PathStone Group

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THE CONTINUOUS IMPROVEMENT MODEL

Agenda

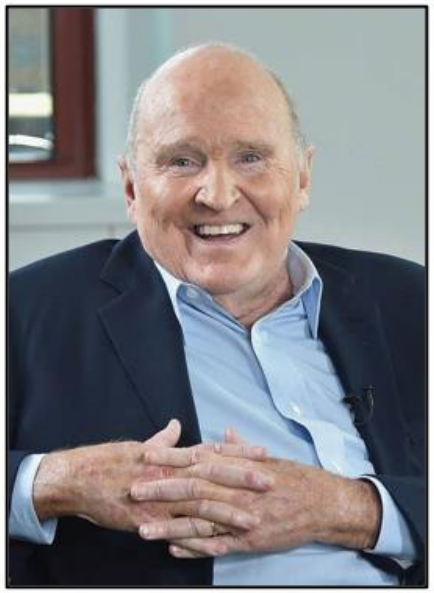
1. The CI Model: What is it ?
2. The CI Model purpose and benefits
3. Kaizen
4. DMAIC and The CI Cycle:
    - Define
    - Measure
    - Analyze
    - Improve
    - Control
5. PDCA and DMAIC
6. Takeaways

Introduction

What is it ?

In Lean, continuous improvement **is like a religion**. Although it seems like a simple thing to achieve, leaders and teams who are **not familiar with process improvement techniques are having a hard time sustaining it.**

To **implement this mindset**, we need to understand clearly what exactly continuous improvement is, what **principles** we need to follow, and check some of the **best practices**.



"Innovation doesn't arrive like a thunderbolt.
It emerges incrementally, in bits and chugs,
forged by a mixed bag of coworkers from up, down, and across the organization."

Jack Welch
Former CEO, General Electric

Introduction

Purpose and Benefits

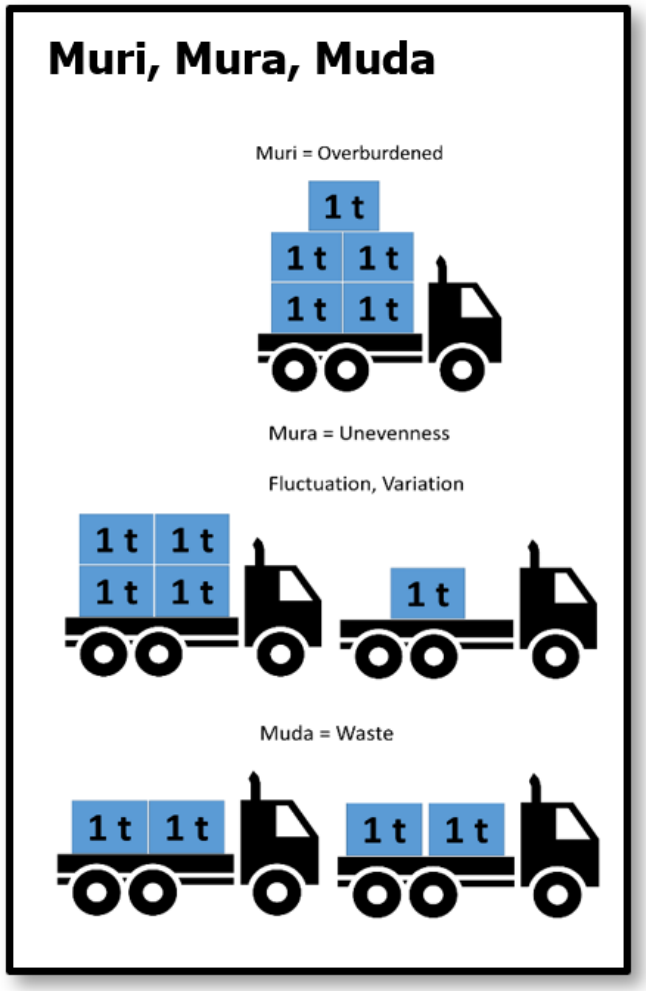
Continuous Improvement is a never-ending strive for perfection in everything we do. In Lean management, continuous improvement is also known as **Kaizen**.

In the Lean methodology, continuous improvement seeks to improve every process in a business by **focusing on enhancing the activities that generate the most value** for the customer while **removing as many waste activities** as possible.

The CI Model

There are three definitions of waste in Lean:

- **Muda** – The eight wastes ("DOWNTIME")
- **Mura** – The waste of unevenness
- **Muri** – The waste of overburden

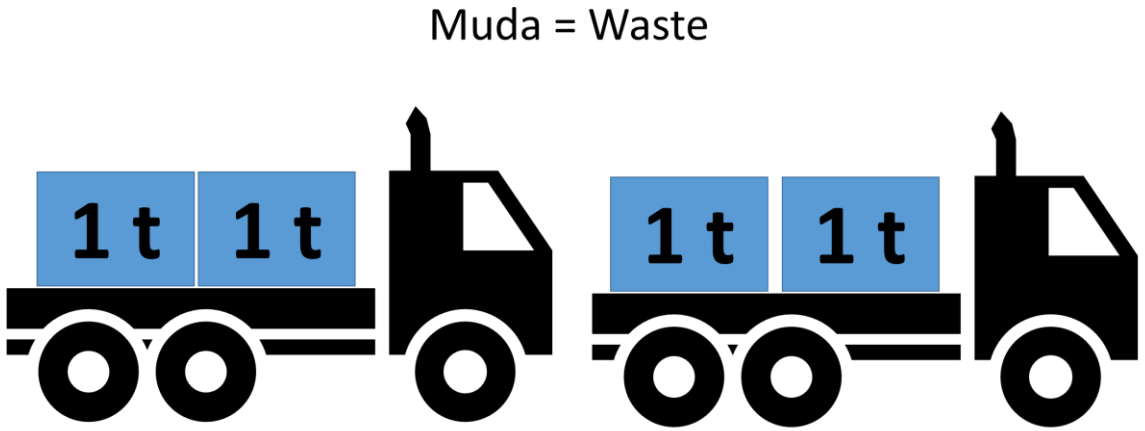


The CI Model

Muda – The eight wastes ("DOWNTIME")

Comprises the eight major process wastes: **transport, inventory, motion, waiting, overproduction, over-processing, defects, and non-utilized talent.**

Removing all of them completely is **nearly impossible** but focusing on minimizing their negative effects at the workplace is crucial for the successful implementation of continuous improvement.



The CI Model

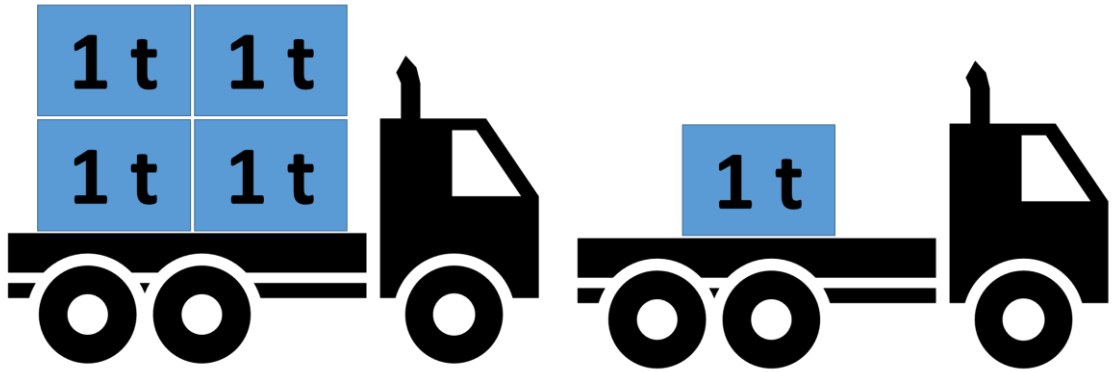
Mura – The waste of unevenness

It is caused by **unevenness** or **inconsistency** in the process. It handles many of the 8 wastes of Muda.

Mura stops our tasks from **flowing smoothly** across the work process and, therefore, gets in the way of reaching continuous flow.

Mura = Unevenness

Fluctuation, Variation



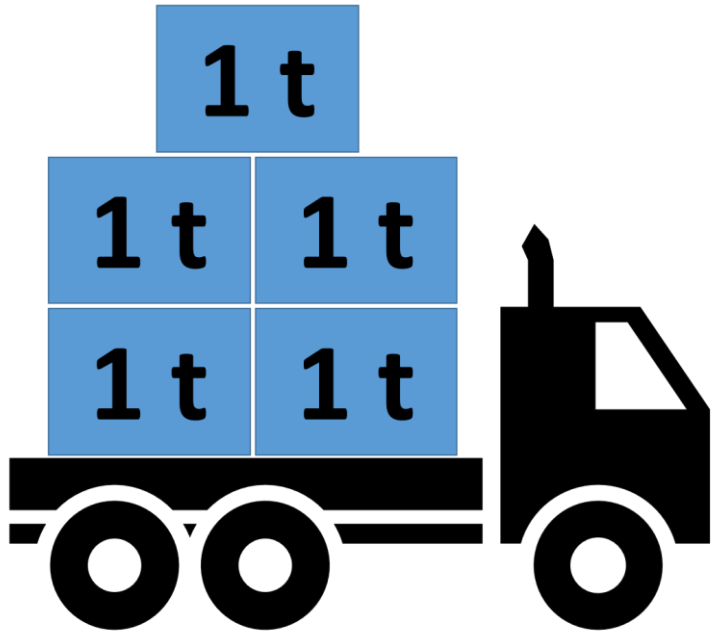
The CI Model

Muri – The waste of overburden

Muri is a major problem for companies that apply push systems. When we assign **too much work to the team**, we **place unnecessary stress** on both the team and process.

Muri is usually a result of Mura and if we want continuous improvement to become part of the business culture, we need to **focus on getting rid of those wastes**.

Muri = Overburdened



The CI Model

Kaizen

The original meaning of the Japanese word "Kaizen" could be literally translated as ***"The act of making bad points better".***

The more popular translation is ***"change for better"***, also standing for improvement.

