



THE SCOPE OF TOOLS AND TECHNIQUES

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SMED-SINGLE MINUTE EXCHANGE OF DIE

What is SMED?

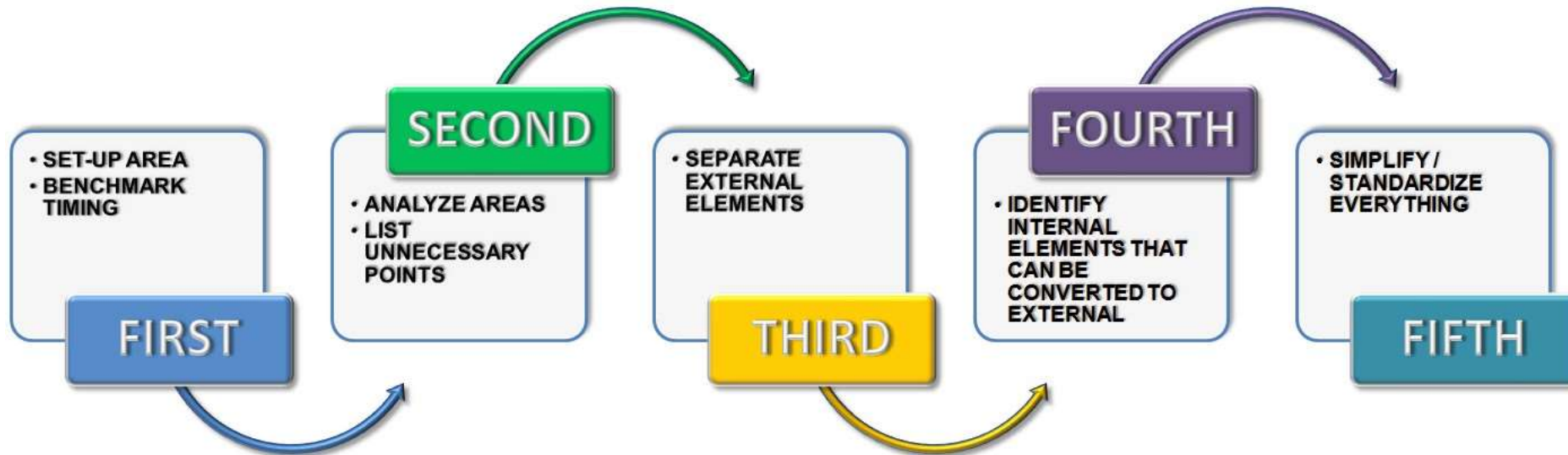
What is the Purpose of SMED?

What can SMED do for You?



SMED-SINGLE MINUTE EXCHANGE OF DIE

SINGLE MINUTE EXCHANGE OF DIES (SMED) PROCESS STEPS





SMED-SINGLE MINUTE EXCHANGE OF DIE





STEP ONE – IDENTIFY PILOT AREA

Item	Description
Duration	The changeover is long enough to have significant room for improvement, but not too long as to be overwhelming in scope (e.g. a one hour changeover presents a good balance).
Variation	There is large variation in changeover times (e.g. changeover times range from one to three hours).
Opportunities	There are multiple opportunities to perform the changeover each week (so proposed improvements can be quickly tested).
Familiarity	Employees familiar with the equipment (operators, maintenance personnel, quality assurance, and supervisors) are engaged and motivated.
Constraint	The equipment is a constraint/bottleneck – thus improvements will bring immediate benefits. If constraint equipment is selected, minimize the potential risk by building temporary stock and otherwise ensuring that unanticipated downtime can be tolerated.



STEP TWO – IDENTIFY ELEMENTS

Item	Description
Elements	A typical changeover will result in 30 to 50 elements being documented.
Sticky Notes	A fast method of capturing elements is to create a series of post-it notes that are stuck to a wall in the order in which they are performed during the changeover.
Man and Machine	Be sure to capture both “human” elements (elements where the operator is doing something) and “equipment” elements (elements where the equipment is doing something). As discussed later, the human elements are usually easiest to optimize.
Other Notes	While videotaping the changeover have several observers taking notes. Sometimes the observers will notice things that are missed on the videotape.
Observe	Only observe – let the changeover take its normal course.



