A3 Thinking

WHAT

A3 thinking is a structured approach for problem solving & continuous improvement.

LEAN

Adopted by Lean organizations around the world and developed as part of the Toyota Production System (TPS).

WHEN?

Used in problem solving, planning and decision making.

Used as a storytelling tool to communicate improvement projects.

The name A3 is derived from the international A3 paper size.

No special software is needed to use the A3 approach. You just need an A3 sheet, a pencil and an eraser as you will need to erase and rewrite several times.

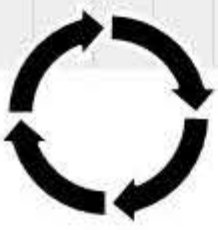
HOW?

The A3 process usually contains multiple stages

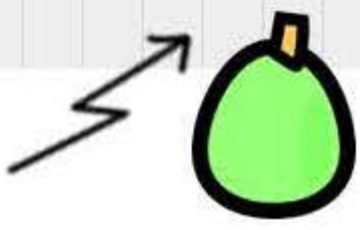
A3 SEVEN STAGES MODEL	
1. Background	5. Countermeasures
2. Current situation	6. Implementation plan
3. Target	
4. Analysis	7. Follow-up

A3 FOUR STAGES MODEL	
1. Problem Definition	3. Action Plan
2. Cause Analysis	4. Results & Follow-up

The exact number of stages is not what matters but rather having a structured approach for problem-solving.



A3 thinking is built around the PDCA philosophy and considered to be its practical form



Ensure using visuals & graphs in the A3 report as they are more effective than text in communicating ideas

Detailed documents are usually attached to the A3 report, so you don't get overwhelmed with the details when viewing the A3 report

AFFINITY DIAGRAM

WHAT

A grouping method for classifying items together into meaningful categories.

WHEN to use ?

During brainstorming and problem-solving sessions

To organize the voice of the customer and research data

WHY

Benefits

Helps organize information and ideas, see how they are connected.

HOW

An affinity exercise tends to be more effective when it is conducted by a team of subject matter experts, and when it is led by a facilitator who is familiar with the subject.

1

With your team, present the topic or define the problem clearly.

2

Give your team sticky-notes then ask them to write one idea per sticky-note.

3

Collect the sticky notes and stick them randomly on the wall.

4

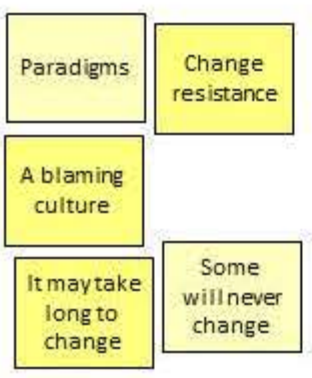
Lead the participants to group the ideas and label the categories.

There should be no evaluation of ideas until the final affinity diagram is complete.

You may add arrows between items and groups to show relationships.

EXAMPLE

The following affinity diagram identifies how to successfully implement and sustain change.



Change Obstacles

Planning

Implementation

BOX PLOT

WHAT | A graphical representation for the frequency of numeric data values.

WHEN

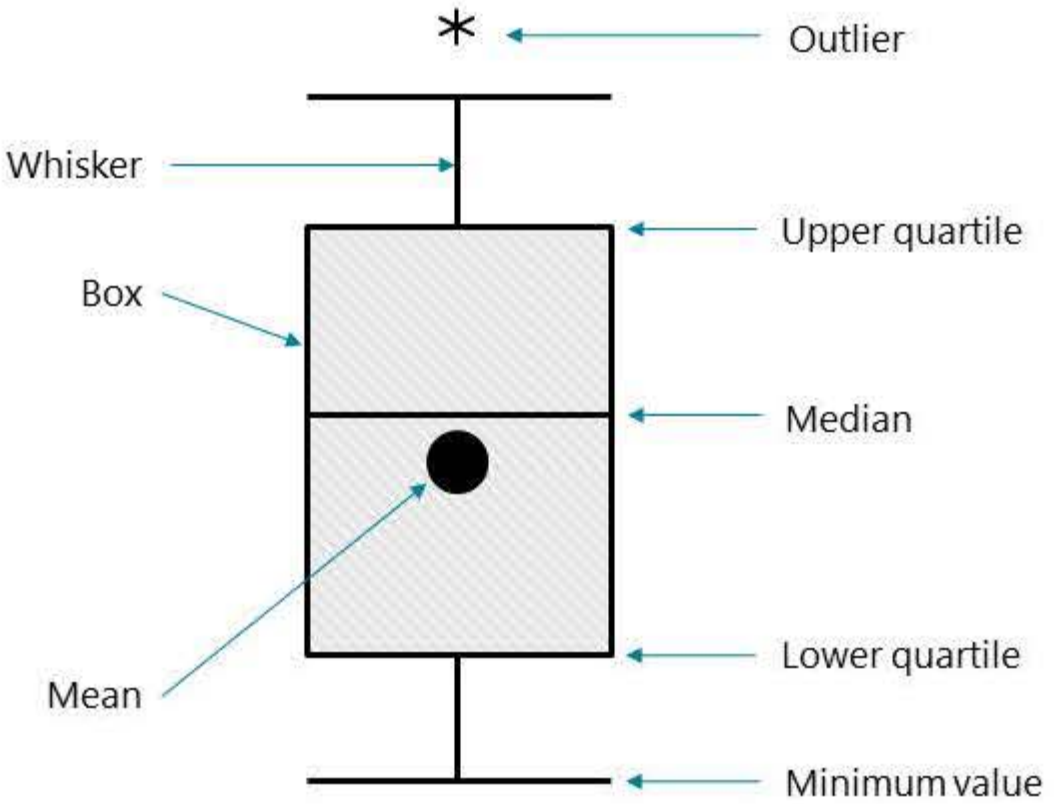
To explore, present and compare multiple data sets in an easy and understandable manner.

WHERE

Widely used in process improvement, scientific research, economics, and in social and human sciences.

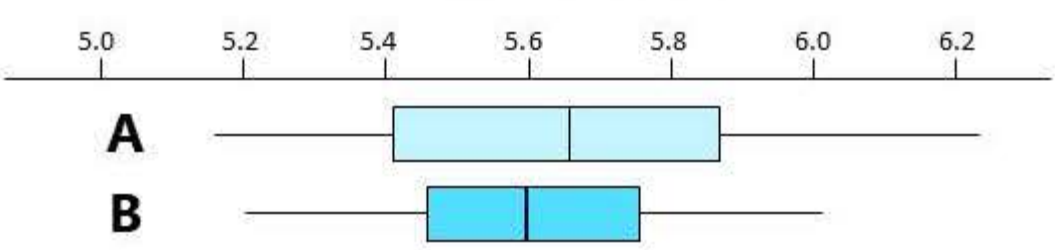
. . . Basic Structure . . .

A box plot is made up of a **box** and two **whiskers**



The data is plotted in such away that the bottom **25%** and the top **25%** of the data points are represented by the two whiskers, whereas the middle **50%** of the data points are represented by the box.

EXAMPLE



'**A**' appears to have higher median and higher variability than '**B**'.

FISHBONE DIAGRAM

WHAT

A tool that allows to establish and present the cause-and-effect in an easy and understandable format.

WHEN

Capture, categorize and organize people's knowledge of a process.

&

In product and process design to prevent future problems and risks.

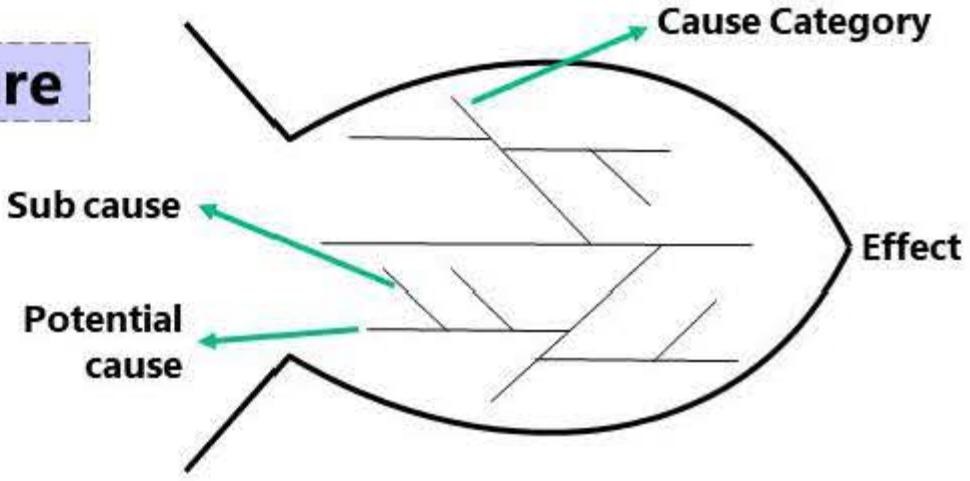
HOW?

Three Main Steps

1. Clearly define the effect which may be desirable or undesirable.
2. Identify the cause categories using the 6 Ms or any other approach.
3. Brainstorm and log all possible causes under the proper categories.

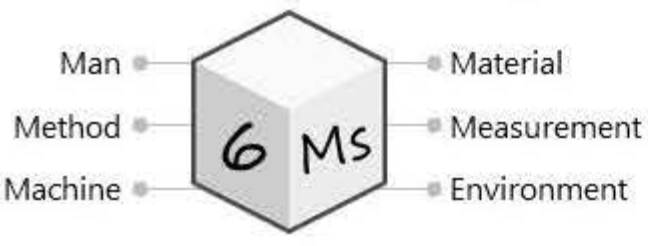
Basic Structure

Combining the fishbone with the 5 whys allows to identify the hierarchy of causes including possible **root causes**.



The 6 Ms Approach

Used to categorize and label the branches of the fishbone diagram

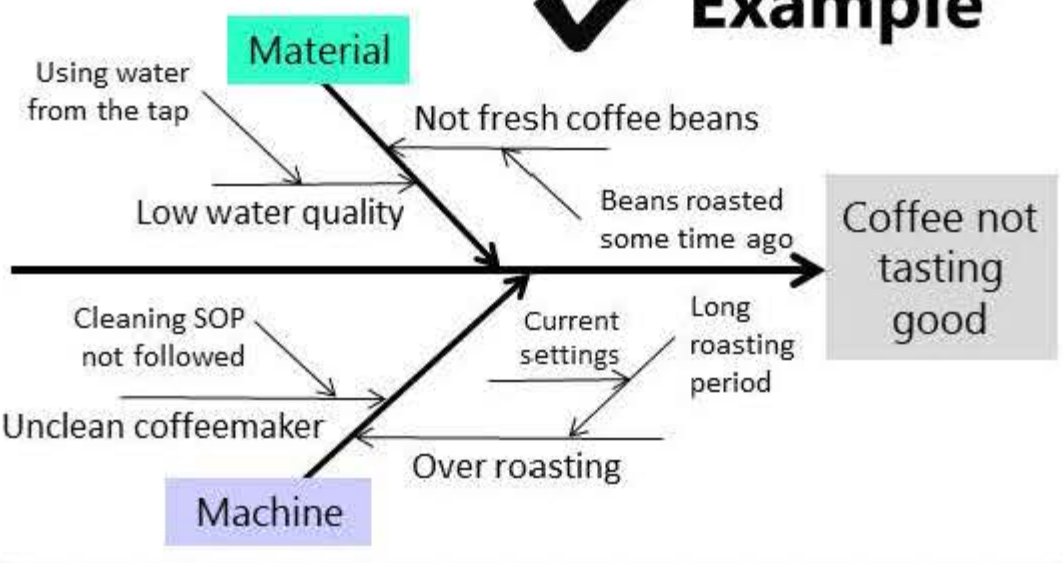


Other Approaches

You can use the process steps in a process map as the basis for categorization.

You can also use the affinity groups in an affinity diagram to categorize the branches.

Example



5S

WHAT

A Japanese approach for organizing and maintaining a disciplined and productive workplace.

LEAN

Developed by **Toyota** and represents an important component of the Lean production system.

Considered a prerequisite for driving other **LEAN** techniques such as TPM, Flow and Kaizen

5S represents five simple practices that starts with the letter "S"

S1 SORT

Going through all the items in the workplace and keeping only what is needed.

S2 SET IN ORDER

The practice of arranging the remaining items (where, how, and how much).

S3 SHINE

Aims of creating clean and neat workplace without rubbish, dirt or dust.

S4 STANDARDIZE

The practice of ensuring the consistency of implementing the first three 5S practices.

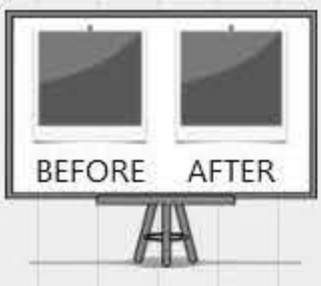
S5 SUSTAIN

Aims of ensuring all know the benefits and be involved in the 5S program.

WHY ?

- Minimizes errors and mistakes.
- Enhances safety and efficiency.
- Promotes workplace ownership and motivation.
- Improves image & builds customer confidence.

HOW



1. Review the current situation & take 'before' photos.
2. Brainstorm to identify improvement opportunities.
3. Develop & implement a plan to improve the area.
4. Audit the area and take the 'after' photos.
5. Share and publish the results.
6. Implement a controls to sustain the improvement.