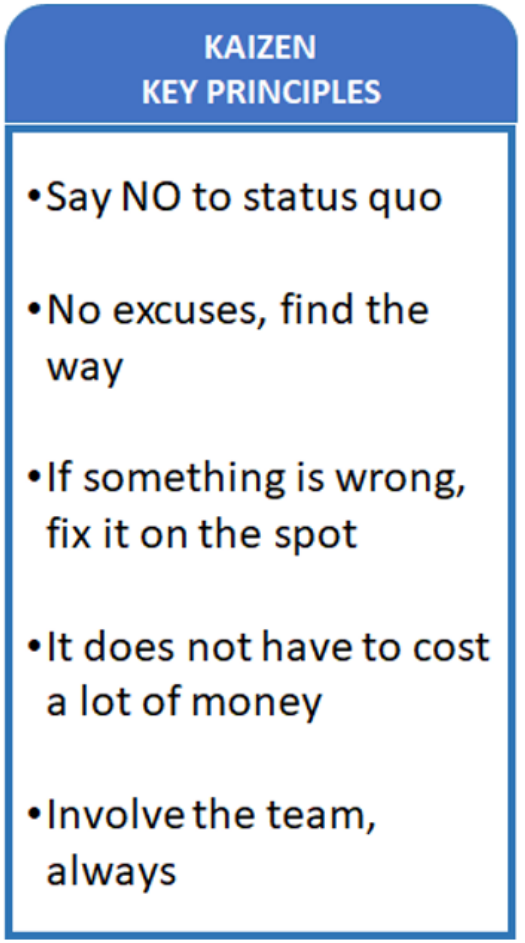
The CI Model

Kaizen

Kaizen is more of an **internal process** that happens within **our own mind**. The goal is to realize our potential, break the status quo, and this way achieve improvement.

A more precise way to define Kaizen would be of **"continuous self-development."**

Kaizen Principles



The CI Model

Kaizen

Toyota is the brightest example of a company that made an **excellent practice of continuous improvement,** creating effective management systems to generate, capture, and review improvements in never-ending cycles.

Toyota's overall system of techniques for production management is called the **Toyota Production System (TPS).** The system rests upon several core principles, one of which is labeled **Kaizen**.

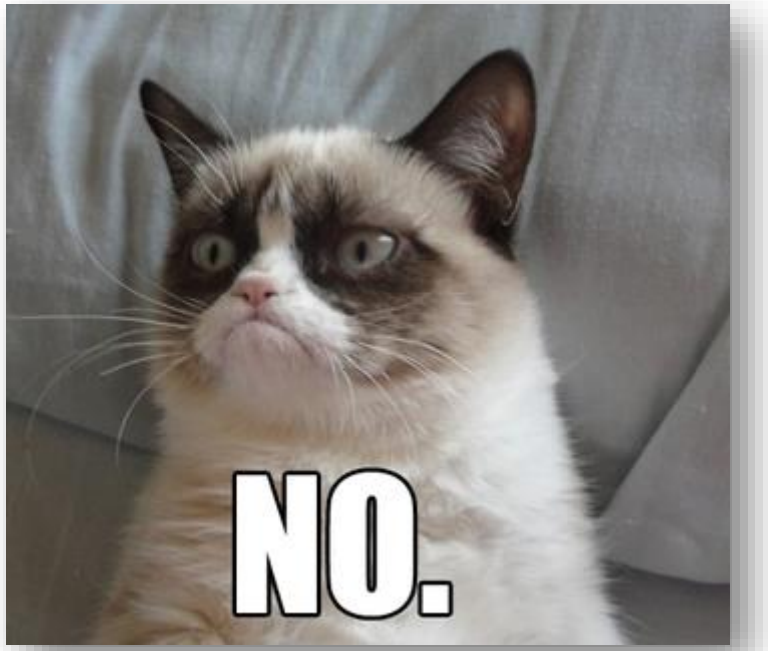
The CI Model

Kaizen

However, most of us are programmed to **resist radical change**; our nervous system wires us for resistance to a big overhaul of any kind.

This truth applies **not just to managers but also to the employees we need to carry out our programs for change**.

If we have tried to change an organization and met with disappointment, there is no reason to feel guilty, **it is challenging and sometimes takes years.**



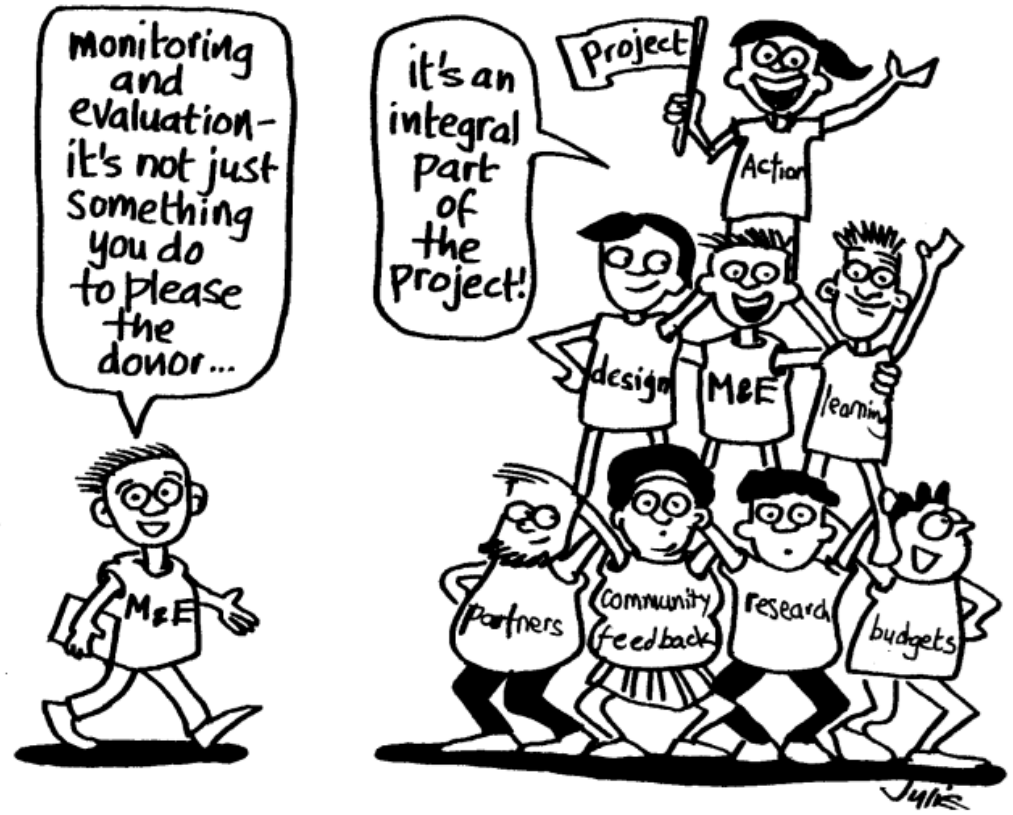
The CI Model

Kaizen

To achieve Kaizen, we need first to adopt the **practice of self-criticism**.

In Japanese, that practice is known as **"Hansei."**

This means that we need to **hold ourselves accountable** and **find room for improvement,** even if everything is going according to plan.

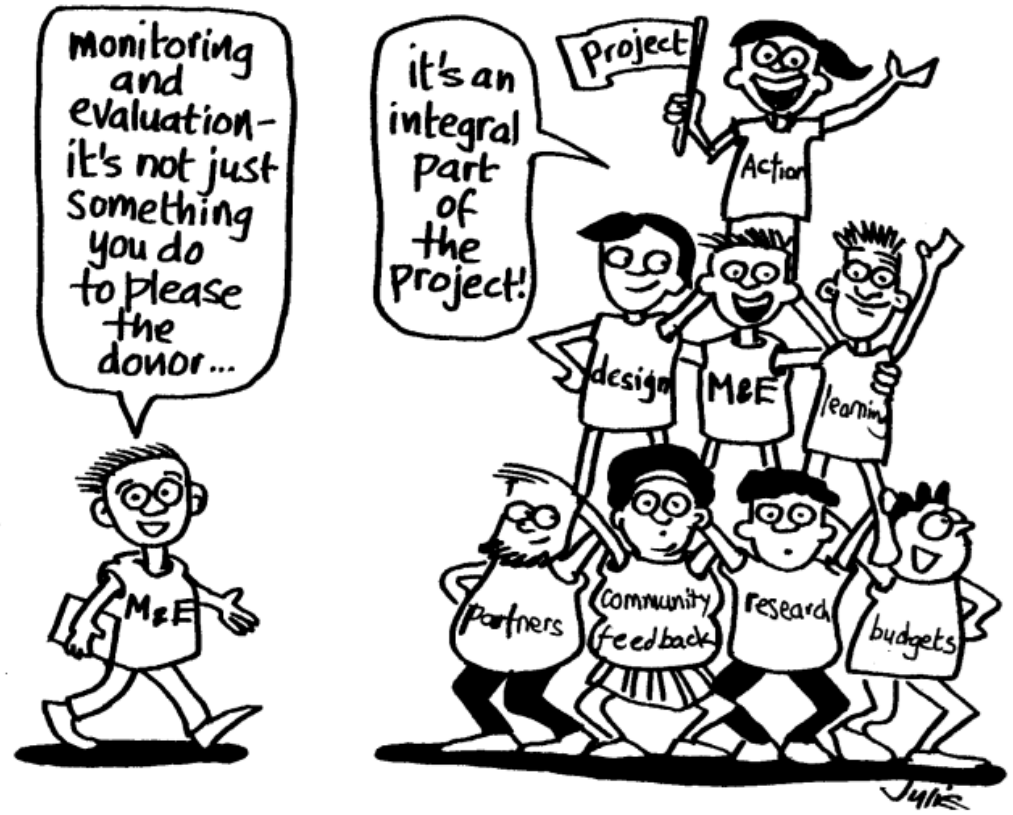


The CI Model

Kaizen

Adopting this type of mindset will give us the ability to **break the status quo** and push ourselves to the **limits**.

