is important to solve. Target State: ☐ Describes the idealized outcome in metrics (give the process "forward" to) Current State: ☐ Describes the current (As-Is) process using the same unit of measure as the Target State Problem Statement: ☐ Restates the Gap in words	5a. Develop Countermeasures: ☐ Multiple Ideas – Considered a wide variety of potential countermeasures ☐ Breakthrough Thinking – Considered bold, creative, out of the box countermeasures ☐ Lean Thinking – Incorporated basic lean principles (5S, Visual, Simple, etc.) into the countermeasures ☐ Shift Control – Reworked and tested countermeasures (PICK Program) 5b. Trystorm: ☐ Try it NOW – Tested idea(s) NOW, not in days or weeks ☐ Experiments – Validated countermeasures using rapid experiments prior to making large investments ☐ Risk – Considered potential negative consequences of the countermeasures
2. Breakdown the Problem: ☐ Used one or more of the following tools if needed: • Otisani Check Sheet • Process Observation Form • Process Mapping • Pareto • Contributing Factor Tree 3. Target Setting: ☐ States: Do What, To What, How Much, and By When ☐ Describes the projected impact on the Gap in Step 1 above 4. Causal Analysis: ☐ Involved appropriate stakeholders in root cause analysis ☐ Identified multiple potential root causes ☐ Used one or more of the root cause analysis tools such as: • Fishbone – Determined potential causes and identified Controllable/Owner • 5 Whys – Drove down for root causes • Pareto Chart – Separated out the "vital few" from the "trivial many" ☐ Validated potential causes by observing the work ("Go & See")	6. Action Plan: ☐ Plan – Identified who, what, when & status for all key actions 7. Impact on the Gap, Standardize, Share: ☐ Learn from Failure – If target was not met, used PDCA to redo Steps 2-4 ☐ Impact on Gap – Described how the achieved results impacted the Gap ☐ Standardization – Verified the results can be sustained over time ☐ Standardization – Established the new process as the new way of doing business ☐ Training – Updated Standard Operating Procedures and training ☐ Reflection – Documented lessons learned throughout the process ☐ Share – Communicated improvements and lessons learned with owners of other similar processes

“Tape and Hold” Before You “Bolt and Weld”