STEP THREE – SEPARATE EXTERNAL ELEMENTS

Item	Description
Retrieval	Retrieval of parts, tools, materials, and/or instructions.
Inspection	Inspection of parts, tools, and/or materials.
Cleaning	Cleaning tasks that can be performed while the process is running.
Quality	Quality checks for the last production run.



STEP FOUR – CONVERT INTERNAL ELEMENTS TO EXTERNAL

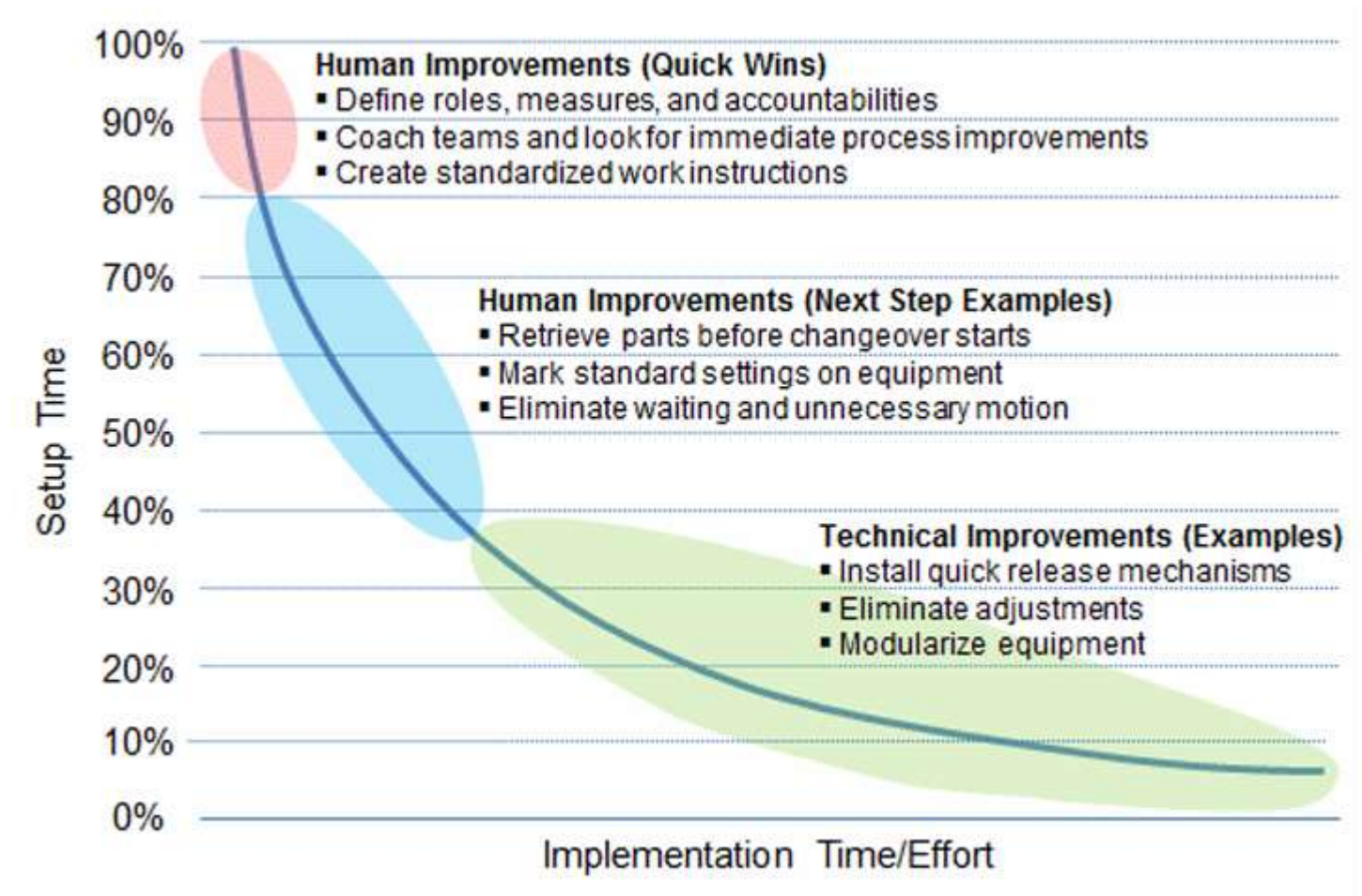
Item	Description
Advance Preparation	Prepare parts in advance (e.g. preheat dies in advance of the changeover)
Jigs	Use duplicate jigs (e.g. perform alignment and other adjustments in advance of the changeover)
Modularize	Modularize equipment (e.g. replace a printer instead of adjusting the print head so the printer can be configured for a new part number in advance of the changeover)
Modify	Modify equipment (e.g. add guarding to enable safe cleaning while the process is running)