While positive thinking will show us everything as a success, it is the negative emotion of **"it could've been better"** that will give us the motivation to improve continuously and eventually conquer new peaks.

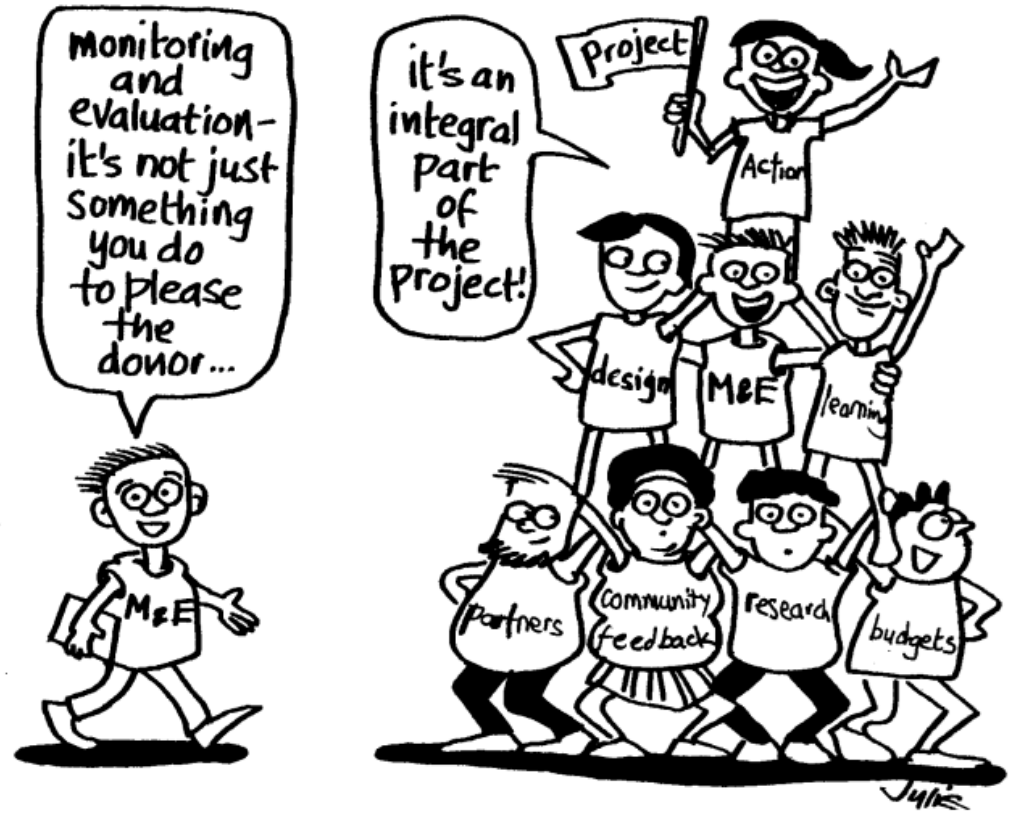


The CI Model

Kaizen

Some of the most remarkable benefits of having an established Kaizen culture are:

- **Everyone Speaks the Same Language**
- **Creates a Growth Mindset**
- **Increases Motivation**
- **Better Acceptance of New Ideas**

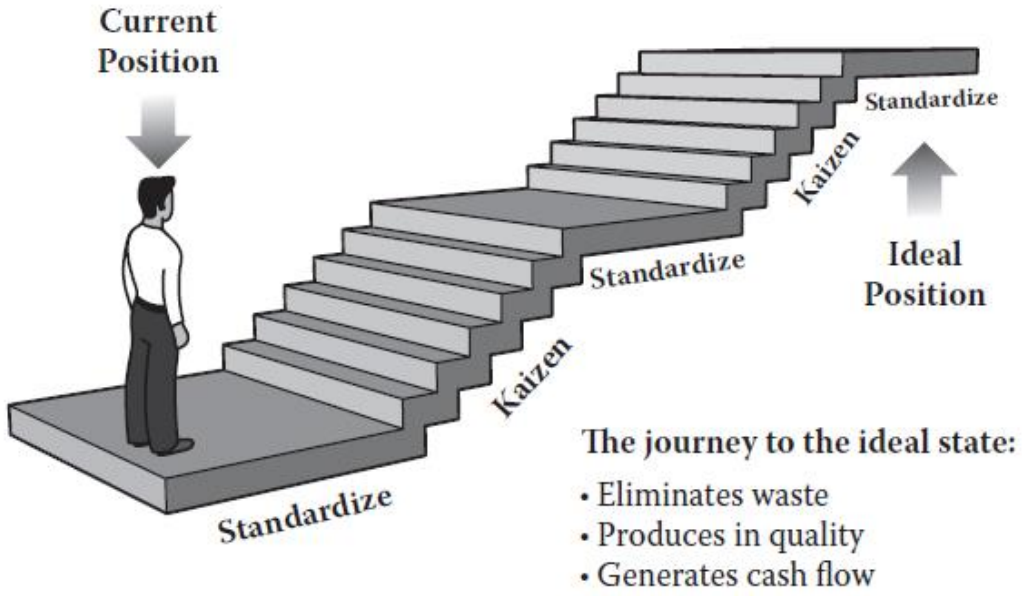


The CI Model

Kaizen

Kaizen Stabilization.

Once a continuous improvement project has been implemented, the organization needs to stabilize to realize **fully the benefits of the change** and begin the Kaizen Journey to **build momentum** and **stabilization**.



The CI Model

Kaizen

Lowering the Water.

When the kaizen activity is implemented, **the water is lowered**; the problems that were exposed before are amplified and problems that were being covered up by the inefficiency of the operation **are now exposed** and **causing problems** in the operation as well.

Even though this seems like an undesirable scenario, this is the desired condition of kaizen. It is only through this process of kaizen that we can **"lower the water"** and **expose our problems**. A problem that is not exposed can never be fixed.

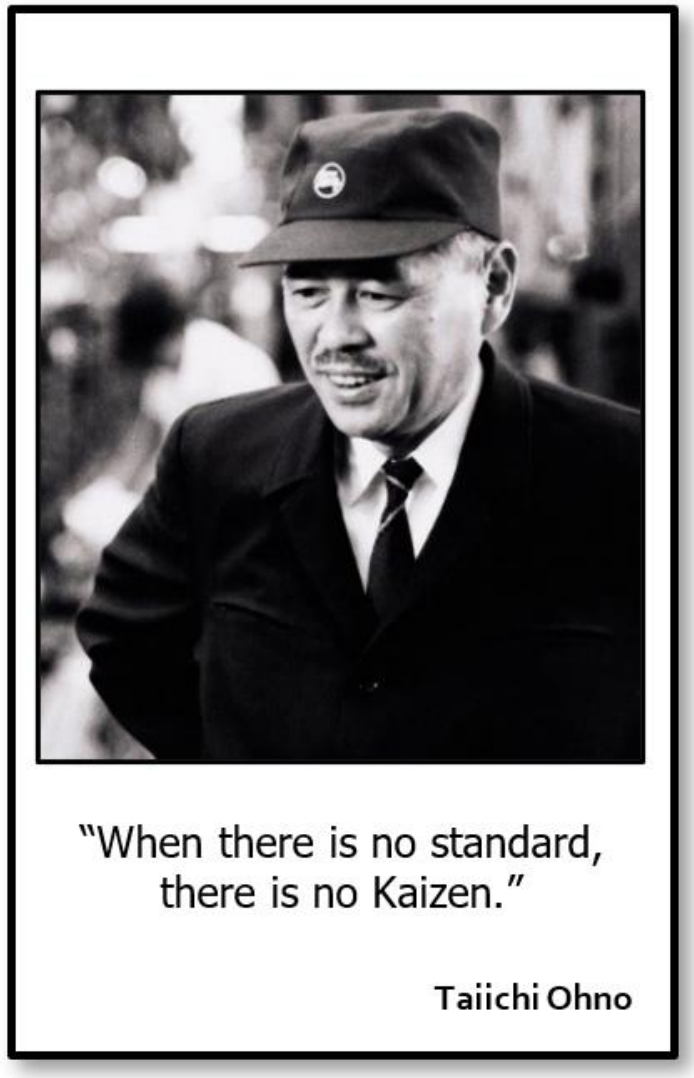
The CI Model

Kaizen

Lowering the Water.

It is one thing to "lower the water," but we must be prepared to deal with what we uncover. This is where stabilization comes into play. It is important for all organizations to **have stable operations**.

When an organization is establishing a continuous improvement process, the **need for stability is essential** for facilitating the cycle.



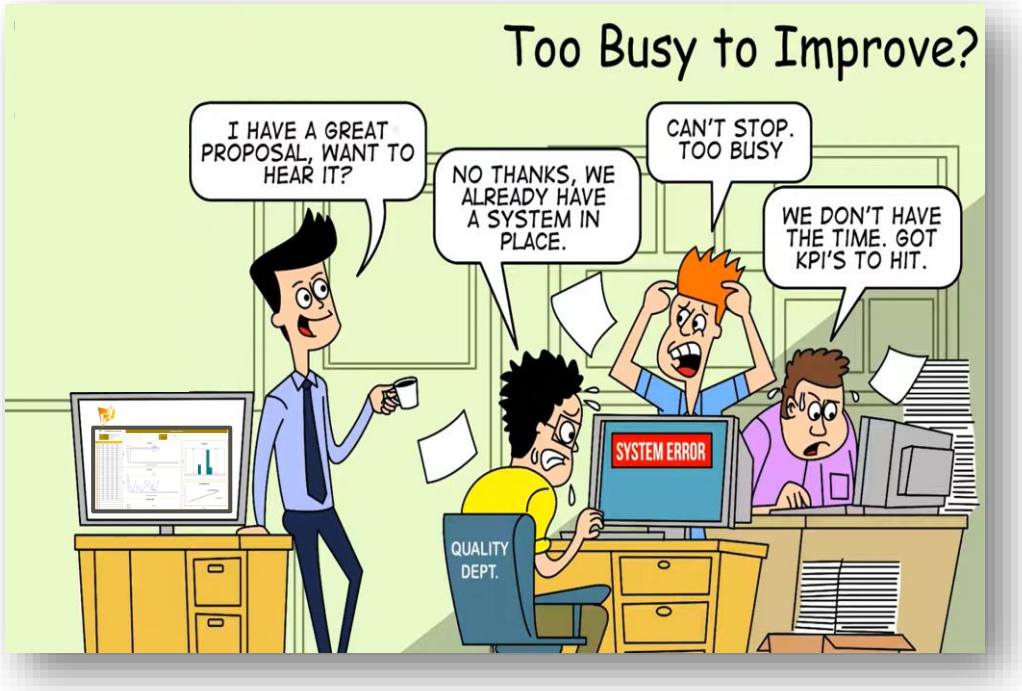
The CI Model

Kaizen

Lowering the Water.