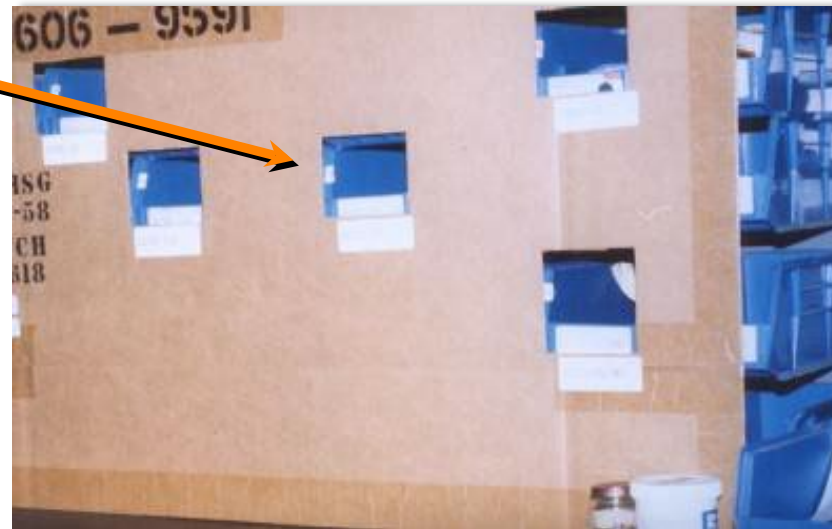


Trystorm Example

**Wrong parts pulled.
Product defective**



**Cardboard template is
“Bill of Material.” Wrong
parts cannot be picked.**



*Courtesy of
QCT Associates, Inc.*

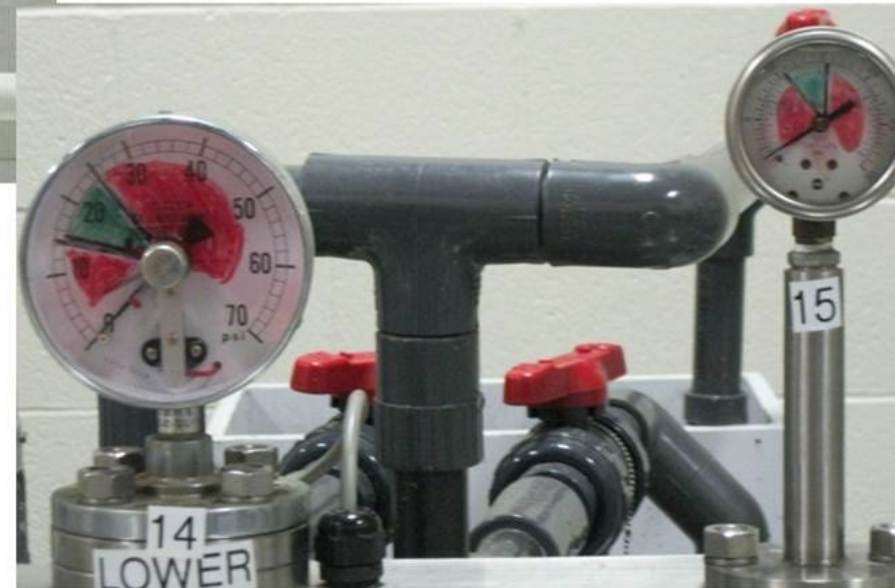


Trystorm Example

Associated Improvements- Visual Controls

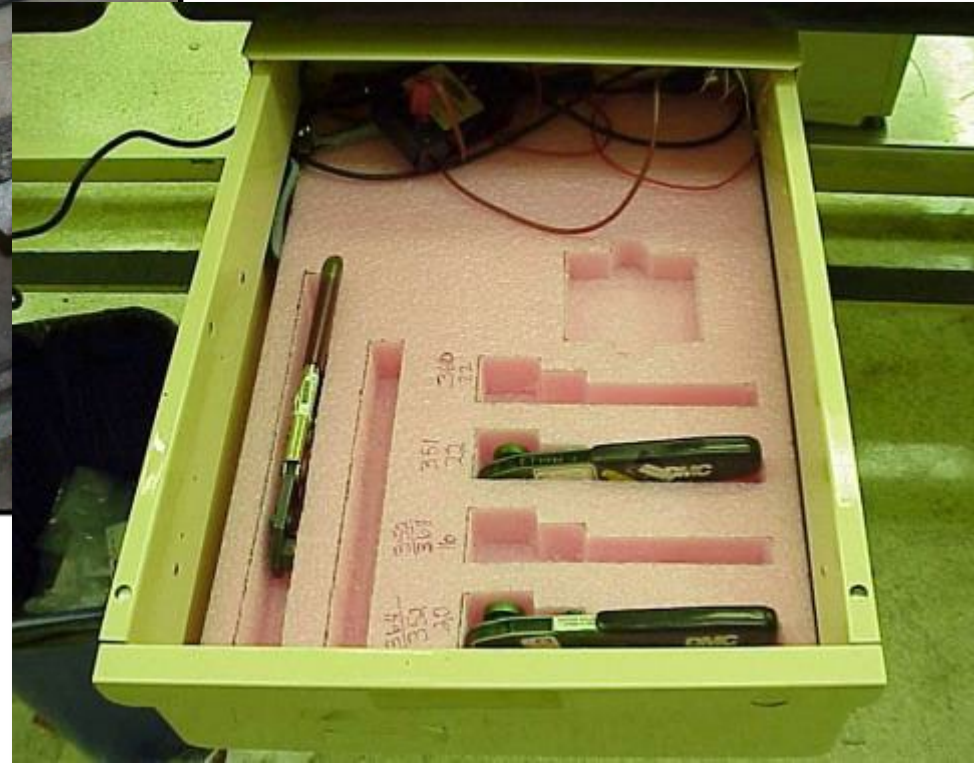


Visual control of Pressure Ranges on Gauges.