STEP FIVE – STREAMLINE REMAINING ELEMENTS

Item	Description
Release	Eliminate bolts (e.g. use quick release mechanisms or other types of functional clamps)
Adjustment	Eliminate adjustments (e.g. use standardized numerical settings; convert adjustments to multiple fixed settings; use visible centerlines; use shims to standardize die size)
Motion	Eliminate motion (e.g. reorganize the work space)
Waiting	Eliminate waiting (e.g. make first article inspection a high priority for QA)
Standardizing	Standardize hardware (e.g. so fewer tools are needed)
Operations	Create parallel operations (e.g. note that with multiple operators working on the same equipment close attention must be paid to potential safety issues)
Mechanize	Mechanize (normally this is considered a last resort)

ACCELERATE PROGRESS



INDUSTRIAL CASE

Materials Laydown

The layout shown left is the largest cabinet site we have to build. The layout below shows the ideal placement of materials to allow the gang to build the site as efficiently as possible. I.e. materials they need first are closer to the works area.

For smaller sites the materials can be placed on one side only.

2no. A Chamber and 2no. Piles of bedding material at each side of the site to be built

2no. Precase surrounds at each side of the site to be built

Paving slabs appropriate to the site being built

1 Pack of ducts

610 Plymths to be distributed each side of the site

!! DONT PLACE ANY MATERIALS WHERE THE GANG NEED TO WORK !!

NTS

DATE	BY	NO.

Ideal materials distribution at

Consideration needs to be given to how wide the verge is and any other obstructions in the area.

The layout shown here is an ideal situation which will not always exist on site but the general principals of this remain valid, the materials to be used first need to be closer to the works area.

MODIFIED HUB



Trailer carrying ducts

HIAB



The SMED process led to:

Increased productivity from 1.5 chambers in 2 days to 2 per day (167% productivity increase)

Significant increase in the percentage of value adding activities, improved process flow and waste reduction