5 Whys

WHAT

One of the common techniques for problem-solving and root cause analysis.

WHEN?

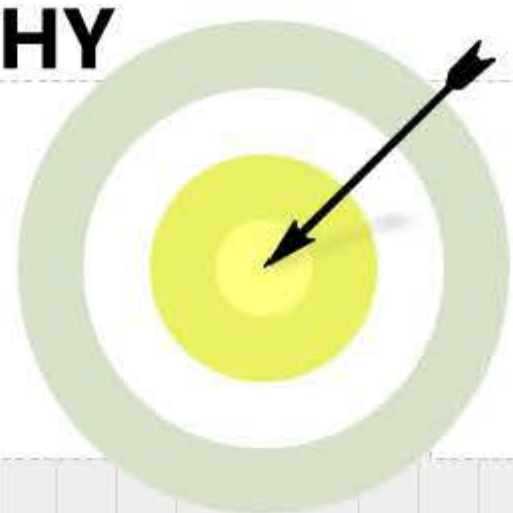
Used in everyday business situations to identify the root cause of a problem.

Often used in the Analysis phase of Six Sigma DMAIC methodology

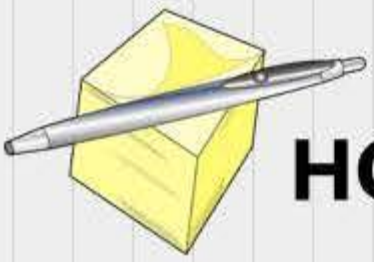
Used in Lean to identify and eliminate wasteful activities

WHY

Gives more depth to the problem-solving process



Engages operators in the process improvement efforts



HOW

5 Whys can be used individually or as part of a cause-and-effect analysis. It can be done in a team setting or on an individual basis.

1 With your team, write a clear and specific problem statement.

2 Ask "Why does this happen?". Write the answer below the problem.

3 Ask Why again for the resulted answer and write the answer below.

4 Keep asking Why until the team identify the root cause of the problem.

5 Discuss and agree on the actions that will solve the problem.

EXAMPLE

PROBLEM	I have just got caught speeding by a speed camera	
WHY?	I drove fast because I was late for work	← Assumed cause
WHY?	Because I got up late	Possible causes
WHY?	Because my alarm clock didn't work	
WHY?	Because the batteries were flat	
WHY?	Because I forgot to replace them	← Root cause

You may find that you need to ask Why more or less times depending on the situation.

FLOWCHARTING

WHAT

A graphical tool that illustrates the flow of a business process and the relationships between its activities.

WHEN

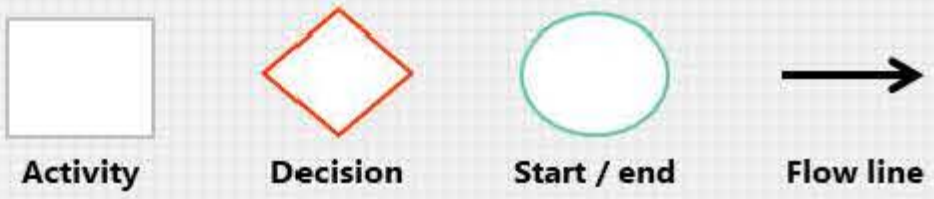
- To understand the sequence of activities
- To identify and analyze problem areas
- To document how to do a particular job
- To provide a view of how a process should be

WHY?

- Provides clarity to a process that appears disordered or complicated.
- Helps communicating any changes that happen on the process.
- Useful for revealing areas of inefficiency for later problem-solving effort.
- Helps explaining the process to suppliers, new employees and subcontractors.

COMMON SHAPES

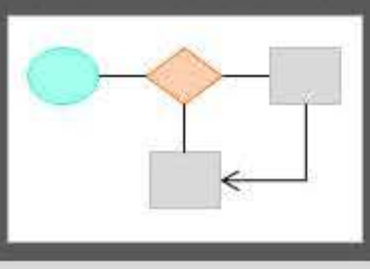
Drawn with shapes of various kinds to represent different types of activities. Other shapes can be used based on the situation.



TYPES

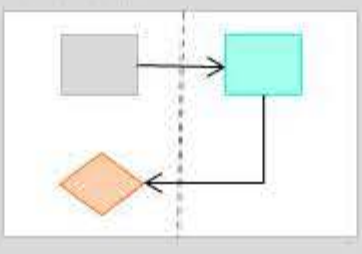
Activity Flowchart

Displays the sequence of the activities that make up the process in a way that focuses on what happens.



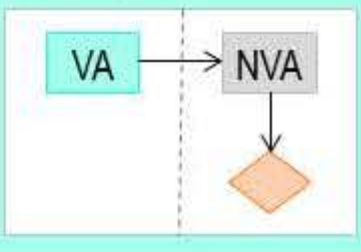
Swimlane Flowchart

Displays the activities to accomplish a process that is cross-functional (focuses on what & who).

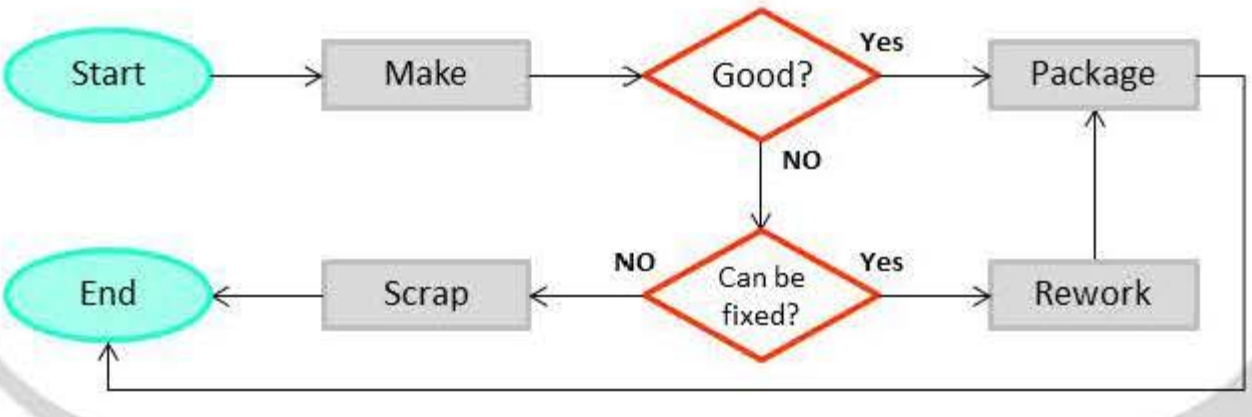


Opportunity Flowchart

Provides a way to analyze and study processes by highlighting the steps that add no value.



EXAMPLE



FORCE FIELD ANALYSIS

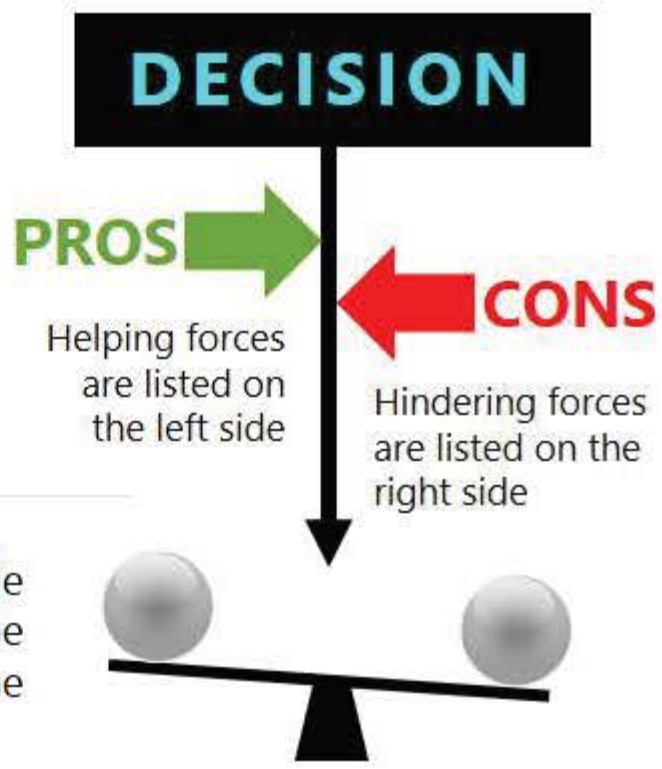
WHAT

A decision making technique used to analyze the pros and cons of any decision.

WHEN

Used when decision making isn't going well

It looks at the forces that are either **driving** or **blocking** movement toward a goal.



Better decisions are made up by **weighing up** the pros and cons to determine the winning force!

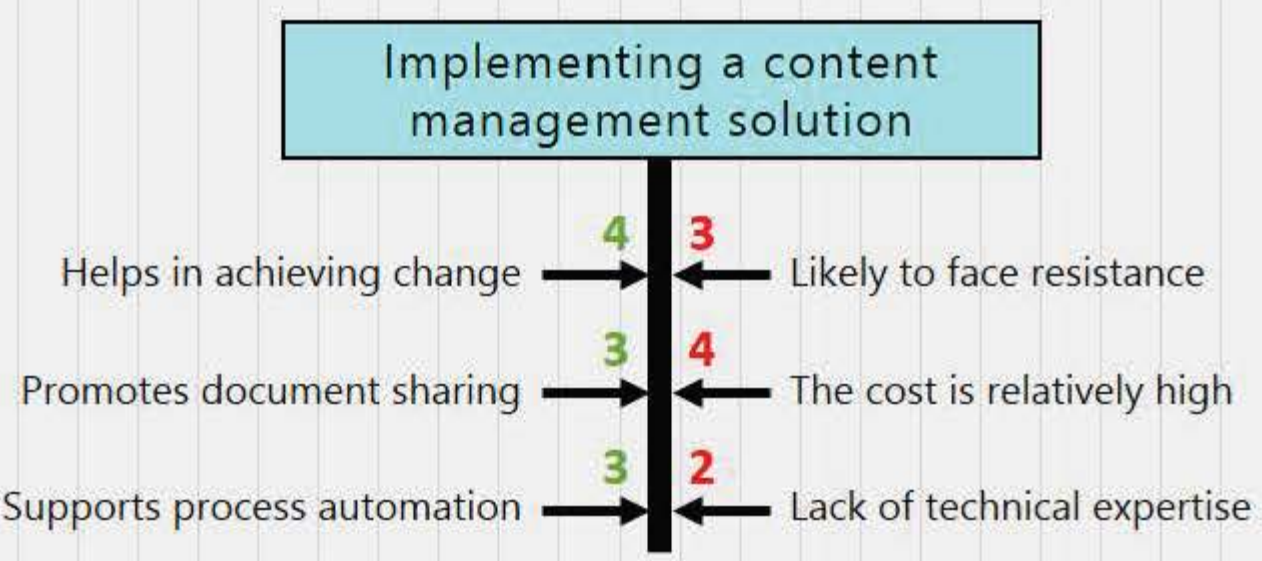
WHY

By analyzing both the helping and the hindering forces, decision makers and change agents can make more intelligent business decisions.

HOW

1. Write the decision in a box at the top middle of a paper
2. List all helping & hindering forces (left & right side respectively)
3. Allocate a numerical score to each force indicating its significance
4. Add up the scores of both lists to find out the overall winning force

EXAMPLE

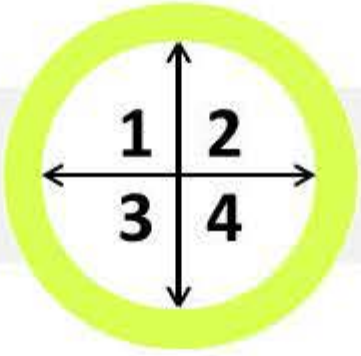


FOUR FIELD MATRIX

WHAT

A two-dimensional chart that consists of **four** equal-sized **quadrants**.

Each quadrant describes different aspects of information

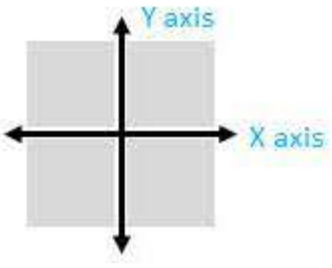


An effective model for planning, organizing and making decisions

WHY ?

Helps you organize your ideas or information in a logical manner that makes sense.

Complex problems can be broken down into easier to handle groups by considering the two most important characteristics (represented on the X and Y axes).

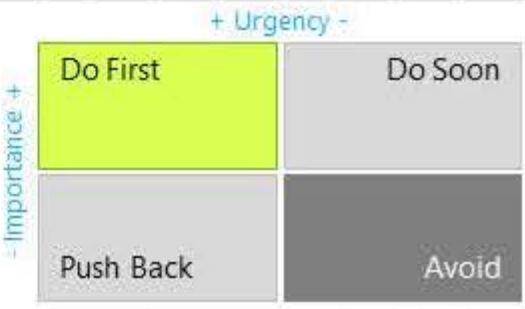


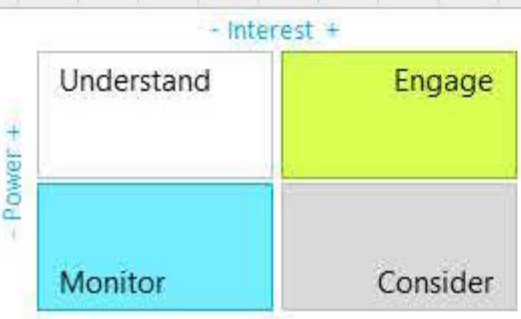
Often used in these following scenarios:

WHERE ?