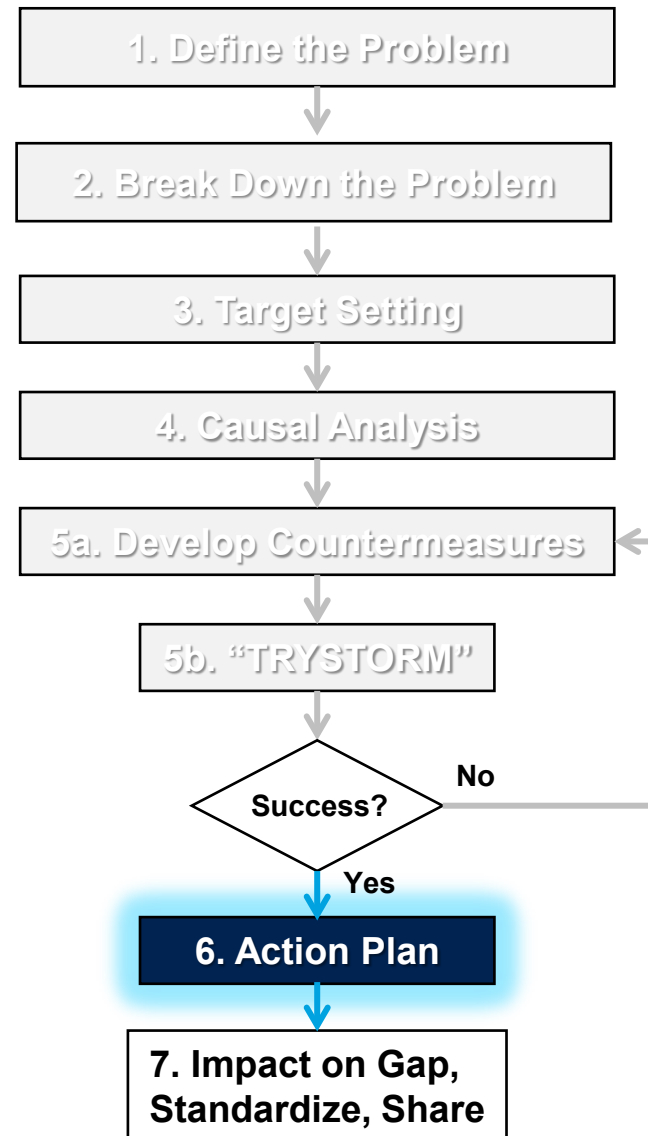


Trystorm Example





A3 Problem Solving Thinking





Step 6: Action Plan (Who, What, When)

Title: _____

1. Define the Problem

Ultimate Goal:

Target State:

Current State:

Gap:

Problem Statement:

2. Break down the Problem:

3. Target Setting:

Do What	x	To What	xx
How Much	By x	By When	x/x/xx
Impact on Main Gap	x		

4. Causal Analysis:

5a. Countermeasures / 5b. Trystorm:

6. Action Plan (Who, What, When):

7. Impact on the Gap, Standardize & Share:

Author:

Version & Date:



Step 6: Action Plan

6. Action Plan:

- Plan – Identified Who, What, When & Status for all key actions

• Critical content includes:

- Who
- What
- When

The Plan

- ☐ Who - person responsible
- ☐ What - activity description
- ☐ When – Due date
- ☐ Status - % Complete

• Status:

- Identifies which Action Items are Complete, In Work, To Be Worked or TBD.

1. Define the Problem: ☐ Ultimate Goal: States the high level metric or goal this AP supports and conveys why the problem is important to solve Target State: ☐ Describes the idealized outcome in metrics (How the process "Should Not") Current State: ☐ Describes the current ("As Is") process using the same unit of measure as the Target State Gap: ☐ Identifies the difference between the Target and Current State as a number or value Problem Statement: ☐ Restates the Gap in words	5a. Develop Countermeasures: ☐ Multiple ideas – Considered a wide variety of potential countermeasures ☐ Breakthrough Thinking – Considered bold, creative, out of the box countermeasures ☐ Lateral Thinking – Incorporated basic brain principles (BS, Visual, Simple, etc.) into the countermeasures ☐ Prioritization – Prioritized potential countermeasures (PICK Chart) 5b. Trystorm: ☐ Try it NOW – Tested ideas NOW, not in days or weeks ☐ Experiments – Validated countermeasures using rapid experiments prior to making large investments ☐ Risk – Considered potential negative consequences of the countermeasures
2. Breakdown the Problem: ☐ Used one or more of the following tools if needed: • Observe Check Sheet • Process Observation Form • Process Mapping • Fishbone • Contributing Factor Tree	6. Action Plan: ☐ Plan – Identified Who, What, When & Status for all key actions
3. Target Setting: ☐ States "Do What, To What, How Much, and By When" ☐ Describes the projected impact on the Gap in Step 1 above	7. Impact on the Gap, Standardize, Share: ☐ Learn from Failure – If target was not met, used P-D-C-A to redo Steps 2-4 ☐ Impact on Gap – Described how the achieved results impacted the Gap ☐ Sustainability – Verified the results can be sustained over time ☐ Standardization – Established the new process as the new way of doing business ☐ Training – Updated Standard Operating Procedures and training ☐ Reflection – Documented lessons learned throughout the process ☐ Share – Communicated improvements and lessons learned with owners of other similar processes
4. Causal Analysis: ☐ Involved appropriate stakeholders in root cause analysis ☐ Identified multiple potential root causes ☐ Used one or more of the root cause analysis tools such as: • Fishbone – Brainstormed potential causes and identify as Contributing Factors • 5 Whys – Drilled down for root causes • Ishikawa Chart – Separated out the "soft" low from the "hard" money ☐ Validated potential causes by observing the work ("Go & See")	