SMED - BENEFITS

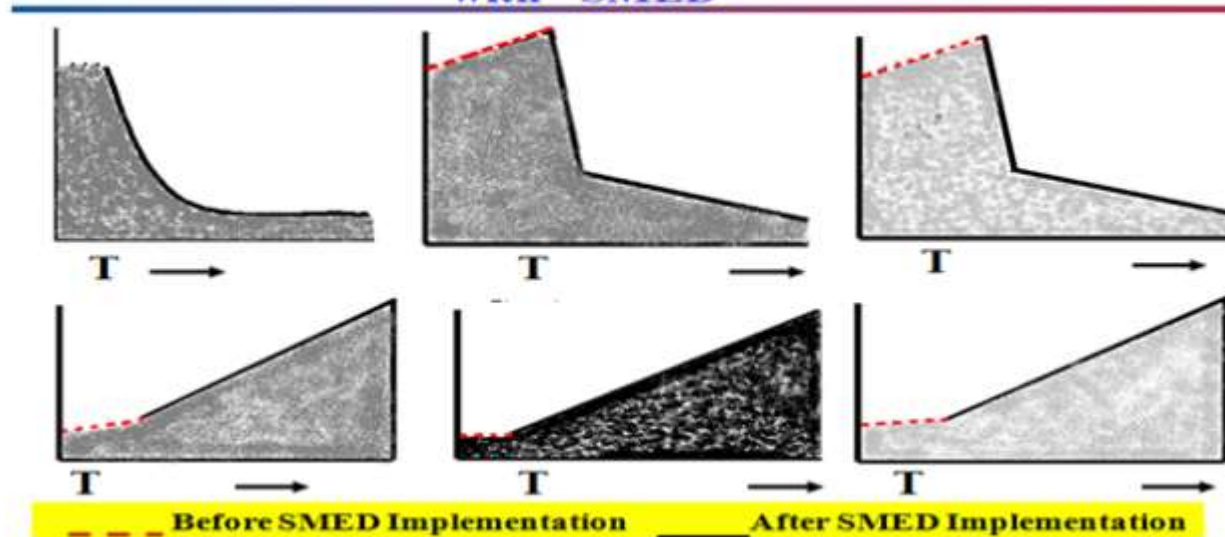
Benefits for Companies

- Flexibility
- Quicker Delivery
- Better Quality
- Higher Productivity

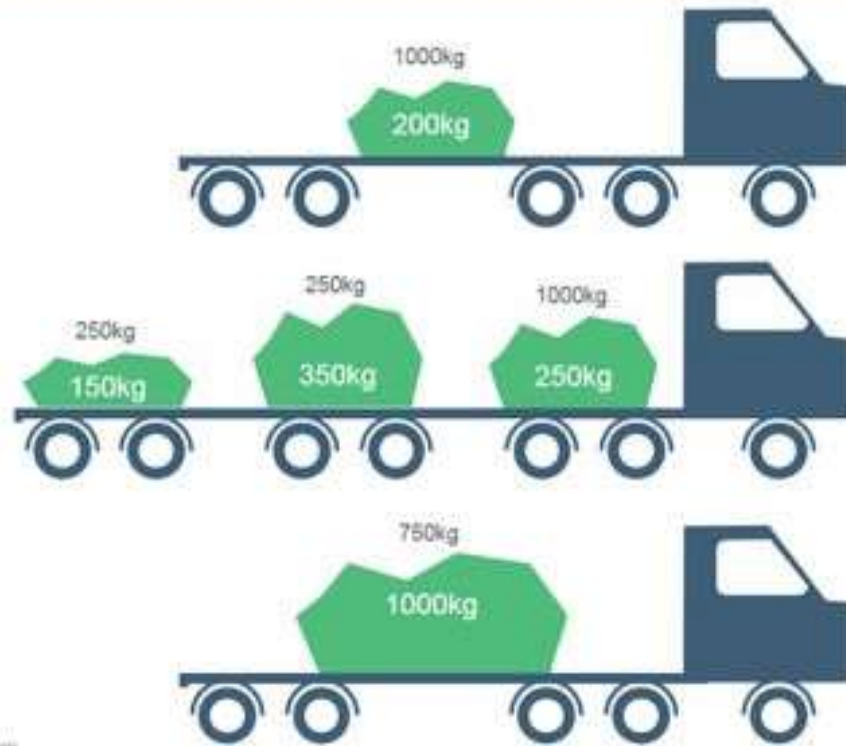
Benefits for You

- Simpler Setups Result in
- Less inventory
- Setup Tools when Standardized & Combined means