SWOT Matrix
To evaluate the strategic position of an organization

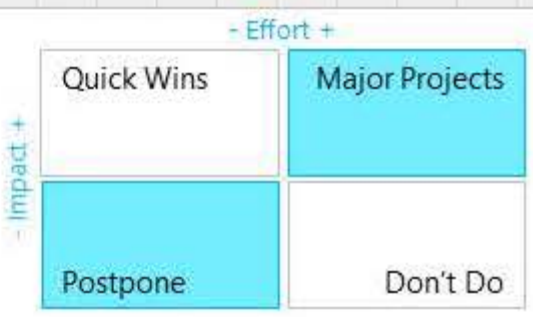
Importance Urgency Matrix
To prioritize work & personal activities based on the Eisenhower method





Power Interest Matrix
To classify stakeholders according to the power they hold and how likely they are to be interested in a project

Project Prioritization Matrix
To select the projects that will have the greatest impact with the least amount of money, time or effort



Project Methodology Matrix
To select the methodology for problem solving and process improvement

GAP ANALYSIS

WHAT

Gap analysis compares two different states of something, the current state and the desired state.

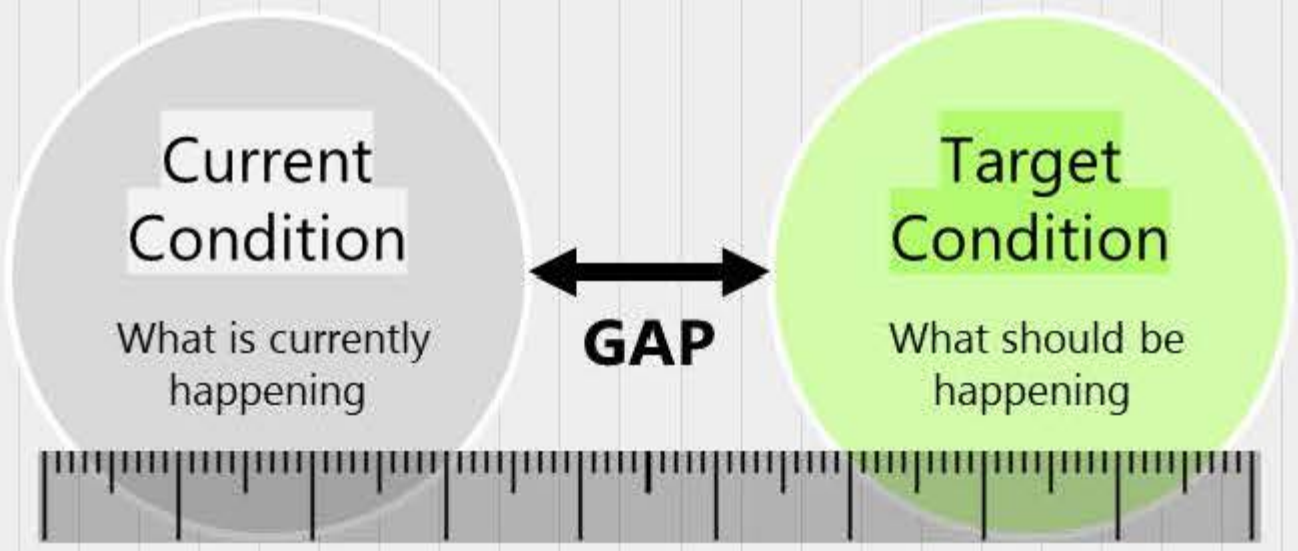
WHY

Brings understanding to the problems faced in order to select the actions of greatest impact.

Benefits

WHEN?

- To identify the areas where a business is performing below standards.
- To address the unsatisfactory performance of a process.
- When comparing an existing process to a process that is performed elsewhere.



It is common to use performance indicators when comparing the two states at any point during the gap analysis process.

HOW

1. Select a specific problem area
2. Understand the current state.
3. Identify the desired state.
4. Identify the gap between the two states.
5. Agree on the steps to take to close the gap.

EXAMPLE

THE PROBLEM	CURRENT STATE	DESIRED STATE	THE GAP	Actions
The last audit results were negative in three areas.	External audit score is below standards (<60%).	External audit score should be above 90%.	More than 30%.	1. Maintain all records 2. Comply with legal needs.

Various tools and models can be applied to identify the gaps, such as SWOT analysis and fishbone analysis

HISTOGRAM

WHAT | A graphical representation for the frequency of continuous data values.

WHEN

To explore and present the data in an easy and understandable way.

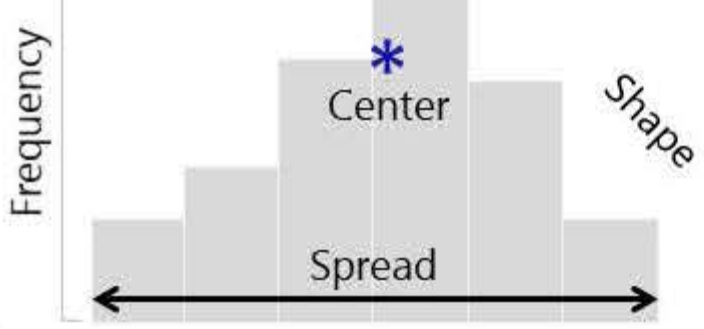
To determine the underlying probability distribution of the data.

WHY ?

- Identify whether you can apply certain statistical tests for further analysis.
- Identify whether variability is within specification limits and the process is capable.
- Verify visually if an improvement has been achieved after a process improvement initiative.

A way to shape sample data to make predictions and draw conclusions about an entire population

Basic Structure

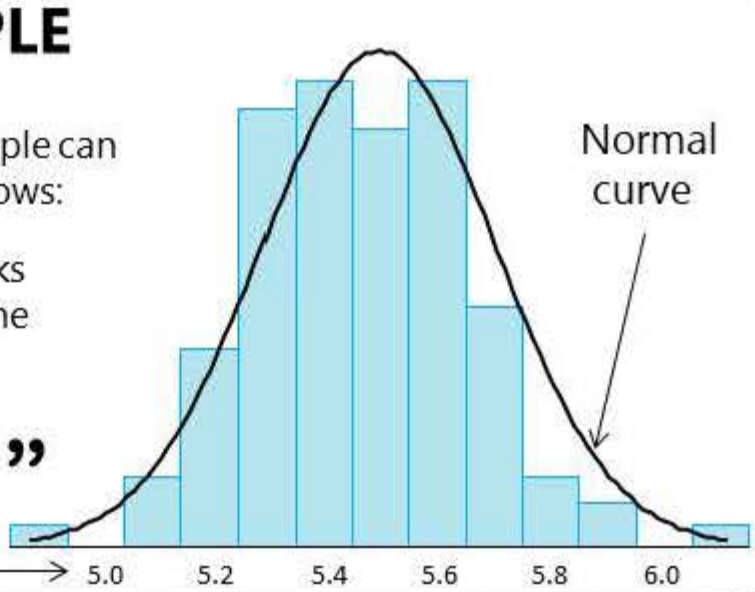


The bars should be adjacent with no gaps between them.

EXAMPLE

The result in this example can be summarized as follows:

> "The distribution looks symmetric around the mean (5.46 cm) and appears to fit the Normal distribution"



Histograms are ideal to represent moderate to large amount of data. In practice, a sample size of at least **30** data values would be sufficient.

How-How Diagram

WHAT

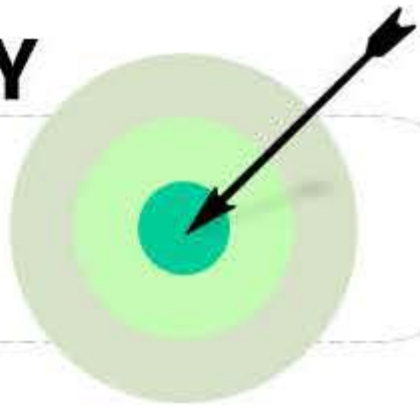
A simple method that is used to generate multiple ideas to solve a particular problem.

WHEN

In problem solving when seeking a practical solution to solve a problem.

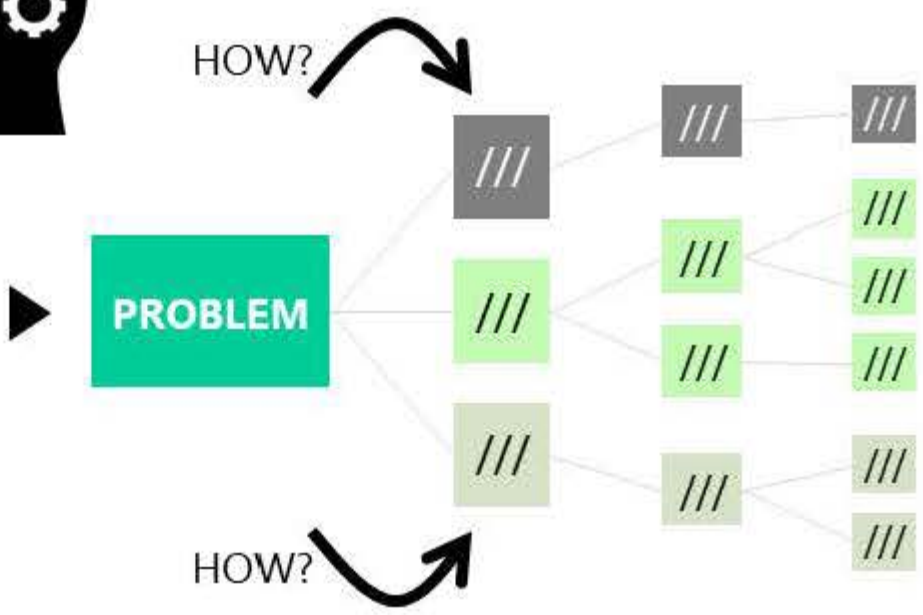
WHY

Provides an effective structure for organizing possible ideas and solution options all in one place.



HOW

The how-how diagram can be represented in a tree format (Multiple answers can be given to one question



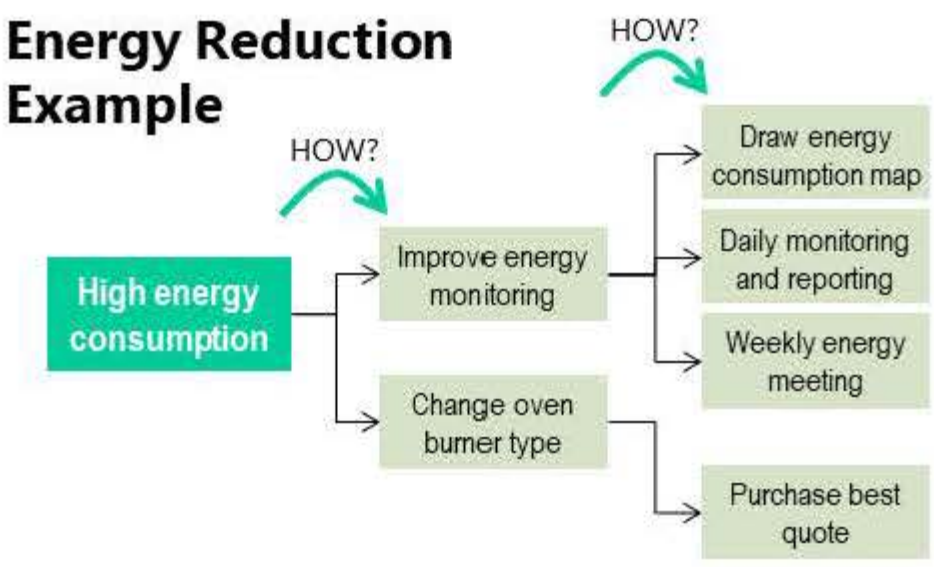
1 Clearly state the problem to be solved.

2 Ask 'how can this problem be solved?'.

3 Keep asking 'how' until the ideas are specific enough.

4 Prioritize & identify the key ideas to be implemented.

Energy Reduction Example



IMPORTANCE URGENCY MATRIX

Eisenhower's Principle - Covey's Time Management Grid

WHAT

An effective method for organizing priorities based on the importance and urgency of activities.

All activities are evaluated in terms of **importance** and **urgency** then placed in the following matrix:

Important and **urgent**	**Important** but not urgent
Not important but **urgent**	Nor important nor urgent

WHEN

To prioritize work activities

To prioritize personal activities

Leave some time in your schedule for the unexpected activities

Avoid procrastination and be proactive

Spend most of your time here

Do First MANAGE	**Do Soon** FOCUS
Delegate PUSH BACK	**Drop** AVOID

Important / Not important

Urgent / Not urgent

Arrange regular meetings to avoid interruptions

Learn to say NO

Helps you achieve your personal and professional goals

Limit the time you spend in this quadrant

EXAMPLES

Professional		Personal	
Major deadlines	Planning	Family calls	Exercise
Customer calls	Prevention	A family breakfast	Family gathering
Customer emails	Coaching	The daily medicine	Daily planning
	Networking		Reading a book
Some meetings	Junk emails	Internet chatting	Video games
Interruptions	Gossiping	Work-related calls	Social media
Many emails	Internet surfing	Interruptions	Excessive TV

HOW

1 Draw a four quadrant matrix

2 Sort your activities in the appropriate quadrant

3 Manage and focus what's on the first two quadrants, and pushback or drop what's on the last two

IMPROVEMENT ROADMAP

WHAT

An approach that is used to guide through the implementation of a long-term improvement journey.