Fail to Plan = Plan to Fail

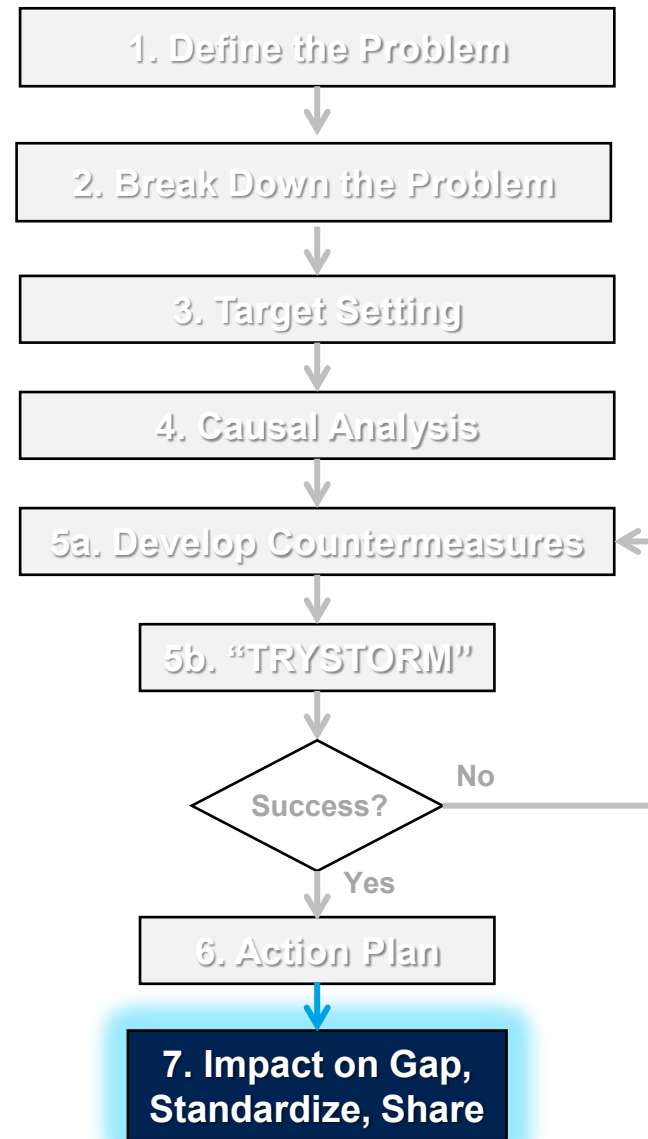


Action Item List Example

What		How	Who	When		
No.	Problem – Issue – Opportunity	Action Required	Person Responsible	Due Date	Status	% Cmp



A3 Problem Solving Thinking





Step 7: Impact on the Gap, Standardize, Share

Title: _____

1. Define the Problem

Ultimate Goal:

Target State:

Current State:

Problem Statement:

Gap:

2. Break down the Problem:

3. Target Setting:

Do What	x	To What	xx
How Much	By x	By When	x/x/xx
Impact on Main Gap	x		

4. Causal Analysis:

5a. Countermeasures / 5b. Trystorm:

6. Action Plan (Who, What, When):

7. Impact on Gap, Standardize, Share:

Author:

Version & Date:

Step 7: Impact on the Gap, Standardize, Share



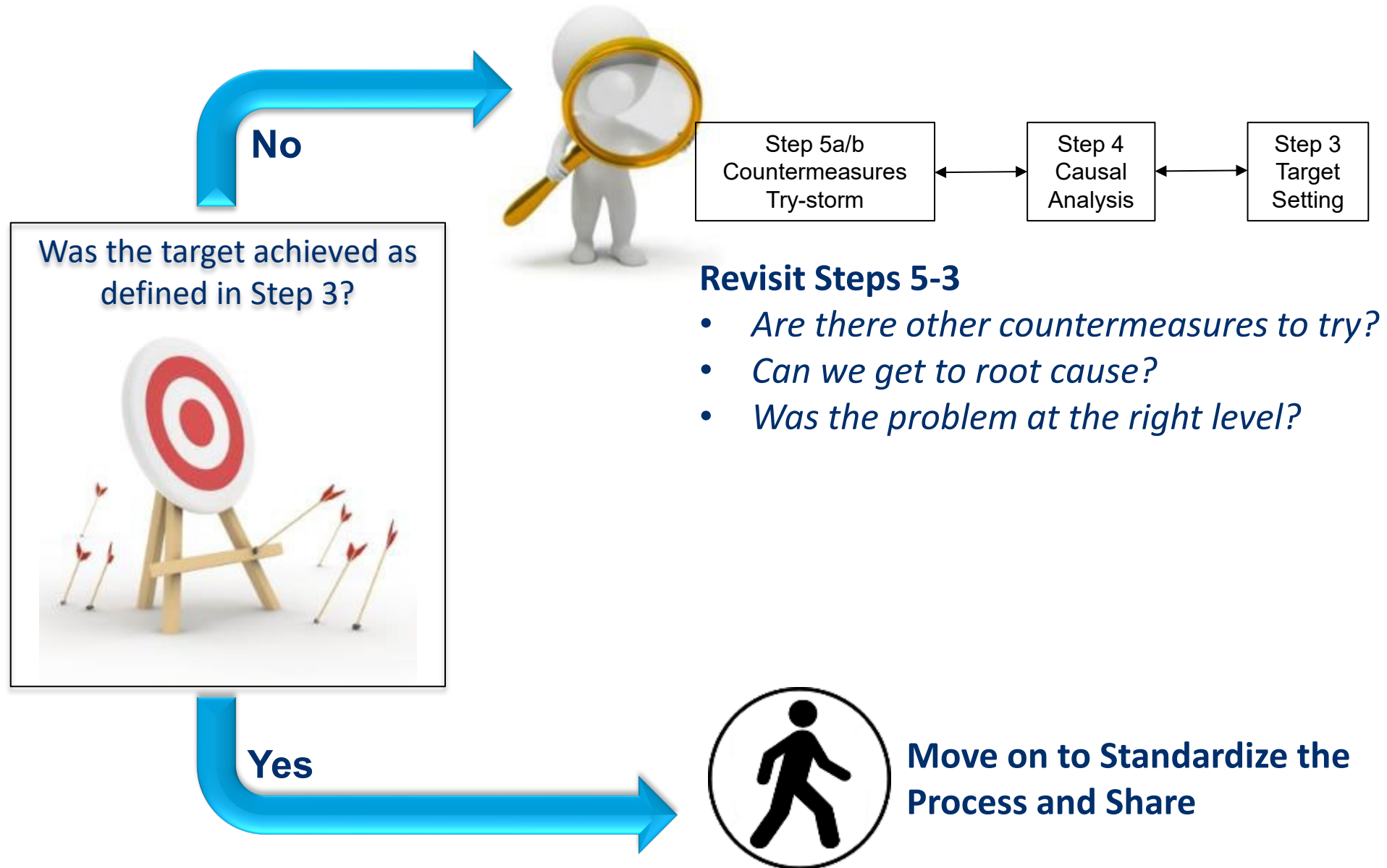
6. Impact on the Gap, Standardize, Share:

- ☐ Learn from Failure – If target was not met, used P-D-C-A to redo Steps 2-5
- ☐ Impact on Gap – Described how the achieved results impacted the Gap
- ☐ Sustainment – Verified the results can be sustained over time
- ☐ Standardization – Established the new process as the new way of doing business
- ☐ Training – Updated Standard Operating Procedures and training
- ☐ Reflection – Documented lessons learned throughout the process
- ☐ Share – Communicated improvements and lessons learned with owners of other similar processes



