Lean principles

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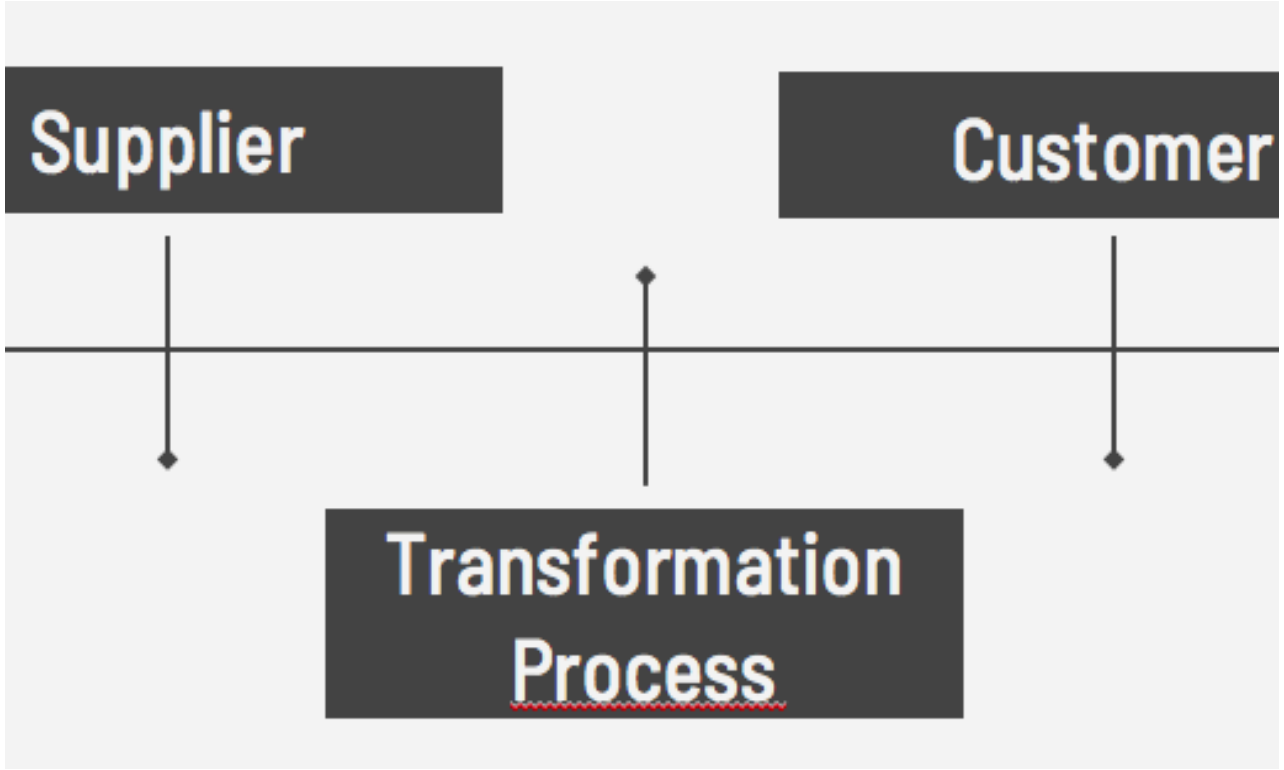
Lean definition

- The term **Lean manufacturing** refers to the application of **Lean** practices, principles, and tools to the development and manufacture of physical products. ... Manufacturers use **Lean manufacturing** principles to eliminate waste, optimize processes, cut costs, and boost innovation in a volatile market.

Value stream



- Value chain is **a set of activities** that are performed by an organization to produce its products and services.
- Whereas a **value stream** map represents a core business process that adds **value** to a **material** product, a **value chain** diagram shows an overview of all activities within a company.