Establishing **operational KPIs** that need to be managed during implementing the project is helpful for monitoring the contribution of the current projects.

Although it is necessary for the project team to support the changed processes, it is also necessary to **manage the level of support that is being used to achieve the current level of results.**



The CI Model

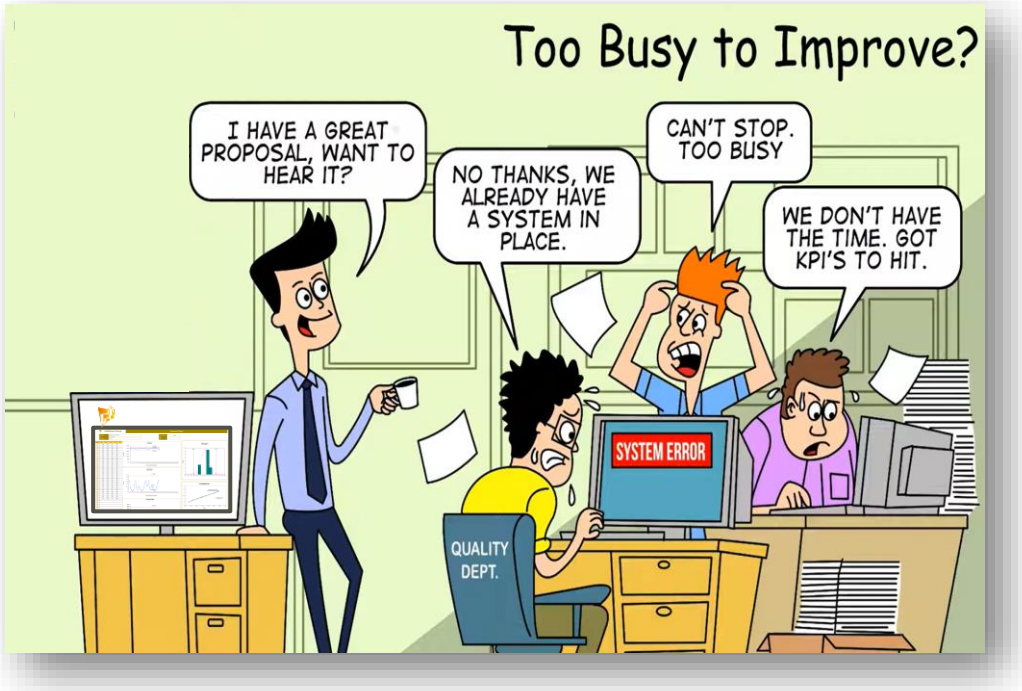
Kaizen

Lowering the Water.

By understanding the **current plant efficiency** and the level of support provided, we can determine the steps for stabilizing the operation.

A lot of excellent projects lose momentum and ultimately fail because the project manager and the plant manager **failed to make sure the plant was stabilizing before starting the next level of activity.**

This is the leading reason that many organizations **give up on the continuous improvement process.**



The CI Model

DMAIC and the CI Cycle

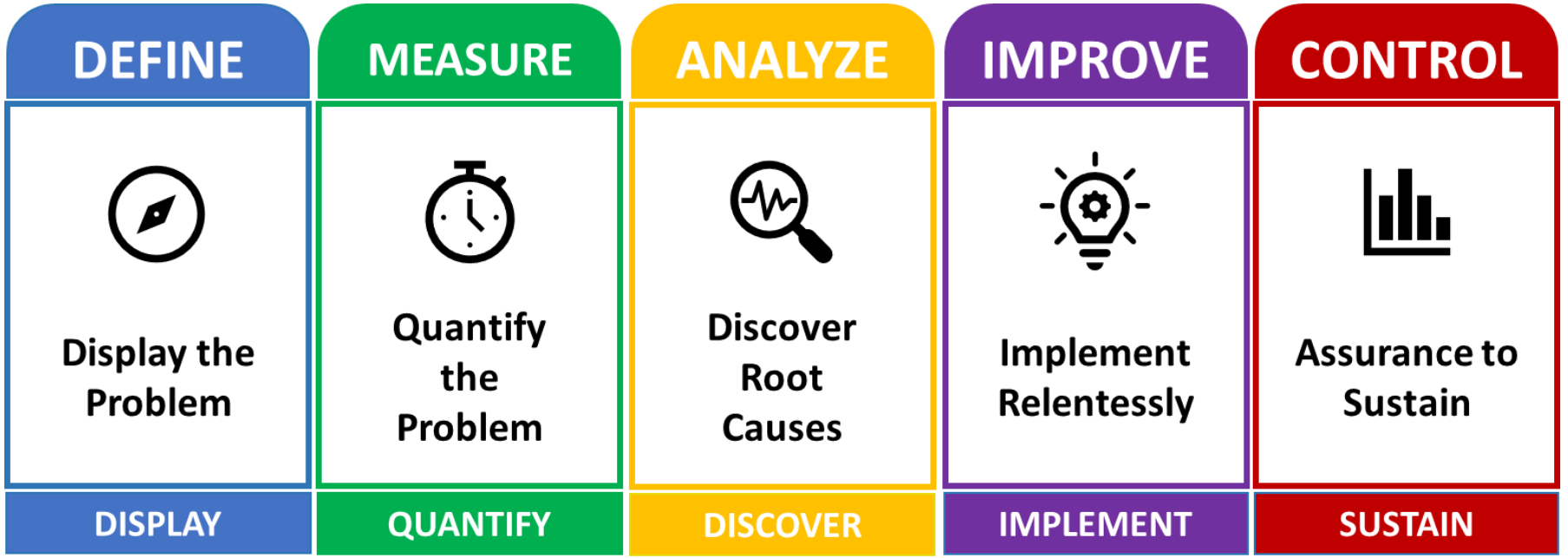
DMAIC is a quality improvement and problem-solving method used to **improve business performance**.

During the DMAIC process, improvement happens project by project; a "project" can be best defined as a **"problem scheduled for a solution."**

This means management has decided it is **important enough** to schedule the resources it needs to get the problem solved.

The CI Model

DMAIC and the CI Cycle



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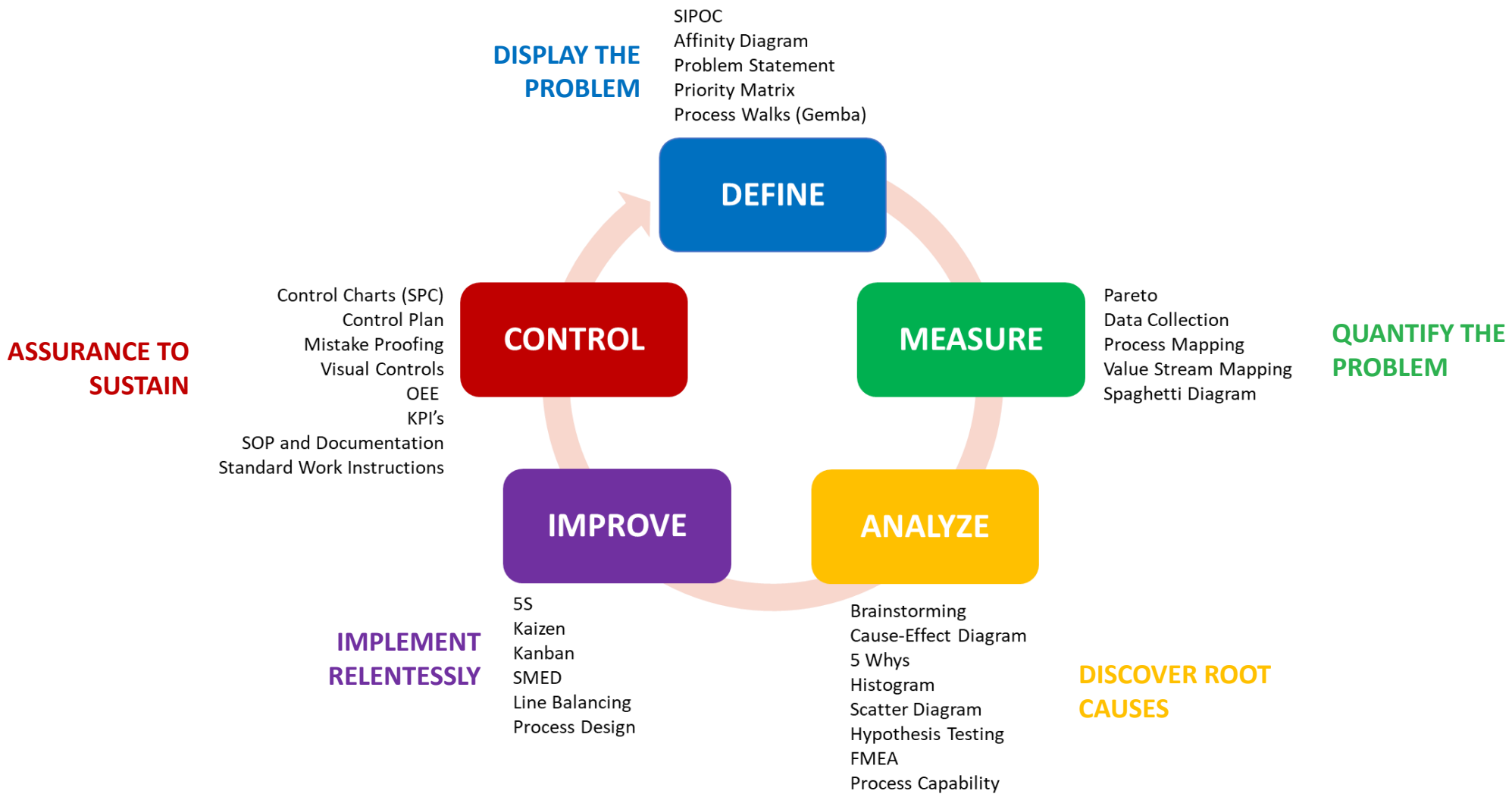
DMAIC Cycle and Tools.