WHERE

Applications

To summarize a strategic plan in a comprehensive and integrated manner.

In organizational development and change management projects.

HOW

An improvement roadmap in its simplest format contains the following four sections . .

Categories	Current conditions	Millstones	Metrics

Improvement roadmaps shall be simple to create and easy to follow

Improvement categories
The dimensions in which you want to set your improvement goals

Current conditions
Indicates the starting point of the journey for each category

Milestones and targets
What you need to do in each improvement category and when

Performance metrics
Allows to monitor performance and assess progress against baseline

EXAMPLE

Improvement categories	Where we are now	Where we want to be in 6 months	Where we want to be in 12 months	Where we want to be in 18 months	Metrics
Spoilage reduction	Spoilage rate is too high (>8.0%)	Defect awareness program to all	Breakdown analysis system in place	Spoilage rate less than 3%	Spoilage rate
Internal audit	Internal audit results are less than 60%	Current audit practices reviewed and improved	Audit system covers all functional areas	Audit score above 90%	Audit score

Action plans can then be used to help breaking down big goals into smaller and workable activities.

KANO ANALYSIS

WHAT

A method used to identify, categorize and prioritize customer needs.

These categories are then considered when analyzing potential opportunities for improvement.

WHY

Helps categorizing the different features of a product or service

Shows how customer needs are constantly changing as time goes on

Kano Categories

1 Must be features

The basic features as determined by the customer. If they are not present or insufficient, customers will be dissatisfied

EXAMPLE: A defect free product or service

2 Performance features (Satisfiers)

The better the performance, the more customers are satisfied. Companies often use these features to prioritize their improvement initiatives

EXAMPLE: The speed of answering a phone in a call center

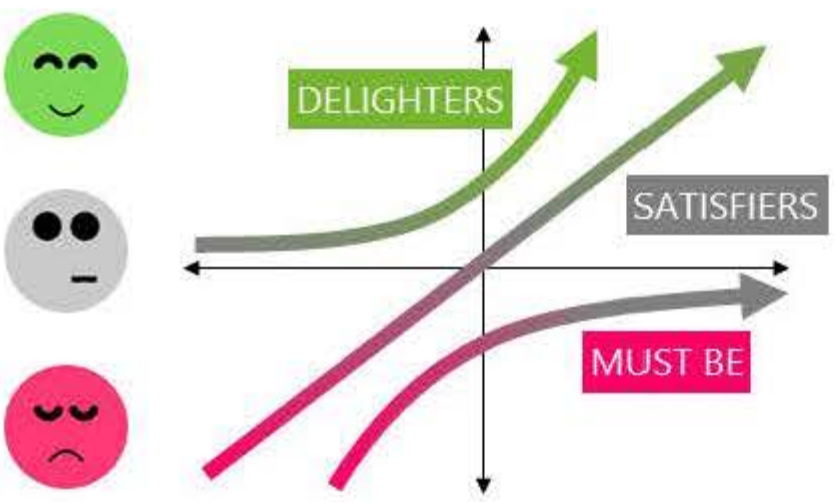
3 Delight features

4 Indifferent features

5 Reverse features

The presence of delighters will lead to high satisfaction. They are often unexpected, unspoken, and provided to customers for no extra money

EXAMPLE: Getting a free mouse when purchasing a new laptop



Kano Diagram

Results can be presented in a Kano diagram, which has two axes: customer satisfaction and feature presence

MIND MAPPING

WHAT

Visually organizing ideas, thoughts and information around a single topic or problem.

WHEN

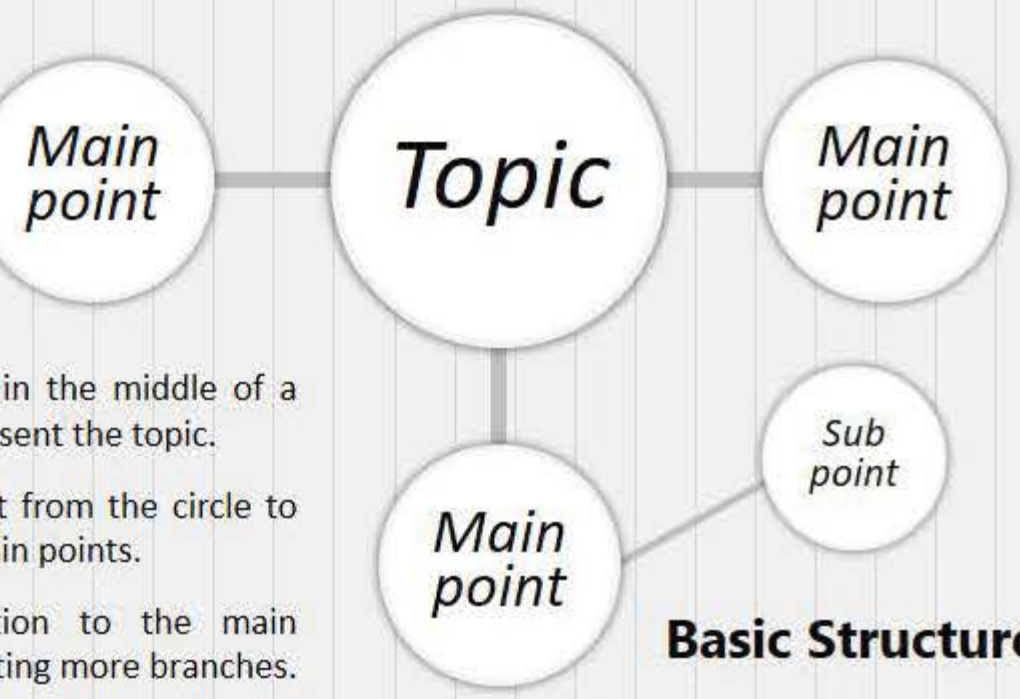
- Sort out new ideas when brainstorming
- Sort out complex situations
- Consolidate information from various sources
- Support interviewing and studying

WHERE

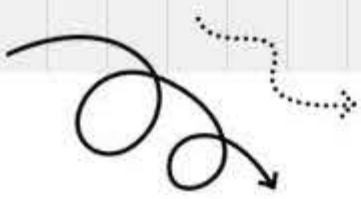
- Meetings and planning sessions
- Brainstorming sessions
- Workshops and lectures
- Individual effort

HOW

1. Draw a circle in the middle of a paper to represent the topic.
2. Draw lines out from the circle to initiate the main points.
3. Add information to the main points by creating more branches.



Basic Structure



A good practice is to show associations by connecting the related items.

Another good practice is to use colors and add images, icons, symbols & shapes.

Often drawn by hand, however, there are many applications that allow the creation of mind maps.

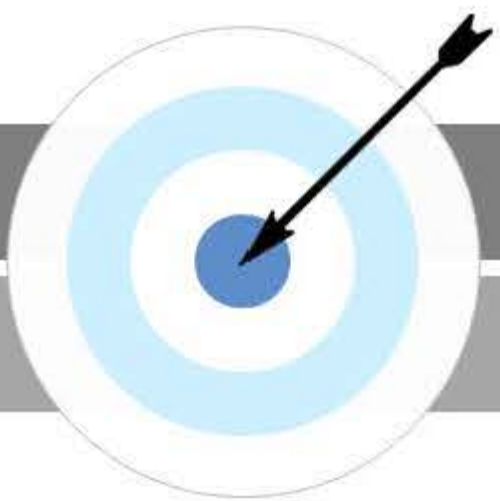
Observation and Gemba Walks

WHAT

Observation is a data collection method used to gather specific information about a process or a situation.

WHY

- Accelerates problem solving
- Allows to listen from the process performers
- Aligns leadership with the shop floor
- Encourages learning and continuous improvement



WHEN

- Measure actual performance against set targets
- Understand the actual situation
- Measure customer satisfaction
- Acquire best practice and benchmark information

Types of Observation

Silent

Useful when collecting raw data and takes only a couple of minutes to one hour.

E.g., collecting of raw data

Interactive

Visiting the actual place to see the actual process, understand it, ask questions, and learn.

E.g., Gemba walks

Extended

The observation period takes much longer time to thoroughly understand the process.

E.g., day in the life of (DILO)

PROCESS OBSERVATION FORM

Process	Process map
Observer	
Purpose	Remarks
Total time	

▼

Process observation forms can be used to record the observed data, interview responses, improvement opportunities, and any other useful information.

▶ **GEMBA** refers to the actual place where value is created

A Gemba walk is going to the actual place and observing how the work is performed.

It aims to get closer to the work and to identify potential improvement areas.

PAIRED COMPARISON

WHAT

A technique for evaluating a small range of options by comparing them against each other.

WHEN

To select the alternative that will be the most effective

To choose the most compelling problem to solve

EXAMPLES

Professional

Deciding which skills and experience are essential when hiring people for a new role

Personal

Deciding how or where to spend your coming summer holidays

Paired Comparison is often used where there is little objective data to base our decision on

HOW

1. Identify the alternatives to be evaluated
2. Identify the evaluation criterion
3. List all alternatives on the left hand column and on the top row of the matrix (see below)
4. Compare then write in the cells the option that better meets the criterion
5. Count the number of times each option has been chosen
6. Rank the options based on their count, then consider the options with the highest ranking

Paired Comparison Matrix

	Option A	Option B	Option C
Option A			
Option B			
Option C			
Count			
Rank			

Comparing Option 1 with Option 2

Cells are blocked out to ensure each comparison is made only once

Pareto Analysis

WHAT | A principle that helps to focus on the most important matters to obtain the maximum benefits.

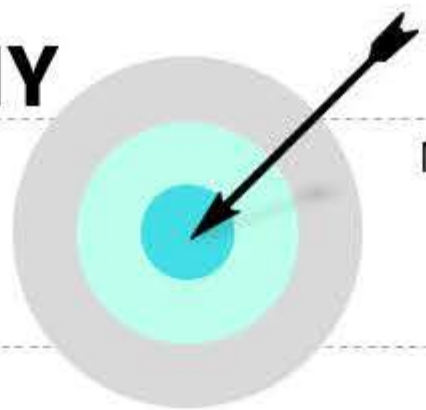
WHEN

In problem solving to focus on the causes that contribute most to a particular problem.

In project management when prioritizing and selecting projects.

WHY

Helps visualizing the data to quickly know where to focus the efforts



Measure the impact of an improvement by comparing before and after

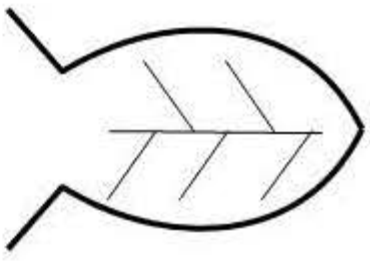
The Pareto principle states that 80% of the results come from 20% of the efforts

20% of the population owns 80% of the nation's wealth

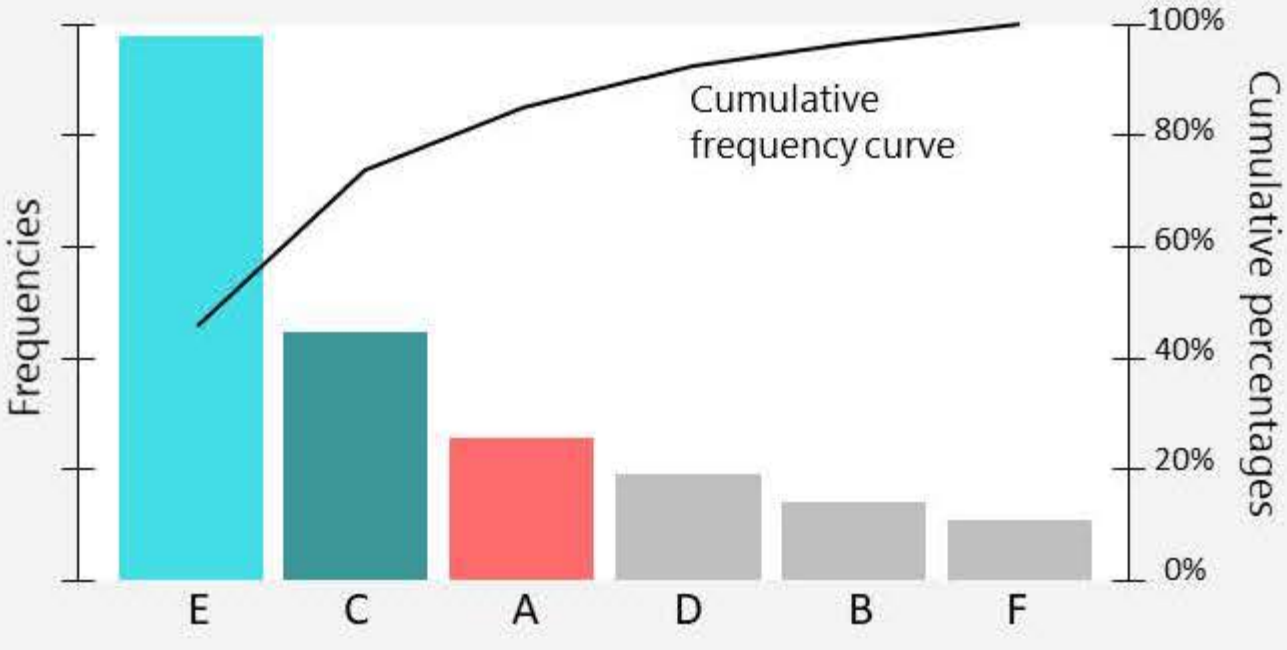
20% of twitter users are responsible for 80% of the tweets overall

We may use 20% of our household tools 80% of the time

In the field of continuous improvement, 20% of the causes account for 80% of the effect in a fishbone diagram!