Benefits of Shortening Changeover Time with - SMED



ACTIVITY



MURA
Imbalance

MUDA
Wastefulness

MURI
overload

MURA
Imbalance

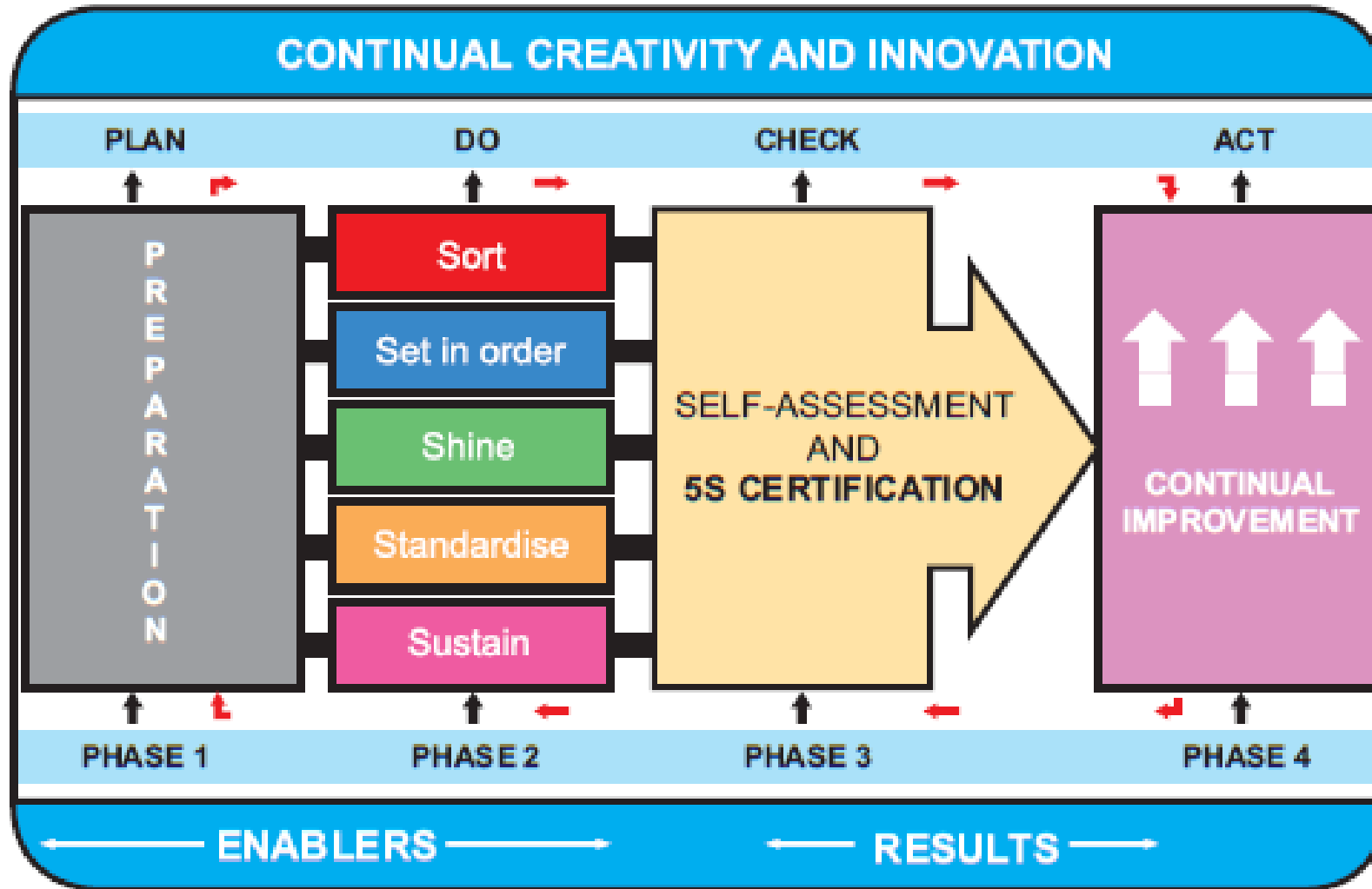
MUDA
Wastefulness

MURI
overload



5S

ROADMAP TO 5S IMPLEMENTATION





BENEFITS OF 5S IMPLEMENTATION

- Workplace becomes cleaner and better organized.
- Shop floor and office operation becomes safer.
- Visible results enhance the generation of more and better ideas.
- Lead-time reduced
- Changeover time reduced by streamlining operations.
- Breakdowns and minor stops eliminated on production lines.
- Defects reduced by mistake proofing.
- Clear methods and standards are established.
- In-process inventory is reduced.
- Space usage is improved.
- Customer complaints are reduced.



VALUE STREAM MAPPING

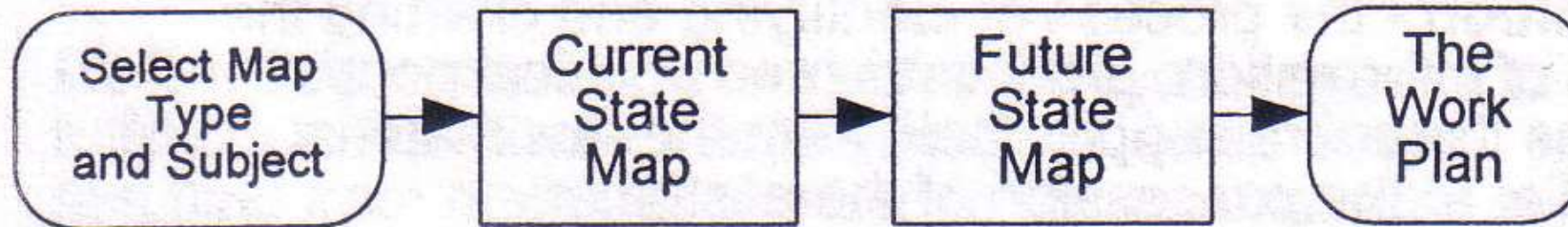
The Value stream mapping

- process allows you to create a detailed visualization of all steps in your work process
- It is a representation of the flow of goods from supplier to customer through your organization