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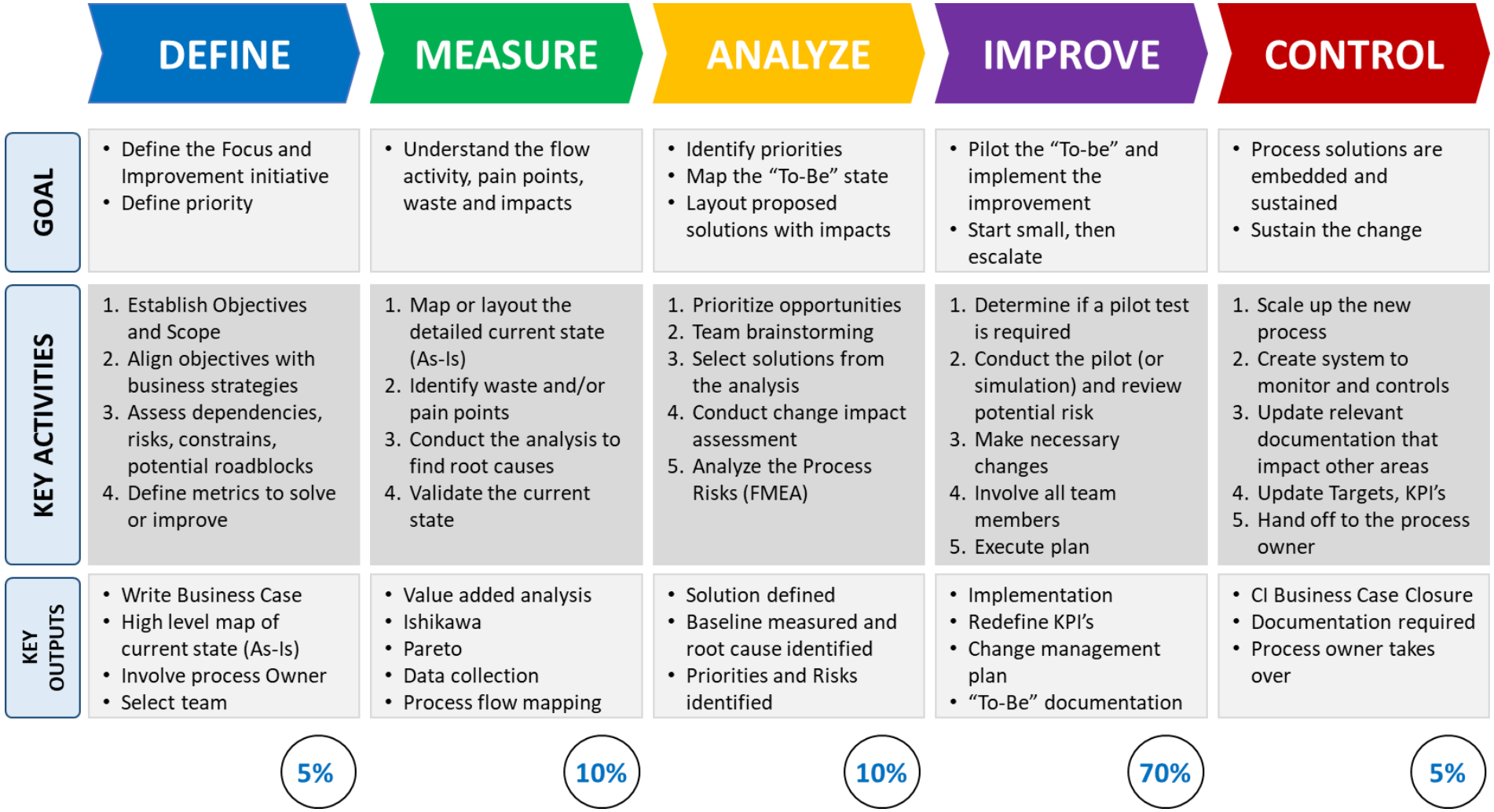
DMAIC Roadmap.



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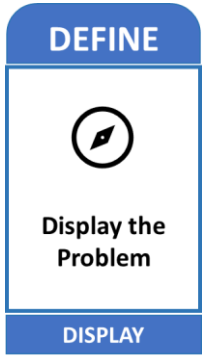


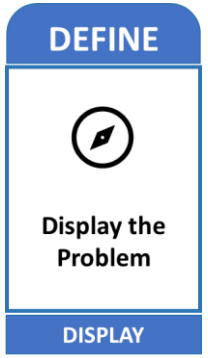
- **Defines the problem,** asking questions of both **internal** and **external customers** to affirm that the issue really exists.
- Focuses the organization on the customer and measures of the **customer needs** and the **process.**
- Sets the stage for the project. From this customer's knowledge, the organization or team can **select the project charter, scope, and problem definition.**
- This is the time to map the process and complete the **AS-IS map**.
- The **voice of the customer** is used to get the customer focus and viewpoint of the **critical to quality** (CTQ) characteristics of the product or service.

DEFINE

DISPLAY THE PROBLEM

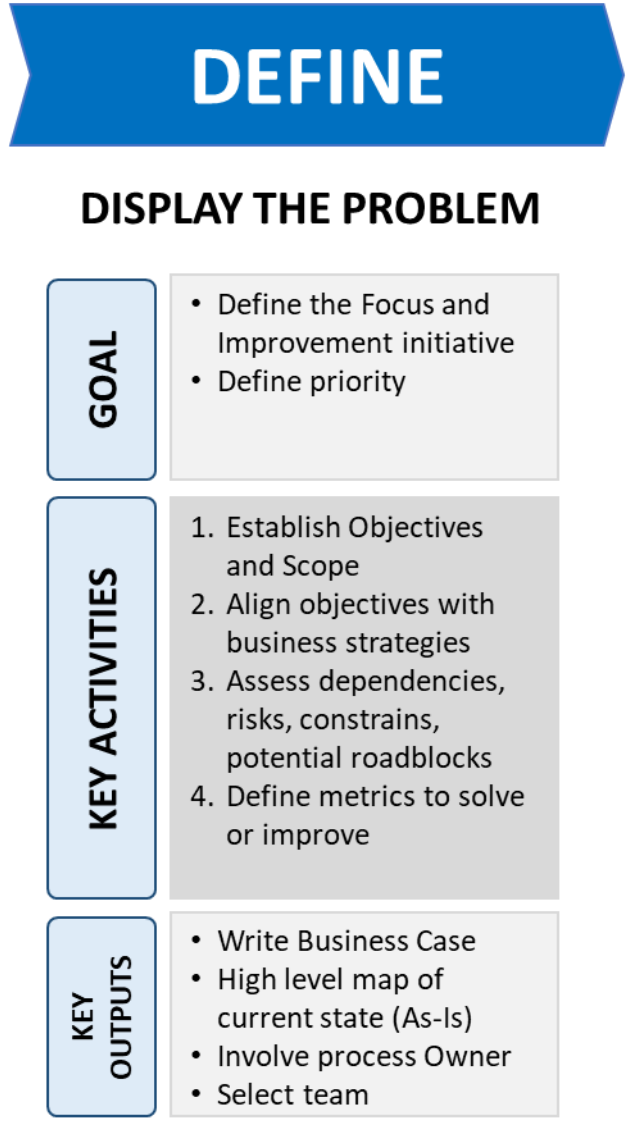
GOAL	• Define the Focus and Improvement initiative • Define priority
KEY ACTIVITIES	1. Establish Objectives and Scope 2. Align objectives with business strategies 3. Assess dependencies, risks, constrains, potential roadblocks 4. Define metrics to solve or improve
KEY OUTPUTS	• Write Business Case • High level map of current state (As-Is) • Involve process Owner • Select team

The CI Model



Tools for DMAIC Define Phase

- Describe the Stakeholder and/or process owner.
- Collection of the voice of the customer (VOC) using the voice of the customer matrix.
- Voice of the customer to critical to quality translation.
- High-level process map (SIPOC diagram).
- Problem Statement.
- Priority Matrix.
- Process Walks (Gemba Walks) to understand the problem.
- Project Charter template (One-Page Charter is better).