A **Pareto Chart** is a specialized type of bar chart that plots the frequencies of categorical data



The bars are arranged in order of frequency from left to right so that the 'vital few' categories can be clearly addressed on the left

PDCA Cycle

WHAT

A four-step model that provides a simple and structured way for problem solving and continuous improvement.

Used as the basis of improving the quality of products, services & processes.

Represents the logical way of thinking we tend to follow when solving problems.

Stands at the core of all quality systems (TQM, ISO standards, & A3 thinking).

The PDCA cycle is an easy to remember four logical sequenced steps . . .

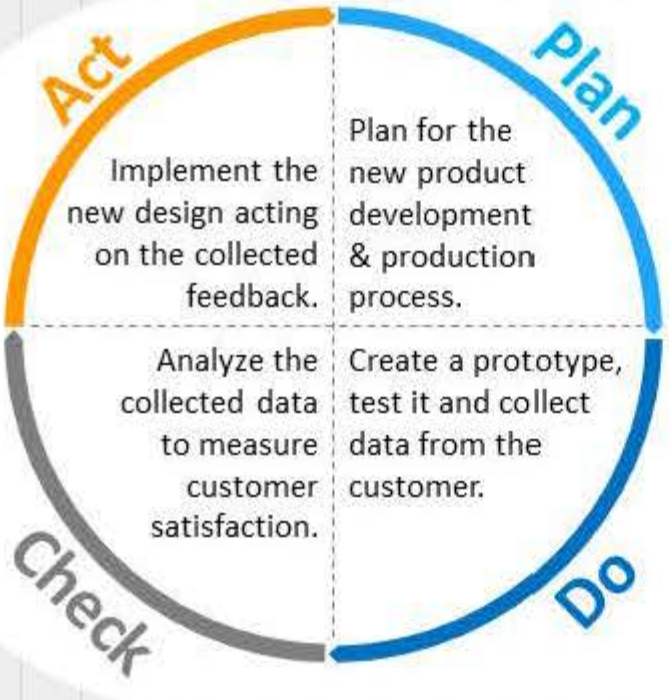
Plan Do Check Act

Can be represented in the form of a diagram . . .

Multiple iterations of the PDCA cycle may be needed to solve the problem permanently and reach the ultimate future state.

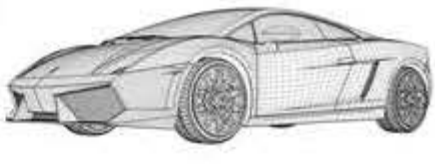
WHY ?

- Encourages the methodical way of problem solving.
- Helps closing the gap between planning & doing.
- Increases process knowledge from solving problems & finding solutions.



Example

A common example often used to illustrate the PDCA cycle is when a team is initiating a new product development.

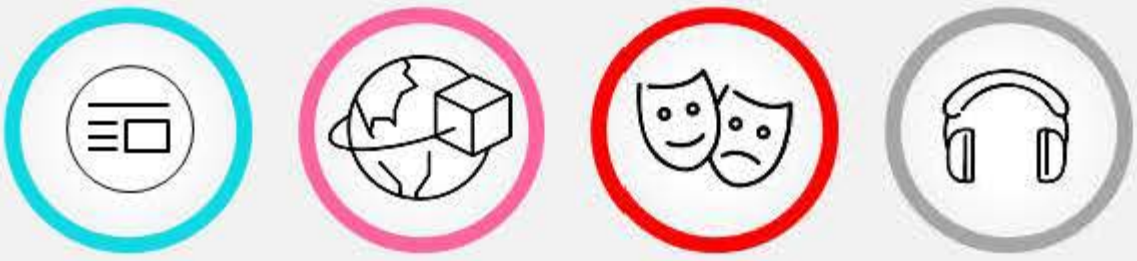


PEST ANALYSIS

WHAT

A strategic and structured tool for evaluating the external environment of an organization.

PEST Stands For . . .



Political **E**conomic **S**ocial **T**echnological

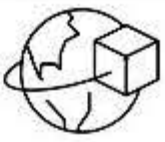
WHEN

During strategic analysis and market research

&

In project management to increase awareness of the opportunities and threats a project may have.

Political factors – focuses on government policies and regulations that may cause instability and uncertainty



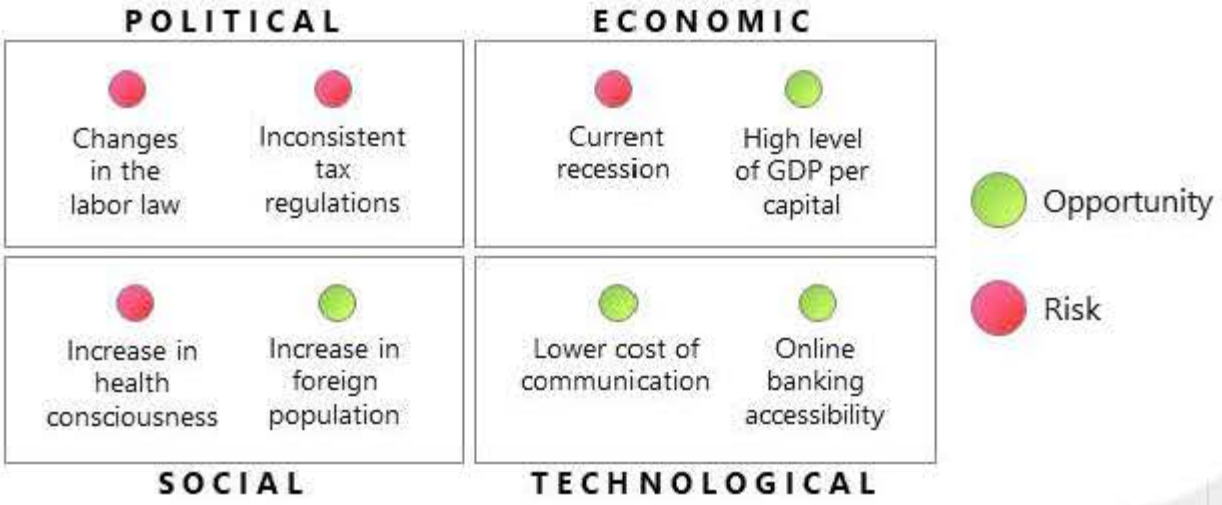
Economic factors – analyzes how the economy affects the profitability of a business

Technological factors – looks at the technological characteristics which brings new opportunities but also new challenges

Social factors – considers the social and cultural characteristics in which the organization is operating

EXAMPLE

This example uses a four-field matrix to present the outcome of a PEST analysis



PRIORITIZATION MATRIX

WHAT

A decision-making tool that allows to select the most appropriate alternative after evaluating multiple criteria.

WHEN

Applications

- Project selection
- System and software selection
- Material and supplier selection
- Personnel selection

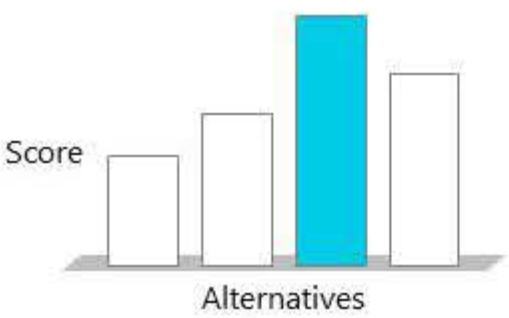
Often used in problems solving and process improvement to select the problem that needs to be resolved and the solution that needs to be implemented.

HOW

Prioritization Matrix Template

Criteria	Wt.	1	2	3
1				
2				
3				
Weighted scores				
Rank				

1. Identify the alternatives
2. Identify the evaluation criteria
3. Weight the criteria in terms of their importance (optional)
4. Rank the alternatives against each criteria from best to worst
5. Calculate the final weighted scores then rank the weighted scores



The outcome of the analysis can be presented using a bar chart to see the scores more clearly

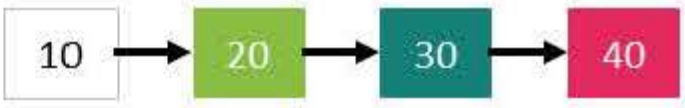
If you have only two evaluation criteria, you can present the alternatives in a four-field matrix

PROCESS MAPPING

WHAT

A graphical representation that illustrates the flow of a business process.

A way of making sense of what happens or must happen in a process.



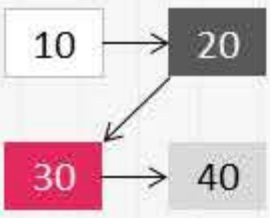
WHEN

Provides a mechanism for analyzing and studying business processes.

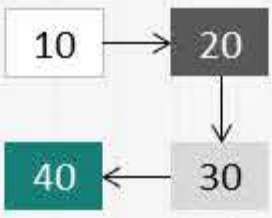
WHY

- Brings clarity to complex processes
- Identifies problem areas in order to improve
- Provides inputs to other improvement tools
- Helps communicate any changes on the process

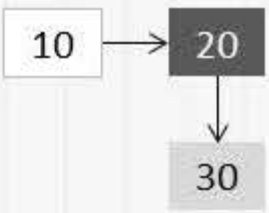
Process maps are used to map existing processes as well as to design new processes.



What you think the process is.



What the process really is.



What the process should be.

Process inputs are the variables, the factors, and the sources of variation in the process. They are transformed by the process into outputs. They are often classified into the following categories:

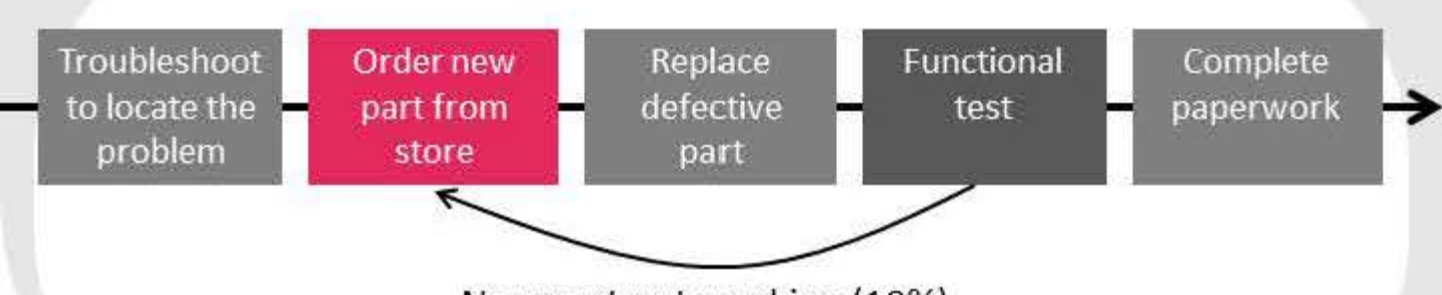
1 Noise factors (uncontrollable)

2 Standard factors (SOPs)

3 Design factors (can be controlled)

4 The 'never thought of before' factors

EXAMPLE



Notice the **rework loop** which occurs when it is discovered during testing that the installed part is non-functional

PROCESS SEQUENCE CHART

WHAT

A symbolic representation that illustrates the sequence of activities within a process.

WHEN

To analyze a process to determine which steps add value and which do not.

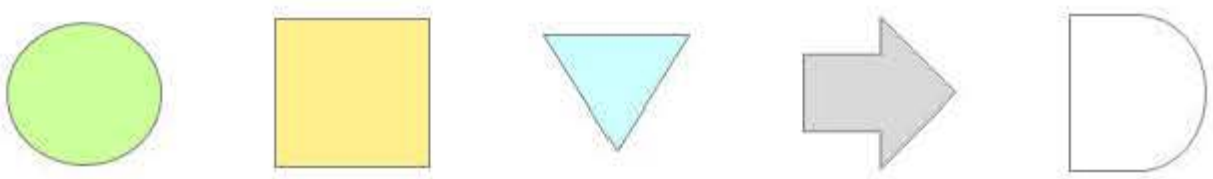
Often used for sequential processes that contain no or few decision points.

WHY ?

- Helps identifying waste, long delays and other non-value-added activities.
- Describes the process accurately as it is typically drawn as the process is happening.
- Helps tracking key metrics such as cycle times, error rates, and distance travelled.

COMMON CATEGORIES AND SYMBOLS

These symbols have been accepted by many Lean practitioners and organizations.