1. Define the Problem: ☐ Define the high level metric or goal for AB supports and convey why this problem is important to solve. Target State: L. Describes the ideal desired outcome in metrics (How the process "SHOULD BE") Current State: L. Describes the current (AS-IS) process using the same unit of measure as the Target State Problem Statement: ☐ Restates the Gap in words 2. Breakdown the Problem: ☐ List one or more of the following brokenhood: • Customer Check Sheet • Process Observation Form • Process Mapping • FMEA • Continuous Process Tree 3. Target Setting: ☐ States: Do What, To What, How Much, and By When ☐ Describes the proposed aspect to the Gap in "Gap" column 4. Causal Analysis: ☐ Indicated appropriate stakeholders in root cause analysis ☐ Identified multiple potential root causes ☐ Used one or more of the root cause analysis tools such as: • Fishbone – Transforms potential causes and details as Contributing Cause • 5 Whys – List down the root causes • Pareto Chart – Separates out the "vital few from the trivial many" ☐ Subdivided potential causes by observing the work (Do & Don't)	5a. Develop Countermeasures: ☐ Multiple Ideas – Considered a wide variety of potential countermeasures ☐ Brainstorming Thinking – Considered bold, creative, out of the box countermeasures L. Brain Thinking – Incorporated basic lean principles (8W, Visual, Simple, etc.) into the countermeasures ☐ Prioritization – Prioritized potential countermeasures (PICK Chart) 5b. Trystorming: ☐ Try it NOW! – Tested (do/ds) NOW, not in days or weeks ☐ Experimenters – Validated countermeasures using repeat experiments prior to making large measurements ☐ Risk – Considered potential negative consequences of the countermeasures 6. Action Plan: ☐ Plan – Identified who, what, when is status for all key actions 7. Impact on the Gap, Standardize, Share: ☐ Learn from Failure – If target was not met, used P-D-C-A to redo Steps 2-4 ☐ Impact on Gap – Described how the achieved results impacted the Gap ☐ Sustainment – Verified the results can be sustained over time ☐ Standardization – Established the new process as the new way of doing business ☐ Training – Updated Standard Operating Procedures and training ☐ Reflection – Documented lessons learned throughout the process ☐ Share – Communicated improvements and lessons learned with owners of other similar processes
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Step 7: Impact on the Gap, Standardize, Share





Step 7: Impact on the Gap, Standardize, Share

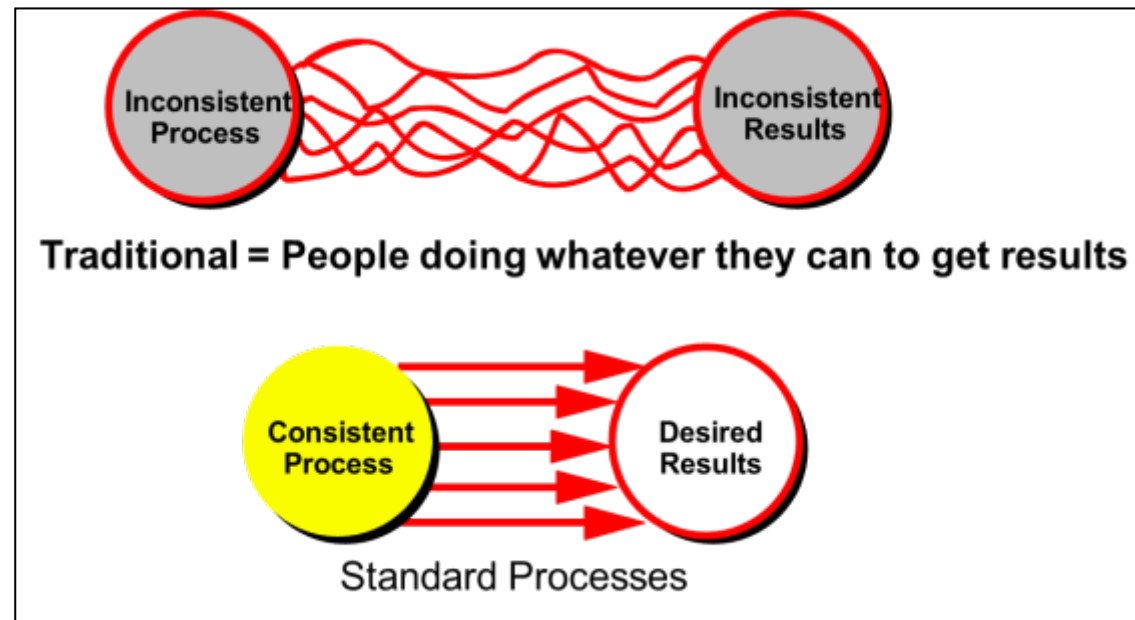


- **Standardization**

- Known way
- *Same way, every time*
- Same outcome, every time

- **Goal**

- Meet customers expectations every time





Step 7: Impact on the Gap, Standardize, Share

Standard Work Rule #1:

All work must be described and performed in terms of:

1. Content

- What work needs to be done
- Include Key Points, for SAFETY & QUALITY

2. Sequence

- Order needed work should be done

3. Timing

- When to do it and how long it should take

Are You Doing Things In A Standard Way?



Step 7: Impact on the Gap, Standardize, Share

Why monitor & control a process?



How do you control a process?



Step 7: Impact on the Gap, Standardize, Share

Control Plan / Method to Monitor							
Process Name:		Range		Process Owner:		Date created:	
Process Step	Measure	Maximum Value (if required)	Minimum Value (if required)	Action, if out of range	Frequency	Who measures	Where recorded

- What is the Measure?
- What is the Max expectable value?
- What is the Min expectable value?
- What action needs to be taken if out of range?
- Who measures, where is it recorded, how often?

Control Plans



Step 7: Impact on the Gap, Standardize, Share

Training Academy Example

Control Plan / Method to Monitor							
Process Name:		Range		Process Owner:		Date created:	
Process Step	Measure	Maximum Value (if required)	Minimum Value (if required)	Decision rule, if out of range	Frequency	Who measures	Where recorded
Student arrival	wait time	7 minutes	0 minutes	View Standard Op procedure Check for FN	2 per week	Admin clerk	desk log
Student arrival	Foreign nationals (FN)	1 Foreign National in line	0 Foreign National in line	Move FN to special entrance desk	once per day	Security guard	desk log

Original Problem: Long wait times for Students. How long?

Up to 20 minutes, sometimes in the rain and cold

Cause: Foreign Nationals (FN) take 10 minutes to process for admission.

Solution: Add a sign directing (FN) to special line, if FN gets to Desk clerk they would redirect them to special line

Control: Measure wait times twice a week, check for FNs in line daily

Control Plans



Step 7: Impact on the Gap, Standardize, Share

Process Control Plan

Process Name: _____
Customer _____ Int/Ext _____
Location: _____
Area: _____

Prepared by: _____
Approved by: _____
Approved by: _____
Approved by: _____

Page: _____ of _____
Document No: _____
Revision Date: _____
Supercedes: _____

Sub Process	Sub Process Step	CTQ		Specification Characteristic	Specification/ Requirement		Measurement Method	Sample Size	Frequency	Who Measures	Where Recorded	Decision Rule/ Corrective Action	SOP Reference
		KPOV	KPIV		USL	LSL							

Control Plans



Step 7: Impact on the Gap, Standardize, Share

- What did you learn?
- What would you do differently next time?
- Who else could benefit from your efforts?

Look at these viewpoints



*A Good Process Helps Us Repeat Good Results
Sustain the Gains!*

Quantify Results – Why it Matters



- Measure impact and communicate success
- Demonstrate ROI and business value
- Inform decision-making for next steps to take
- Track progress over time and identify trends



NOTE: Connect with your BA APEX POCs or visit their websites for how to quantify your A3 results (slide 113).

“If you can’t measure it, you can’t improve it.” – Peter Drucker



Key Points



- PDCA and A3 are iterative processes
- Both are structured problem-solving approaches
- A3's a visual tool that communicates impact on one sheet of paper
- A3 solves problems focused on desired results through root cause and waste analysis and other lean tools
- A3 drives countermeasures to test solutions until desired outcome is achieved
- A3 focuses on sustaining the gains, documenting and communicating results

Resources and Call to Action



Resources

- [APEX Teams Channel](#)
- [APEX Website](#)
- [APEX Business Area POCs](#)
- [AI A3 & Charter Tool](#)
- [APEX Tools and Templates](#)

How to Get Involved

Work with your PMT and/or leadership to lead an A3 and post your results!

Visit your BA CI Tracker!

Aero
MFC
RMS
Space

Earn Your Badge



...Take Assessment...
Atlas Course Code:
223709TES01

LOCKHEED MARTIN 