The CI Model

DEFINE

Display the Problem

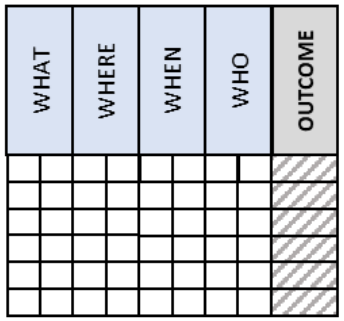
DISPLAY

1

IMPROVEMENT OPPORTUNITY

2

DATA SOURCE

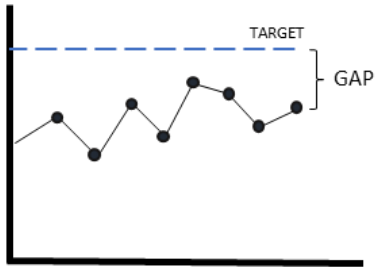


3

STRATIFY AND SIMPLIFY THE DATA (PIVOT TABLE)

4

"DISCOVER" THE GAP



5

SELECT THE TEAM

6

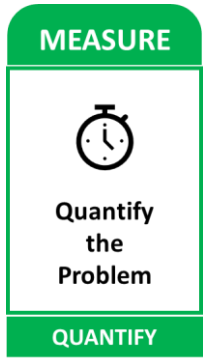
PROBLEM STATEMENT DATA DRIVEN

7

ACTION PLAN (GANTT CHART)

TOLLGATE

The CI Model



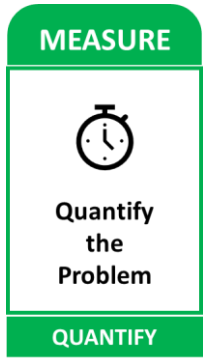
- The project team assesses the current **baseline performance** of the problem, **collecting** and **interpreting** the available data on current performance.
- This often leads to a redefining of the problem to focus on the most pressing or '**vital few issues**.'
- **Measure the current process and decide what to improve.** We are also collecting data about defects and their potential causes. The process map may need further detail.
- **Defects analysis** is used to determine whether the process contains any special causes and is stable.
- Before calculating the sigma level of the process, **special causes** and **stability issues need to be solved.**

MEASURE

QUANTIFY THE PROBLEM

GOAL	• Understand the flow activity, pain points, waste and impacts
KEY ACTIVITIES	1. Map or layout the detailed current state (As-Is) 2. Identify waste and/or pain points 3. Conduct the analysis to find root causes 4. Validate the current state
KEY OUTPUTS	• Value added analysis • Ishikawa • Pareto • Data collection • Process flow mapping

The CI Model



Tools for DMAIC Measure Phase

- Pareto Analysis.
- Data Collection Plan.
- Detailed Process Mapping (AS-IS).
- Value Stream Mapping.
- Spaghetti Diagram.

MEASURE

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The CI Model

MEASURE

Quantify the Problem

QUANTIFY

1

Muda
Muri
Mura

Delays
Defects
Deviations

8 Waste

GO TO THE GEMBA

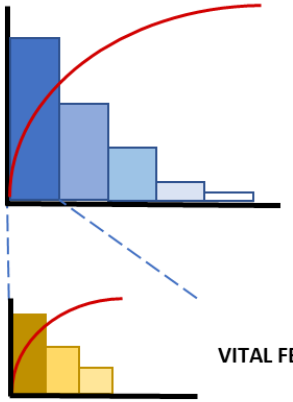
2

WHAT	Trial 1	Trial 2	Trial 3	OUTCOME
A	X			X
B		X	X	XX
C			X X	XX
D	X			X
E		X		X
F	X	X	X	XXX

DATA COLLECTION

a

HISTOGRAM OR PARETO



VITAL FEW

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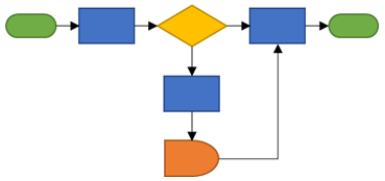
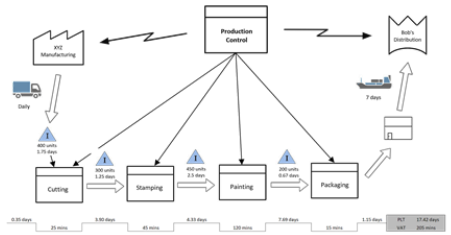
PROCESS MAP "AS-IS"



c

VSM "CURRENT"



TOLLGATE

The CI Model

- Collects and uses data to **prove theories** of root cause or causes of the problem.
- Take enough time to collect and analyze all the data to determine when, where, what, and how the variation affects the process performance.
- The problem may become **more focused,** and the charter and scope of the problem definition **may have to be changed**.
- **Special causes** must be taken care of before we can improve upon the **common causes** of the process. We usually look at the process as **unstable** until the special causes are resolved.
- At the end, the team will have **narrowed down** their potential solutions to a **vital potential few root causes.**

ANALYZE

DISCOVER ROOT CAUSES

GOAL	• Identify priorities • Map the "To-Be" state • Layout proposed solutions with impacts
KEY ACTIVITIES	1. Prioritize opportunities 2. Team brainstorming 3. Select solutions from the analysis 4. Conduct change impact assessment 5. Analyze the Process Risks (FMEA)
KEY OUTPUTS	• Solution defined • Baseline measured and root cause identified • Priorities and Risks identified

The CI Model

Tools for DMAIC Analyze Phase

- Calculating Sigma Level.
- Graphs and Charts.
- Brainstorming.
- Stratification.
- Histograms.
- Box Plots.
- Scatter Diagrams.
- Cause and Effect Diagrams.
- 5 Why Analysis.
- Failure Mode and Effect Analysis (FMEA).
- Impact Control Matrix.
- Process Modeling and Simulation.

ANALYZE

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The CI Model

ANALYZE

Discover Root Causes

DISCOVER

1

ROOT-CAUSE ANALISYS

2

5 WHY's

3

BRAINSTORMING

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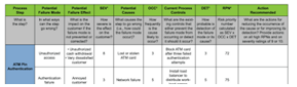

FMEA

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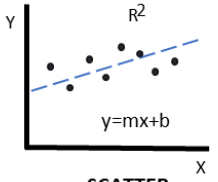

SCATTER

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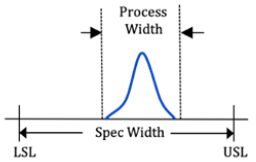

PROCESS CAPABILITY

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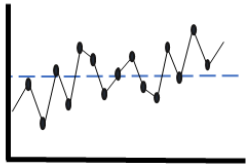

RUN CHART

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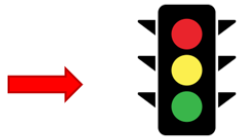
VA & NVA ANALYSIS



TOLLGATE

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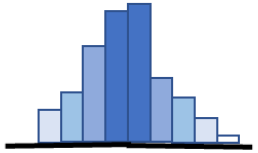

FREQUENCY PLOT (HISTOGRAM)

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SIMULATION

The CI Model

- This is when the project team begins the **remedial journey** and **begins acting** on what they have learned by making improvements. The team will:
  - Generate alternative solutions.
  - Design the solution.
  - Prove the effectiveness of the solution.
  - Implement the solution.
- Determine which of the many **available solutions** should solve the root cause, or causes, of the problem.
- Develop **implementation plans,** conduct a **pilot run** of the changed process, and develop the **best levels** for the process to **maintain a consistent output**.
- The results are **verified** and **measured** at this point to ensure that the **selected solution will work.**

IMPROVE

IMPLEMENT RELENTESSLY

GOAL	• Pilot the "To-be" and implement the improvement • Start small, then escalate
KEY ACTIVITIES	1. Determine if a pilot test is required 2. Conduct the pilot (or simulation) and review potential risk 3. Make necessary changes 4. Involve all team members 5. Execute plan
KEY OUTPUTS	• Implementation • Redefine KPI's • Change management plan • "To-Be" documentation

The CI Model

Tools for DMAIC Improve Phase

- Brainstorming
- Solution Matrix
- Barriers and Aids Chart
- Pilot Study
- Mistake Proofing
- Benchmarking
- Pugh Matrix
- Process Modeling and Simulation

IMPROVE

IMPLEMENT RELENTESSLY

GOAL	• Pilot the "To-be" and implement the improvement • Start small, then escalate
KEY ACTIVITIES	1. Determine if a pilot test is required 2. Conduct the pilot (or simulation) and review potential risk 3. Make necessary changes 4. Involve all team members 5. Execute plan
KEY OUTPUTS	• Implementation • Redefine KPI's • Change management plan • "To-Be" documentation

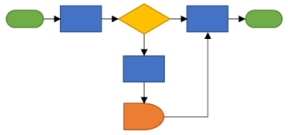
The CI Model

1

DISCUSS POTENTIAL SOLUTIONS

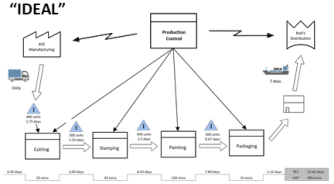
a

PROCESS MAP "TO-BE"



b

VSM "IDEAL"



2

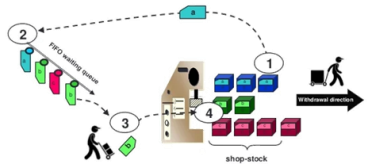
SOLUTIONS ACTION PLAN

3

PILOT TEST (START SMALL)

a

KANBAN



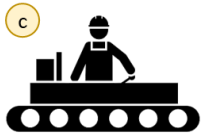
b

SMED

d

IMPROVE 5S

c



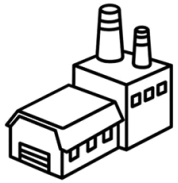
LINE BALANCING

e

ERROR PROOF (Poke-Yoke)

5

TEST AND LEARN SCALE UP GRADUALLY



FULL IMPLEMENTATION

TOLLGATE

The CI Model

- The control phase is when the project team ensures we held **gains** made during the improve phase, and the problem **does not recur**.
- Prevent the improvements made from **slipping back** to the original level.
- Use proven tools to ensure that the process stays in a **controlled state**. From statistical control charts to audit plans that will control the **process parameters**.
- The final **documentation changes, training**, and **methods of monitoring** the process are determined and implemented.
- Consider plans for **future improvement** and **lessons learned** at the end of the project.