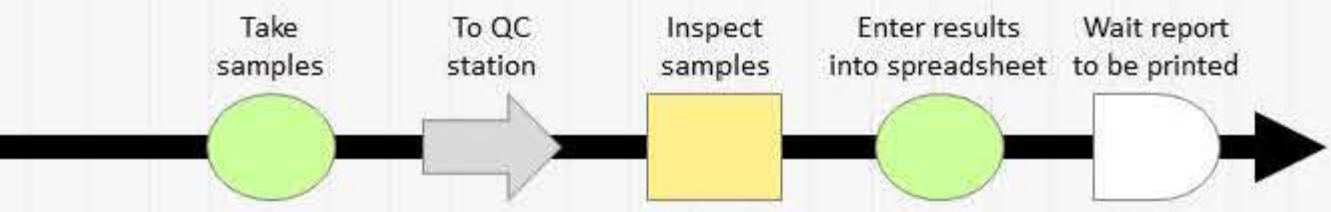
OPERATION **INSPECTION** **STORAGE** **TRANSPORT** **DELAY**

Other categories and symbols can be used based as needed.

The typical approach is to chart the present process on a chart, then the improvement will be proposed on a second chart.

EXAMPLE

Inspection of samples in a production line:



Time MINS	Dist. METERS						Process description
15		X					Take samples
4	90		X				Transfer to QC station
21				X			Inspect samples
15		X					Enter results in spreadsheet
2					X		Wait report to be printed

PROCESS CHART

Presents the steps and the related information in a form of table. It allows recording further information about each step such as error rates, time and distance.

PROCESS YIELD MEASURES

WHAT

Metrics which are used to measure and understand the operational process yield.

WHY

Benefits

Enables operations to understand their true process yield in order to set realistic improvement targets.

Common Process Yield Measures

1 First Time Yield (FTY)

2 Final Yield (FY)

3 Throughput Yield (TPY)

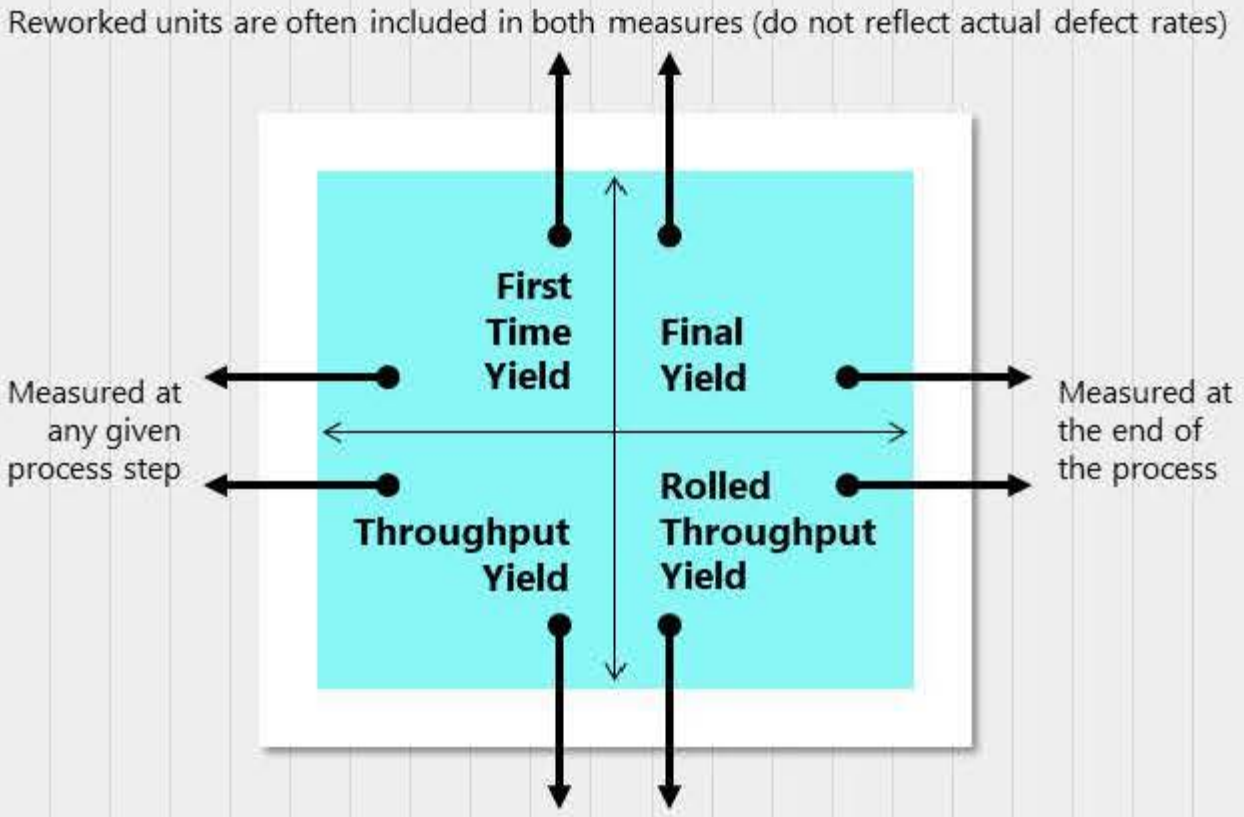
4 Rolled Throughput Yield (RTY)

HOW

Approach

All process yield measures are basically obtained by dividing the good product units by the number of total units entered the process (or process step).

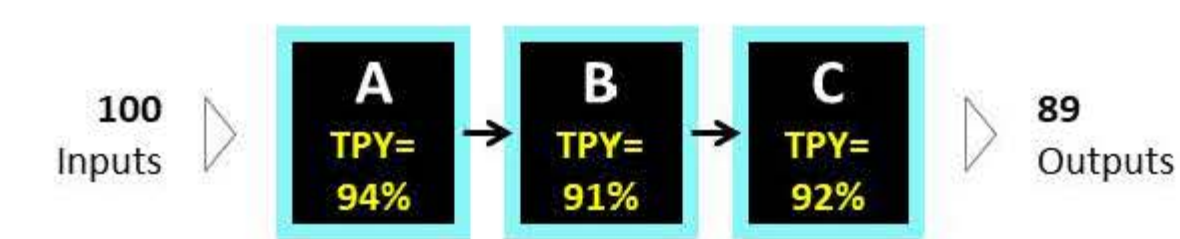
Reworked units are often included in both measures (do not reflect actual defect rates)



Provide a better insight of defect and rework rates, and considered an accurate reflection of the process performance

EXAMPLE

A good practice is to use process mapping as a guide in the process yield evaluation



FY = 89% **RTY** = 0.94 * 0.91 * 0.92 = 78.7%

PROJECT CHARTER

WHAT | A one-page document that summarizes the fundamental information of a project before it begins.

Used to Ensure that the Project is:

WHY?

- Business focused
- Executed in a timely manner
- Well scoped
- Have the necessary resources
- Have the right measures
- Have the necessary support

Key Elements:

PROJECT TITLE

1. **Business Case**
   Including problem and goal statements
2. **Project Team**
   A dedicated project leader and team members
3. **Project Scope**
   Defines what is involved in the project and what is not
4. **Voice of the Customer**
5. **Project Metrics**
   Primary, financial, or both
6. **Time Frame**
   The time required to complete the project

Milestones Highlight important dates.

Signatures Signing on the charter serves as a formal approval of the project and empowers the project leader.

Project charters may include key stakeholders, risks and issues, project deliverables, communication plan summary, and the required resources and funding.

How to Prepare an Effective Project Charter:

HOW

1. A project charter should be customer focused and addresses their specific needs.
2. It should be clear and concise (preferably one page).
3. It should contain realistic and achievable objectives.
4. It should be developed as a collaborative effort.
5. It should be dealt with as a live document during the project lifetime.
6. It should be updated as the project progresses.

Although project charters are short and brief, they often refer to more detailed documents

PROJECT CLOSURE

WHAT

An important part of the overall project life-cycle which provides a formal way of closing projects.

All projects are designed for a specific period of time, so we need a way to bring the project to its final state.

WHY

- Validates project goals have been accomplished
- Ensures controls are in place and sufficient
- Formally releases the team from the project
- Formally hands off the project to the process owner

Key Elements:

PROJECT TITLE

1. **Brief Description**
   Including the project deliverables and results
2. **Time Frame**
   Actual vs. estimated date of completion
3. **Benefits Obtained**
   Hard savings as well as soft savings
4. **Improvement in performance**
5. **Best practices, lessons learnt & shortcomings**
6. **Ongoing work and next steps**
7. **Controls in place to sustain the benefits**
   Audit checklists, visual controls, standard work, SPC charts, preventive maintenance, etc.
8. **Signatures**
   Signatures from key stakeholders to confirm the completion of the project.

Get the digital signatures of the key stakeholders or print out a copy of the project closure and get their physical signatures.

PROJECT TITLE

Description	Benefits	Key metrics
Controls	Deliverables	Shortfalls

SIGNATURES:

PUGH MATRIX

WHAT

A scoring method used to compare and select the best solution from a set of alternative proposals.

A form of **prioritization** matrix

Alternatives are compared against a **standard**

The **standard** can be current solution that is already exist or a goal

WHY

Benefits

- Subjective opinions can be made more objective
- It does not require a great amount of quantitative data

[HOW]

1. Identify the alternatives
2. Select the baseline solution
3. Identify the criteria to be used for comparing
4. Indicate how the baseline solution is compared with each alternative:
   - \+ (better)
   - \- (worse)
   - 0 (same)
5. Notice the strongest solutions, the one with the most pluses and the fewest minuses

Criteria	Wt.	Standard	1	2
1				
2				
3				
		Score		
		Rank		

Further solutions can be developed by mixing the positive aspects of a number of solutions

WHEN

Applications

- Deciding which product to develop
- Deciding which vendor to select
- Deciding which investment to take
- Designing or redesigning processes

RACI MATRIX

WHAT

A tool that shows how stakeholders are assigned to different project and process activities.

WHEN

When defining roles and responsibilities

- Project Management
- Business Process Management
- Change Management

WHY?

Provides a clear view of what is expected from each stakeholder.

Helps identifying who should be approached at any given situation.

Reveals issues such as too many responsible persons.

RACI is an acronym for the four major **participation types**

Responsible
Anyone who participate to accomplish a particular activity

Accountable
The one who delegates the work to those responsible

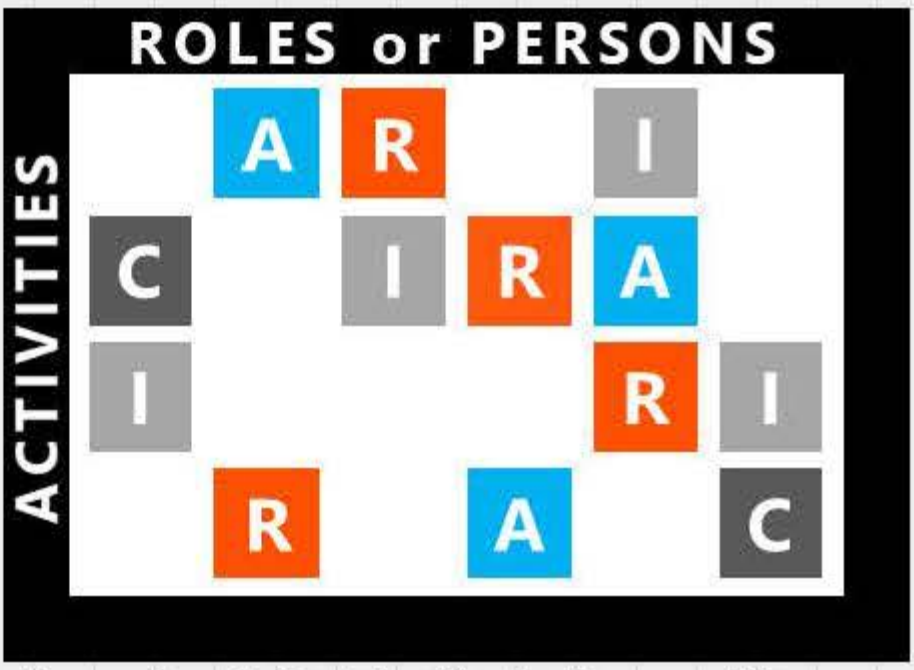
Consulted
Anyone who can provide valuable information to complete the work

Informed
Anyone who should be notified about the activity

HOW

From the organizational chart

From the work breakdown structure or process map



For each activity, identify the Responsible, Accountable, Consulted and Informed.

It is recommended that each activity receives only one of the RACI categories at most. In some conditions, however, the Responsible and Accountable can be the same (small teams).

RAID LOG

WHAT | A project management tool used to store several project information in one place.

A central repository for all

RISKS, ASSUMPTIONS, ISSUES and **DEPENDENCIES**

Drives to take the necessary actions to ensure successful implementation of the project.

RISKS

Something that will have a negative impact on the project if it happens, and can lead to quality, delay or cost problems.

ISSUES

Incidents that cause the project to become out of alignment (risks that have already occurred).

ASSUMPTIONS

Those factors that are taken for granted but cannot be guaranteed and may impact the result of the project.

DEPENDENCIES

Those activities that need to start or be completed in order for the project to proceed successfully.

WHY ?