The primary purpose of creating a value stream map

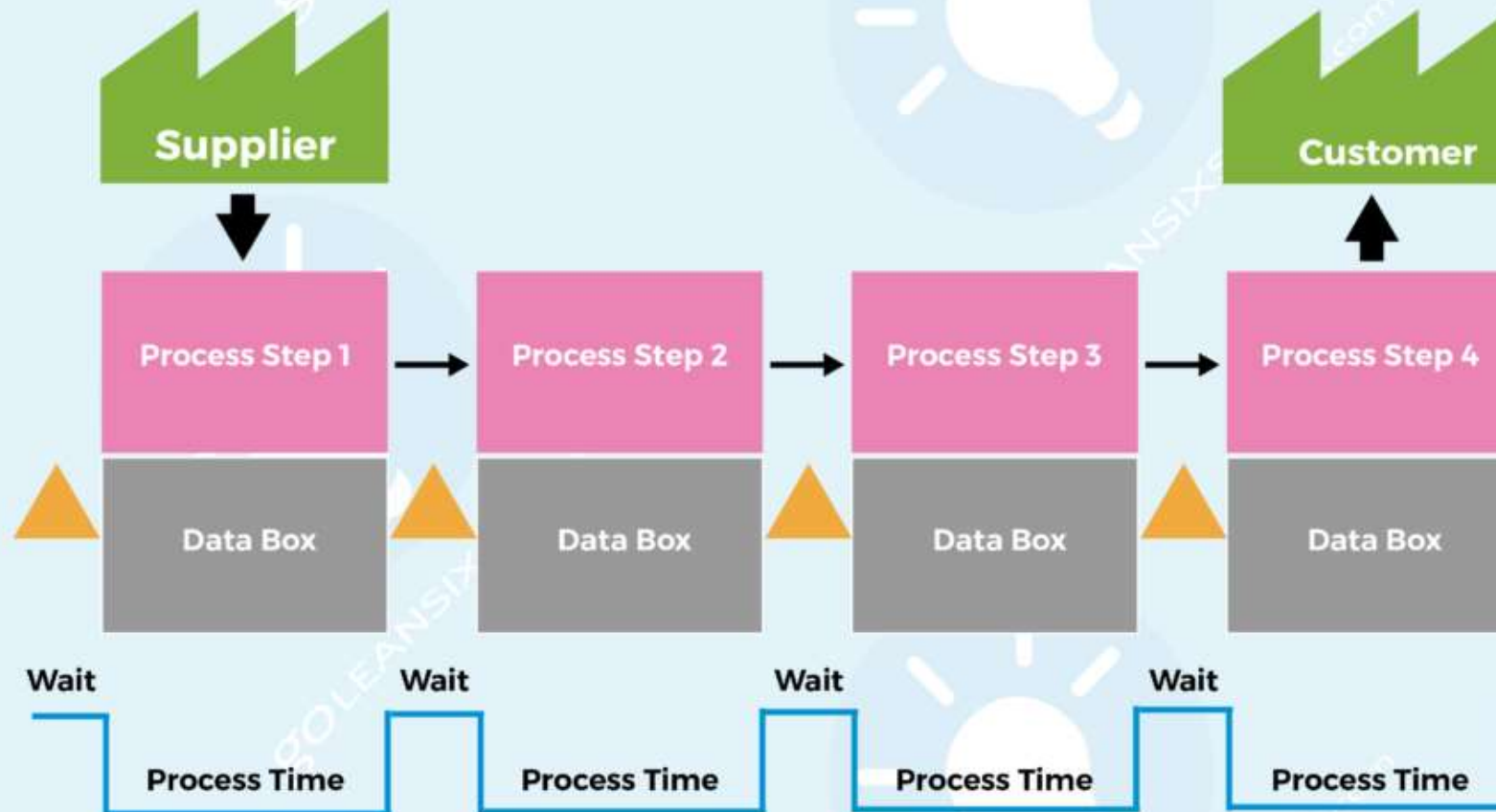
To show you the places where you can improve your process by visualizing both its value-adding and wasteful steps.

Action Plan



Value Stream Map

A Value Stream Map displays the high level process steps along with key process data.





REFERENCES

1. <https://asq.org/quality-resources/pareto>
2. <https://www.whatissixsigma.net/implementing-smed/>
3. <https://asq.org/quality-resources/pareto>
4. <https://goleansixsigma.com/value-stream-mapping/>
5. **What is Lean Six Sigma** By Michael L. George, David T. Rowlands, Bill Kastle



THANK YOU