CONTROL

ASSURANCE TO SUSTAIN

GOAL	• Process solutions are embedded and sustained • Sustain the change
KEY ACTIVITIES	1. Scale up the new process 2. Create system to monitor and controls 3. Update relevant documentation that impact other areas 4. Update Targets, KPI's 5. Hand off to the process owner
KEY OUTPUTS	• CI Business Case Closure • Documentation required • Process owner takes over

The CI Model

Tools for DMAIC Control Phase

- Identify control subjects
- Establish a measurement for control
- Establish standards of performance
- Measure actual performance
- Compare actual measured performance to standards
- Take action on the difference
- Process Control Plan
- Control Charts
- Shift Production Controls (Production Reporting)

CONTROL

ASSURANCE TO SUSTAIN

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The CI Model

CONTROL

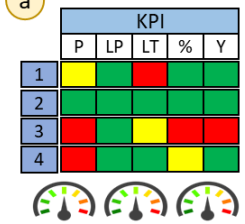
Assurance to Sustain

SUSTAIN

1

IMPLEMENT CONTROLS

a

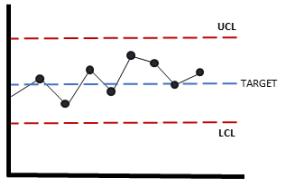


KPI BOARD

b

SOP

c

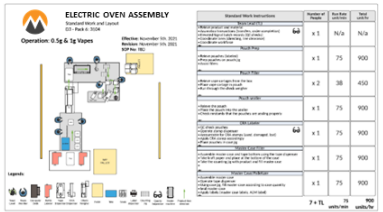


PROCESS CONTROL CHART (SPC)

d

OEE

e



STANDARD WORK INSTRUCTIONS

f

VISUAL MANAGEMENT (KANBAN BOARD)

2

TRAIN STAKEHOLDERS

3

REVIEW AND RECALCULATE HARD AND SOFT GAINS

4

HAND OFF TO PROCESS OWNER

5

CELEBRATE & LESSONS LEARNED

The CI Model

Impact of Lean Six Sigma and DMAIC Methodology

The Lean Six Sigma DMAIC methodology provide a framework to assist organizations in attaining superior quality, sustainable results, and financial returns. They do this by:

1. Assuring that **quality thinking** becomes the way of doing business, creating a focus on customers, and building customer loyalty.
2. Applying **proven tools** to improve goods and services and achieve breakthrough performance.
3. Defining process performance **metrics** that tie to organizational goals.
4. Creating a focused **lean culture** that is **fun** and provides a pragmatic way to achieve greater levels of process quality.
5. **Identifying** projects to drive the improvement that will yield superior quality and sustainable results.

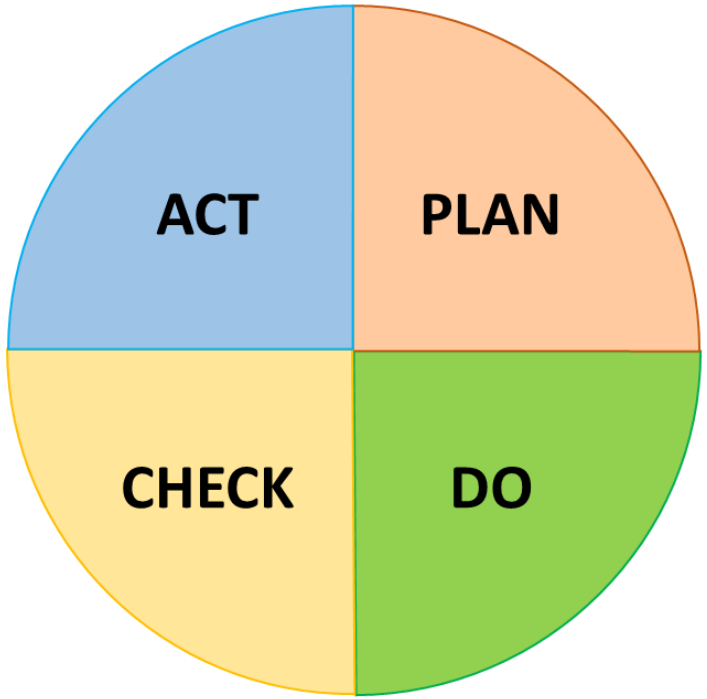
The CI Model

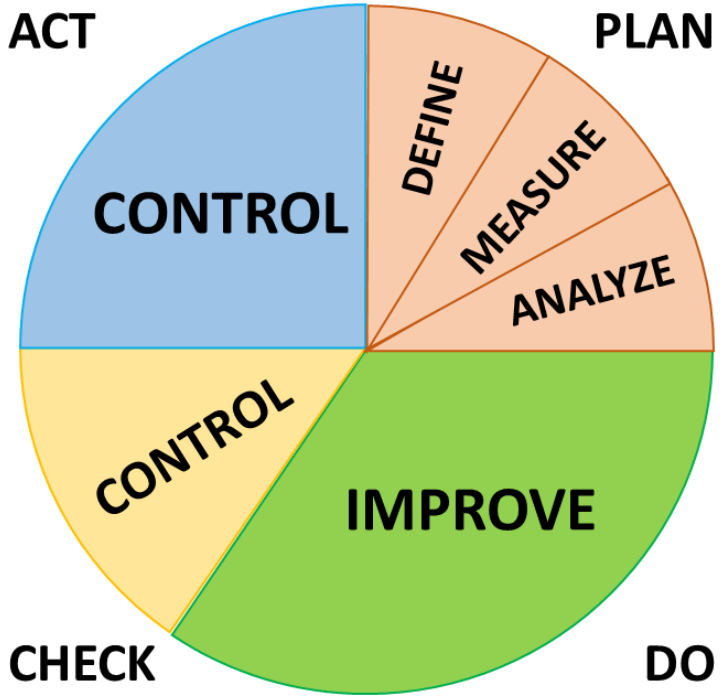
Differences Between PDCA and DMAIC

	LEAN: PDCA	SIX SIGMA: DMAIC	
PLAN	Detect improvement opportunity, do a quick root cause analysis, identify potential root causes and potential contermeasures	**DEFINE**	Define problem, have sponsor and champion, schedule toolgates, establish CTQ metric and a preliminary problem statement
		Tollgate	
		MEASURE	Choose outcome indicator, baseline metrics, and areas of opportunity
		Tollgate	
		ANALYZE	Root cause analysis and other testing tools (Cause-effect, Hypothesis testing if needed)
		Tollgate	
DO	Implement the countermeasures and/or improvement initiative, test and verify the improvement	**IMPROVE**	Brainstorm the potential solutions, verify the root causes, implement, perform a pilot test.
		Tollgate	
CHECK	Review the results	**CONTROL**	Review results, report implementation, adjust where necessary. Hand off and close project.
ACT	Adjust where necessary, implement and report results		

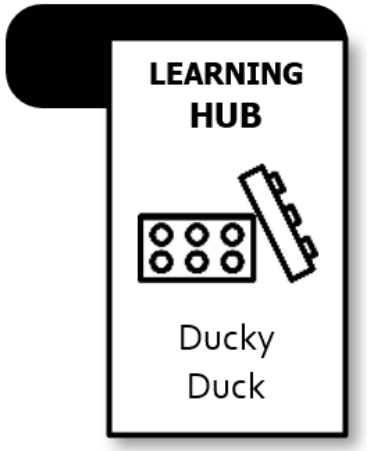
The CI Model

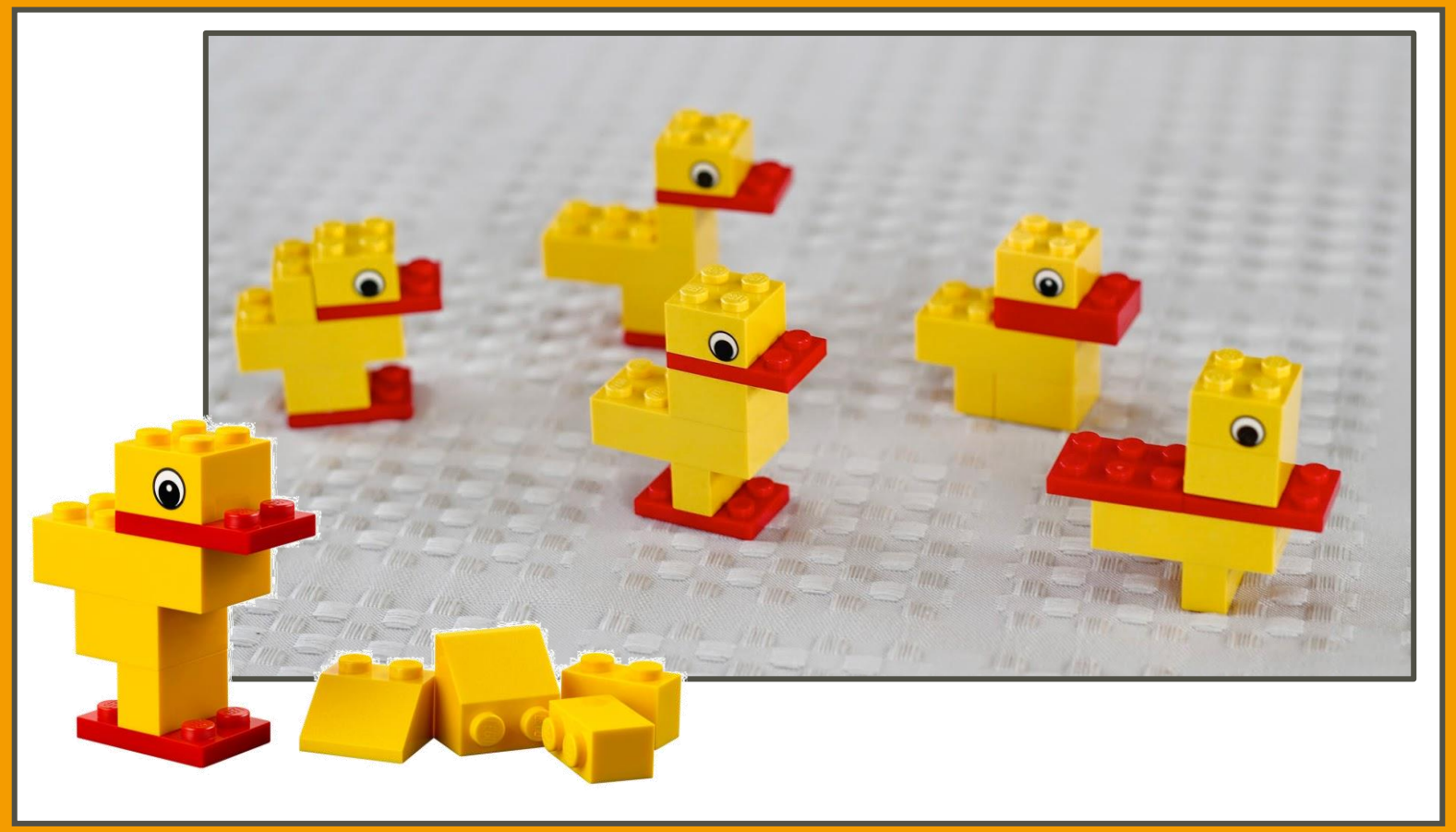
Differences Between PDCA and DMAIC





LEGO Defect Process Control





TOOLBOX

Kaizen Project Template

Kaizen Project Template

PathStone Group

STANDARD KAIZEN (QUICK WIN INITIATIVE)