- Keeps your project organized and on track
- Makes the information easier to store and retrieve
- Useful document in regular project meetings and audits
- Gives confidence that the project is under control

HOW

A good practice is to create the log at the beginning of the project, then regularly update it as needed through regular project meetings

EXAMPLE

Category	Description	Priority	Status
Issue	xxxx	Low	Open
Issue	xxx	Negligible	Closed
Assumption	xxxx	Moderate	Open
Risk	xxx	Critical	Open
Assumption	xxxx	High	Closed
Issue	xxx	Moderate	Closed
Risk	xxxx	High	Open

SCATTER DIAGRAM

WHAT | A way of showing whether two variables are correlated or related to each other.

WHEN

When analyzing the correlation between pairs of variables and before conducting advanced statistical techniques to support or reject hypotheses about the data.

WHY

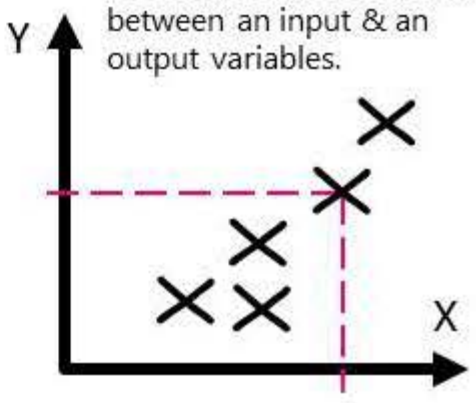
Enables to identify the most significant factors affecting the process.

Useful to verify that any change in the input variable will have an effect on the output variable.

HOW

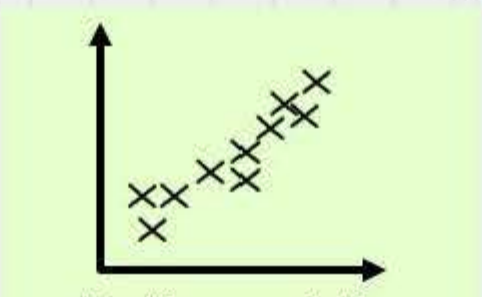
- The input variable is placed on the horizontal axis while the output variable is placed on the vertical axis.
- You may also study the relationship between two input variables (or two output variables).

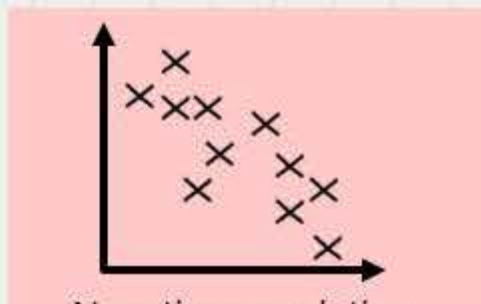
It considers the relationship between an input & an output variables.



Scatter diagrams can indicate several types of correlation


No correlation


Positive correlation


Negative correlation

Scatter diagrams can also indicate nonlinear relationships.

The width of the scattered pattern reflects the strength of the relationship.

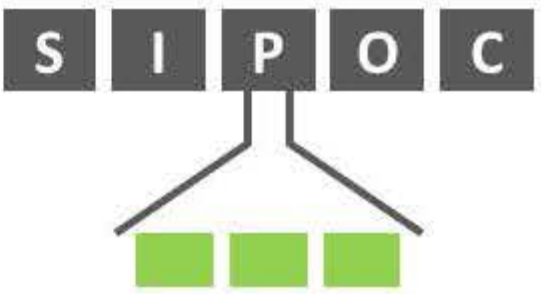
Be careful before concluding that there is a direct cause-and-effect relationship between the variables. There might be a third factor that is affecting the relationship.

SIPOC ANALYSIS

WHAT

A simple tool that provides a high-level view of the important elements of a business process.

SIPOC is an acronym that stands for Suppliers, Inputs, Process, Outputs and Customers.



WHEN?

- When investigating a process to identify its important elements.
- During the define phase of DMAIC and the planning phase of Kaizen events.
- When designing new processes.

WHY

Helps define the scope of work for improvement project and initiatives.

Helps understand the relationships between the inputs and outputs.

SIPOC analysis is a team effort, and the team should include people with enough knowledge of the process.

HOW

1. List the key high-level steps
2. Identify the outputs of the process
3. Identify customers who will receive the outputs
4. Identify the inputs required for the process
5. Identify the suppliers of the process inputs
6. Verify recorded information

EXAMPLE

SUPPLIERS	INPUTS	PROCESS	OUTPUTS	CUSTOMERS
Employees Evaluation panel	Idea description Estimated benefits & costs Evaluation criteria	Submit and Implement an Idea	Implemented Improvement Appreciation letter or reward HR Records	Departments Employees HR team

Submit an idea → Review and evaluate the idea → Implement the idea → Report results → Appreciate / reward employee

STAKEHOLDER ANALYSIS

WHAT

The process of identifying and analyzing the stakeholders that are likely to affect or be affected by a project or other organizational activity.

WHERE

Applications

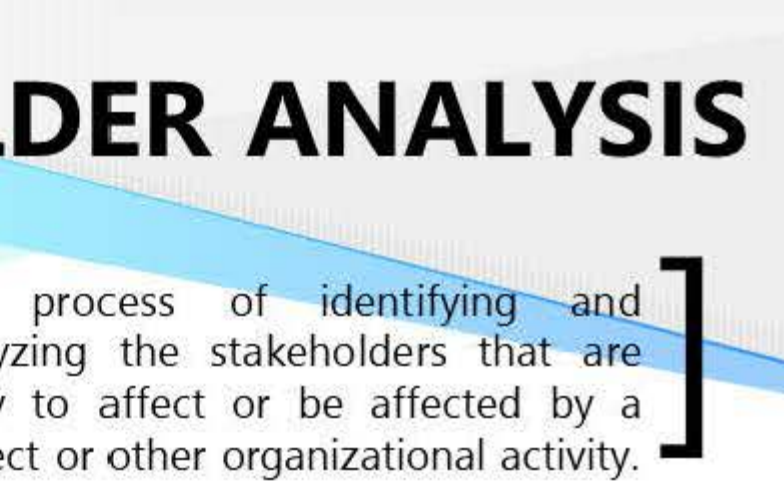
Often used in project management, in conflict resolution, and in organizational transformation and change management.

Examples of Project Stakeholders . . .

- Project team
- Finance manager
- Procurement team
- HR manager
- Operations manager
- Senior executives
- Process owner
- People who work on the process
- Customers of the process output
- Suppliers of the process

One of the most widely used tools for analyzing stakeholders is the **power-interest matrix**

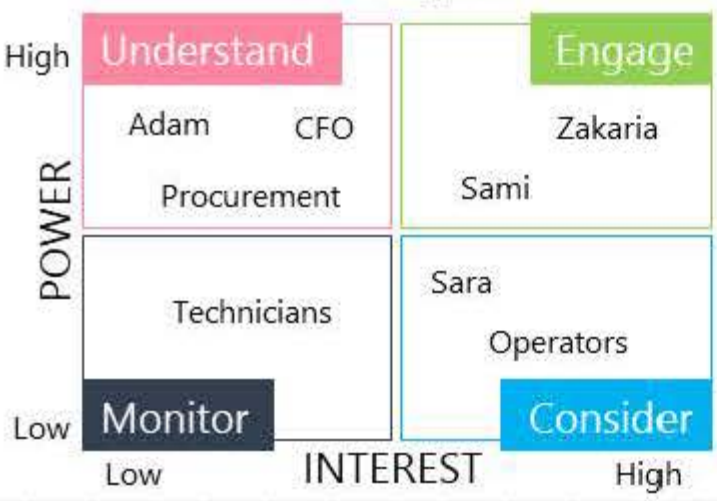
- It classifies stakeholders into four groups according to the power they hold and whether they are interested in the project or not.



HOW

1. Brainstorm the individuals and groups who may have a stake in the project.
2. Sort them by their power and interest.
3. Plot them on the power-interest matrix.
4. Identify gaps between current and desired involvement levels.
5. Create a plan to manage ongoing communication.

Example



WHY?

Mapping the stakeholders on the power-interest matrix helps managing them more effectively throughout the project or change effort.

SWOT ANALYSIS

WHAT

A simple and structured planning tool for reviewing and assessing the position and health of an organization.

SWOT Stands For . . .

Strengths **W**eaknesses **O**pportunities **T**hreats

WHY

Helps understanding where an organization currently stands within the industry and market

WHEN?

- Before developing or updating strategic plans.
- During the prioritization process of projects.
- When evaluating multiple strategic alternatives.

Strengths
The positive characteristics that put the business at a competitive advantage

Weaknesses
The internal deficiencies which may decrease the overall performance

Opportunities
The external factors and events that the business could exploit to its advantage

Threats
Unfavorable external factors that may interrupt the business from achieving its goals

EXAMPLE

Results of a SWOT exercise are often presented in the form of a four-field matrix.

STRENGTHS	WEAKNESSES
Strong financial position Competent workforce	Inability to meet demand High turnover rate
OPPORTUNITIES	**THREATS**
A new technologies Growth of existing market	Shortage of manpower Rising materials price

TIME VALUE MAP

WHAT | A graphical representation of the value-added and non-value-added time in a process.

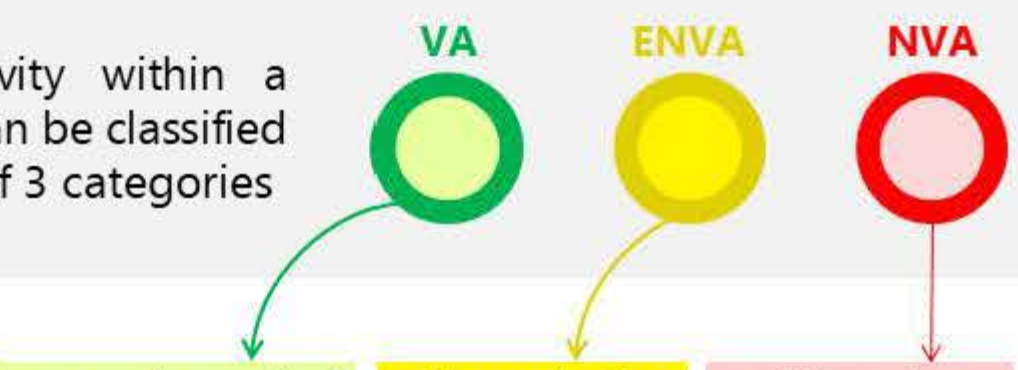
WHEN

When analyzing waste and non-value-added activities in business processes.

WHY

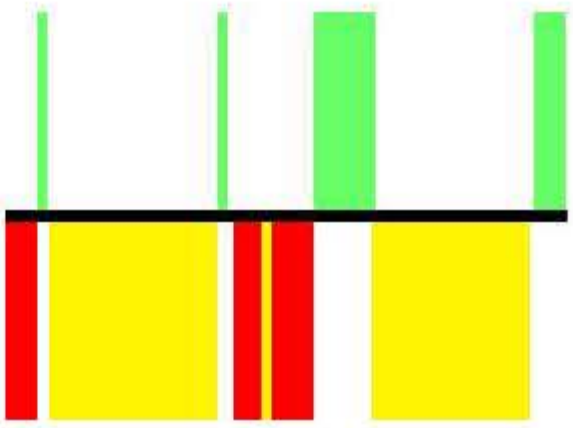
Better understand how much time wasted in a process to maximize value delivered to the customer.

Each activity within a process can be classified into one of 3 categories



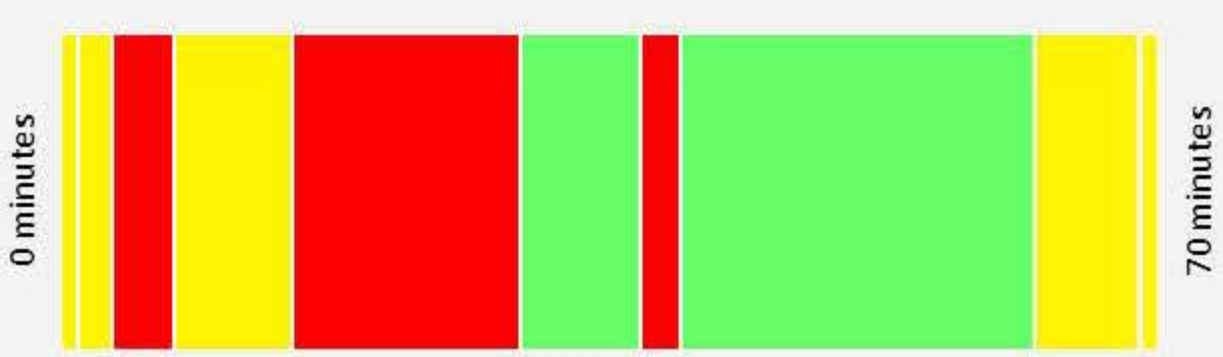
HOW

Plot all process activities as bars proportional to their time values along a horizontal timeline.



Some activities should become obvious candidates for elimination or modification

The scale of the timeline can either be intervals of the cycle time or the actual time of a day



A time value map can also be represented in this format, where all bars are parallel to each other.

TRAFFIC LIGHT ASSESSMENT

WHAT

A rating system for evaluating the performance in relation to a goal.

Performance results are indicated using the real traffic light colors.

RED YELLOW GREEN

WHY

Supports Decision Making

Performance results are indicated using the real traffic light colors

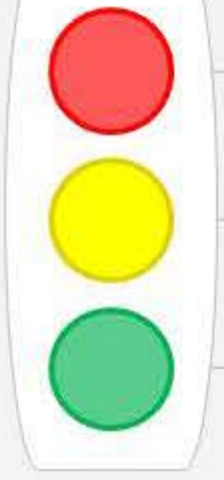
Benefits

Where?

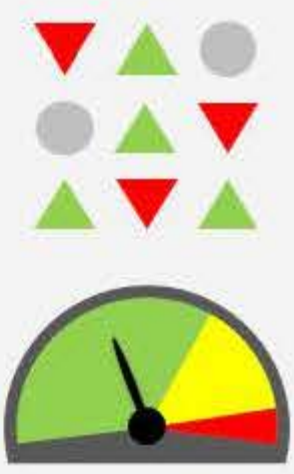
Applications

- **Performance** and trend reports
- **Customer** satisfaction reports
- **Financial** and marketing reports
- **Quality** and compliance audits
- **Risk** management & safety audits

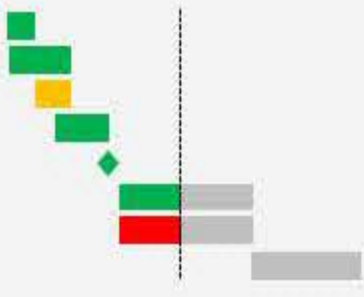
Results are expressed in **Performance Management** as:



- A performance that is far below from target
- A performance that is a bit below from target
- A performance that is expected or better than expected



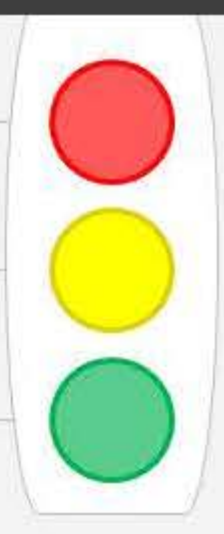
Results are expressed in **Project Management** as:



A Gantt Chart

Represents time duration of activities

- An activity that is incomplete
- Partially completed or completed after due date
- An activity that has been completed on time or ahead of time



Other Uses

1 Communicating production info.

2 Marking material & inventory levels

3 Assessing the skill levels of employees

4 Assessing a particular idea

VALUE STREAM MAPPING

WHAT

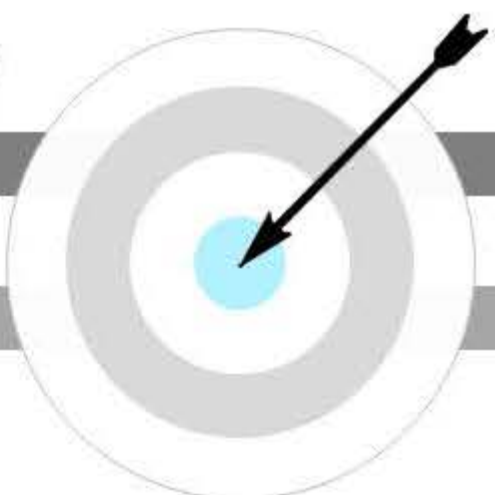
A lean management technique for understanding and analyzing the flow of a business process.

WHEN

To identify and eliminate waste to make the process as close to lean as possible.

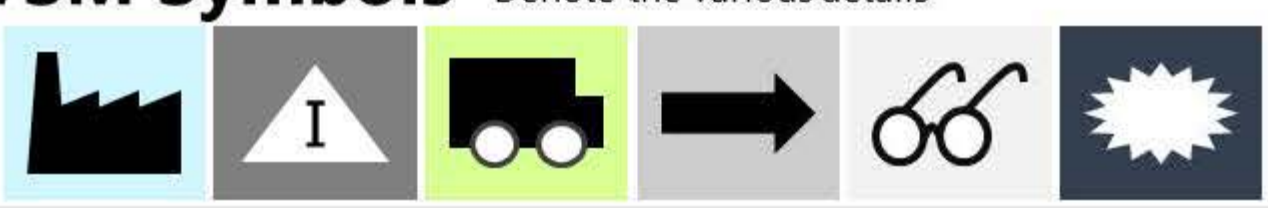
WHY

- Helps to understand the flow of value
- Helps to see where waste and problems occur
- Helps to establish a future state vision
- Helps to plan the needed improvements



VSM Symbols

Denote the various details



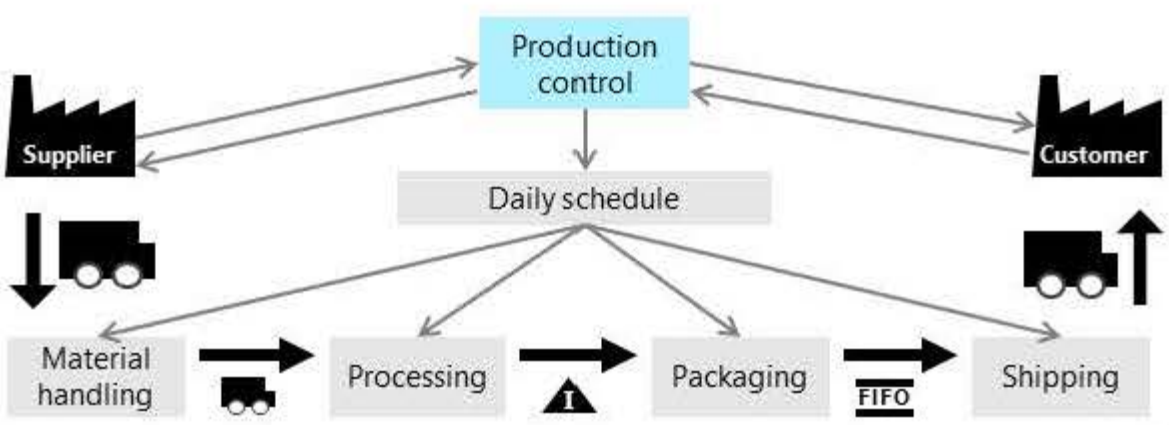
The type of symbols used depends on the industry and the type of work

. . . VSM Process . . .

Select the Value Stream → Draw Current State Map → Draw Future State Map → Develop and Implement Improvements

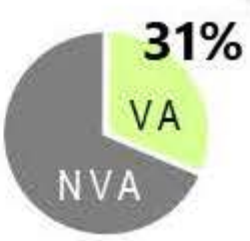
EXAMPLE

A typical value stream map for Manufacturing



Many companies use the Value-Added Ratio (VAR) metric to measure the performance of their end-to-end process.

VAR = Total Value-Added Time / Total Lead Time



Visual Management

WHAT | A business management approach that communicates important information in a visual and real-time manner.

A system of labels, signs, markings, information displays, and visual guides instead of written instructions

LEAN

Used by Lean organizations to detect abnormalities, reinforce standards, and maintain stability and safety

WHY?

- Improves workplace communication and collaboration
- Improves compliance to health, safety and other requirements
- Increases the awareness of error conditions and waste

Types of Visual Controls

INFORMATION
Visuals to show identity, directions, strategy, customer expectations and compliance requirements

- Safety Visuals
- Signage
- Marking
- Posters

INSTRUCTION
Visuals to communicate SOPs, work-related info., and workplace organization & maintenance activities

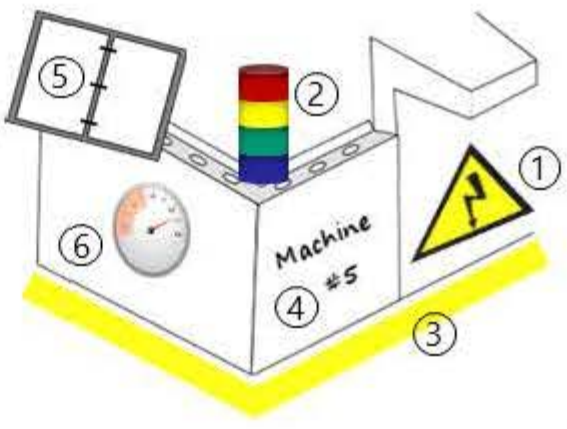
- Work instructions
- Standard work
- 5S
- TPM

STATUS
Visuals to display the status of processes, projects, production, productivity and performance

- Performance metrics
- Andon lights
- Kaizen progress
- Best practices

EXAMPLE FROM A PRODUCTION ENVIRONMENT

1 Safety sign
2 Andon lights
3 Floor marking
4 Machine identity
5 Visual instructions
6 Gauge marking



- Visual management can also be useful for support functions in the production environment, and in the service sector.
- It is very common to conduct Kaizen events where the focus is to enhance the visuality of a specific process or work area.

Why-Why Diagram

WHAT

A problem-solving tool that is used to discover why a problem occurs when there are multiple factors to consider.

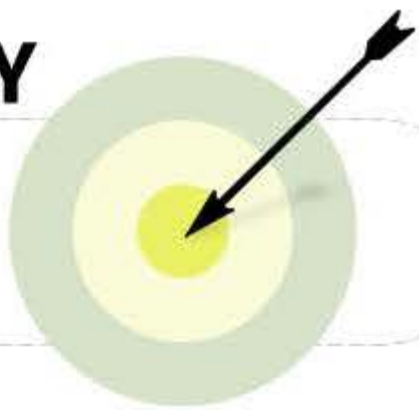
WHEN

To identify the potential causes of a problem in order to solve it.

To identify the potential causes that may lead to future problems.

WHY

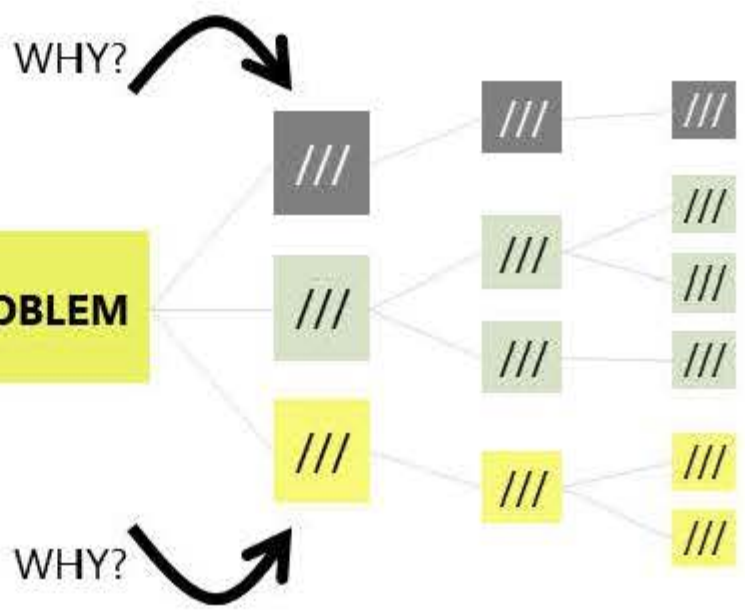
Provides useful information for later problem-solving analyses.



HOW

The why-why diagram can be represented in a tree format or a fishbone format

Multiple causes can be given to one question



1
Clearly state the problem to be solved

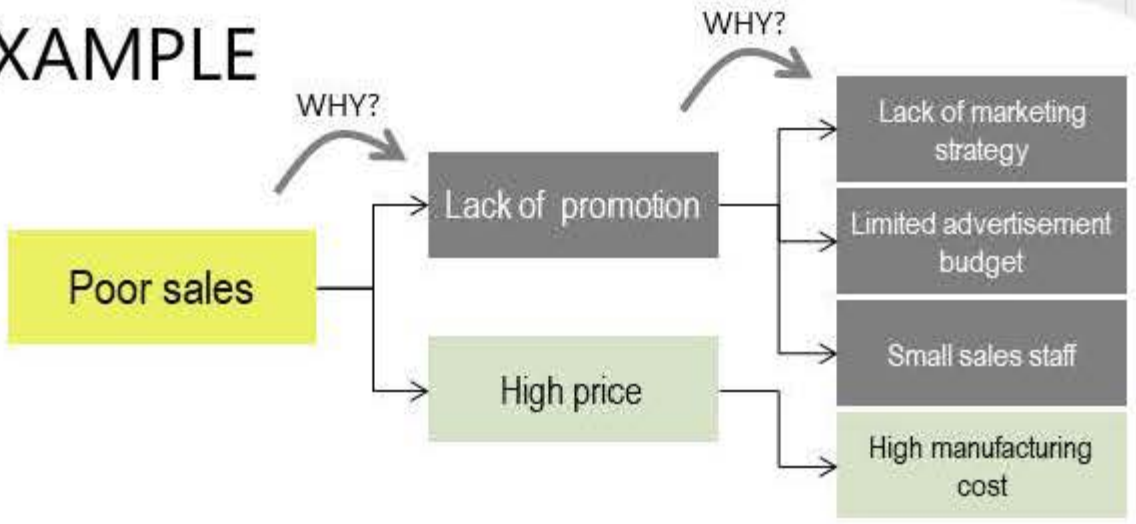
2
Ask 'Why the problem occurs?'

3
Write as many causes as possible

4
Keep asking Why until you identify the root causes

5
Plan for the corrective actions

EXAMPLE



Hint: Potential causes can be organized into categories to provide better focus and easier reference.