PROJECT TITLE:	Pouch packing underweights	SHIFT	DEPT / AREA / PROCESS	SECONDARY	PACK 3	FLOWER AUTOPACK
PROJECT LEAD:	Bill Gates	PM	DATE:	feb 12 2022		

LOSS TYPE — LACK OF QUALITY - MACHINE: ☐ SAFETY ☐ COST REDUCTION ☐ QUALITY CONTROL ☑ CONTINUOUS IMPROVEMENT ☐ EQUIPMENT IMPROVEMENT ☐ THE 8 WASTE ☐ WO (WORKPLACE ORGANIZATION)

PROBLEM DESCRIPTION

5W+1H

WHAT	What does the problem look like? What product, machine, material was being used? What size?
WHEN	When did the problem occur? When in the sequence of operation; startup, continuous running, intermittent problem, shutdown, changeover?
WHERE	Where did you see the problem? Where on the equipment or material did you see the problem?
WHO	Who does it effect? Everyone? Or is it less of a problem for some individuals or teams? (If so, what info can they offer?, Is it skill related? Is there a "knack"?
WHICH	Which trend or pattern does the problem have? E.g. Is the problem more frequent on Monday mornings? After a change-over? Which direction does the problem happen in?
HOW	How is the state of the equipment changed from the optimal? How many times does the problem occur?

SYMPTOMS

1ST WHY
2ND WHY
3RD WHY
4TH WHY
5TH WHY

TARGET REDUCE UNBALANCE

SKETCH OF THE PROBLEM

DESCRIPTION OF SOLUTION

SOLUTION	WHO	DATE(s): MM/DD/YY
1)		
2)		
3)		

SKETCH OF SOLUTION

EXPANSION, STANDARDIZE, COST BENEFIT

CAN THIS KAIZEN BE IMPLEMENTED ELSEWHERE?

WHERE?	WHO?	HOW?	INFORMED?

WHAT STANDARDIZE METHOD HAS BEEN DEPLOYED?

POKE-YOKE ☐	5S ☐	TRAINING ☐	SOP ☐	☐	OTHER ☐
SWI ☐	VSOP ☐	CONTROL CHARTS ☐	WEEKLY AUDITS ☐	☐	

BENEFIT (LIST OUT THE BENEFITS):

PROVIDE VISUAL RESULTS (GRAPH, DATA)

KPI IMPROVEMENT		4M1D ROOT CAUSE	
COSTS	NET RESULTS	COST BENEFIT	VERIFIER & DATE
	$ -		
		COMPLETE DATE	HARD SAVINGS / SOFT SAVINGS

TOOLBOX

Business Case (Project Charter)

Business Case Project Charter Template

CONTINUOUS IMPROVEMENT BUSINESS CASE

PathStone Group

Process Area:	High fiber bagette product	Project initialization date:	March 1, 2022
Leader:	EE & WE	Project completion date:	
Process owner:	Adalberto Chung	Revision #:	2
Facilitator:	Erneso M	Revision Date:	March 24, 2022

Problem Definition

Project Name	
Waste Reduction (packaging lines focused)	
Start Date	**Estimated Completion Date**
March 23, 2022	August 1, 2020

Project Background

From the Q1 report, sales are significantly off track for where we expected to be based on budget. To help maintain profitability and protect cash flows, the team needs to lean in waste and/or scrap (W/S). In the past, the production teams have focused their efforts on increasing productivity, throughout and quality; however, it is also important to not lose sight of the Waste/Scrap (W/S) metric.

Project Scope/Project Focus

In Scope:	Packaging Processing (WIP Production, Packaging), food Waste, Process Re-design
Out Scope:	Packaging Materials, Print/Labelling Operations, Primary Processing

Problem Statement

Our current production reports record waste and Scrap (W/S), and although there is room to improve accuracy. Our reporting shows sufficient data to estimate historical levels in the different business units. Additionally, the Finance team works with an estimate of waste for costing rather than following historical data. The MRP system also has information that can support the W/S investigation. The team needs to confirm a reliable data source. It should also be determined which business unit generates most waste in terms of dollars and kilos. The area generating the highest cost will become the priority of this project.

Goal (Targets based on SMART)	**Expected Benefits** (Hard & Soft)
Build a process to capture and report accurate scrap	Current Waste at packaging operations:
Identify waste/scrap drivers within Packaging lines	Improve Waste / Produciton consumpion accuracy
Recommend and implement solutions to reduce the waste/scrap	

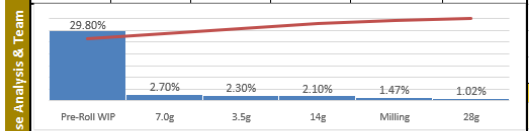
Key Metrics involved (Consider current KPI's)			**Strategic Goal Alignment** *(Type "X" in the box beside the goal)*	
Scrap Rate (food waste)				Net Sales $350M - 400M
Product Yield			X	Industry Leader in Cost & Operations
				Top 3 in Brand Recognition
				Building a Repurable Employment Brand

Cause Analysis & Team

Problem Symptoms (Attach initial insights)

Operation Unit

Pre-Roll WIP	Milling	3.5g	7.0g	14g	28g



- Current scrap percentage will include "overpack" and floor waste
- Pre-Roll WIP % includes Juannaroll and Autocone operations
- Need to investigate the method of capturing and reporting waste in reports and in

Team Member	Roles
Emanuel & Edgar & Songya	Facilitators, Investigation
Production Supervisors	Process Owners
Janelle Si	Cost Analysis
Engineering	Machine and Equipment Support

Potential Project Risks (High costs, safety concerns, labour skills, long timeframe, lack of installatio

Risk	Description
Lack of control after implementation	Initiatives are not being followed post implementation

The CI Model

How do we inspire the Continuous Improvement Culture ?

PathStone Group CI Principles

No Idea is a bad Idea

Speak with data, manage by facts

Good processes bring good results

Teamwork is the engine

Never give up

Takeaways

- The DMAIC methodology is a guide to keep the team and project moving forward efficiently. We often refer to the DMAIC steps as the "**boss of the project**."
- **Start small**, focus in "**quick wins**" or the "**low-hanging fruit**". When teams gain experience, they will be able to tackle more complex improvement opportunities.
- **Change management is crucial**. Study "The lean Transformation Strategy"
- PDCA versus DMAIC, they are quite similar; in the practical environment a blend of PDCA with DMAIC **can pull the best of both worlds.**

Thank You

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THE CONTINUOUS IMPROVEMENT MODEL

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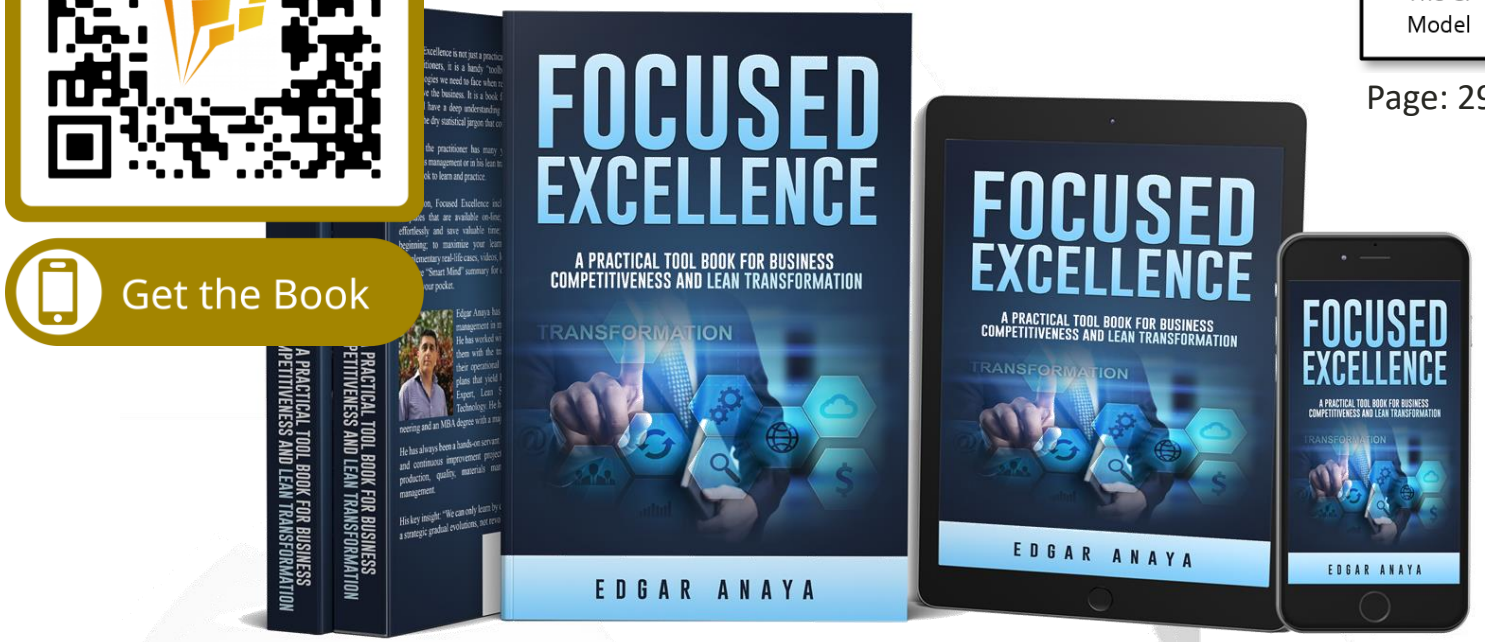
Get the Book



TOPIC

The CI Model

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edgar@pathstonegroup.com

Reference: Focused Excellence by Edgar Anaya

A Practical Tool Book for **Business Competitiveness** and **Lean Transformation**