Three Components

The flow of material: represents the transportation of raw materials, parts, work-in-progress inventory, and final products

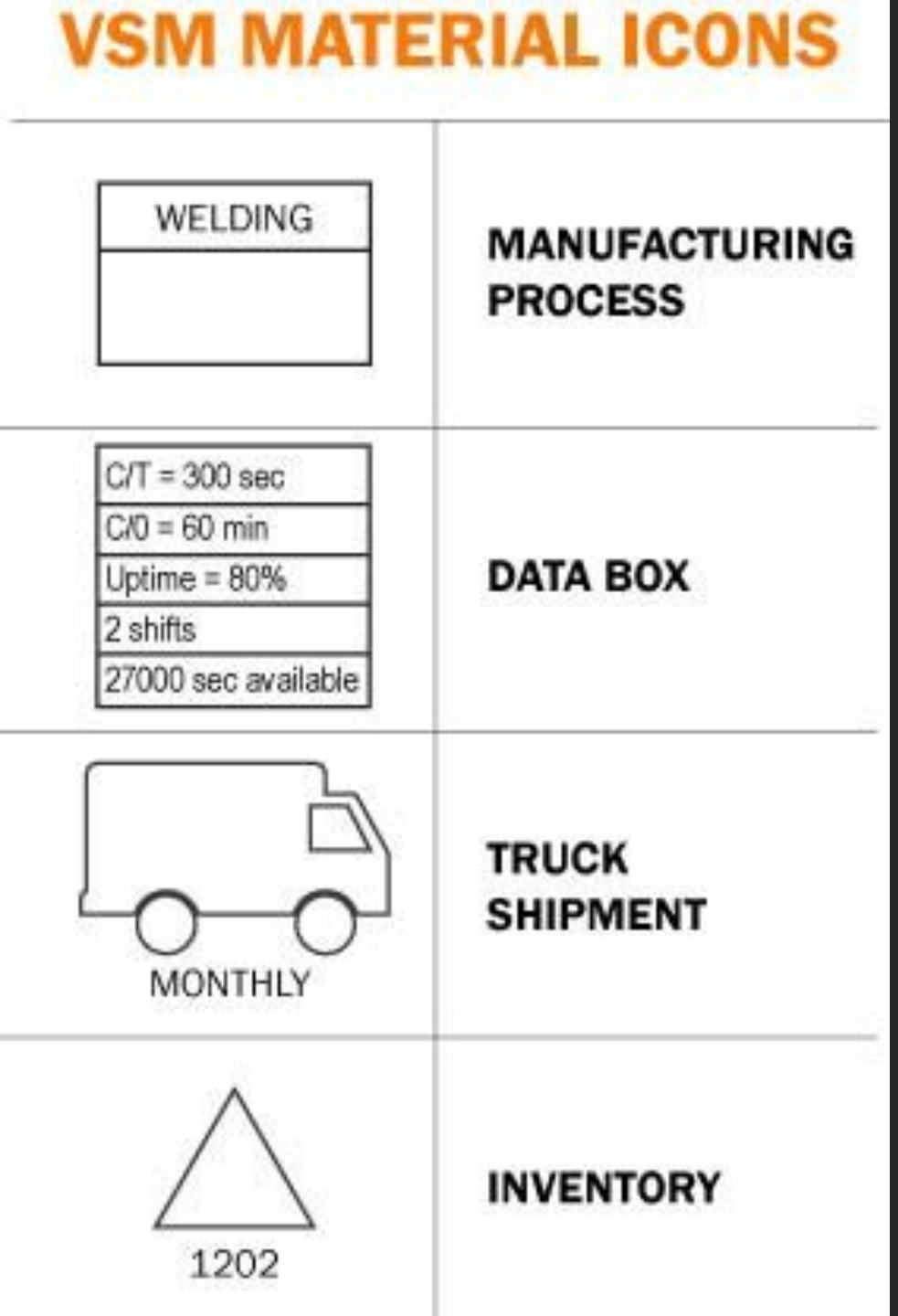
Transformation: represents the process of changing inputs into outputs, also the process of turning raw materials into finished goods.

The flow of information: contains the information that is required to support the flow and transformation of materials

Value stream mapping

Value stream maps are a tool used to evaluate the current manufacturing process before beginning the journey of Lean or to periodically assess a Lean program.

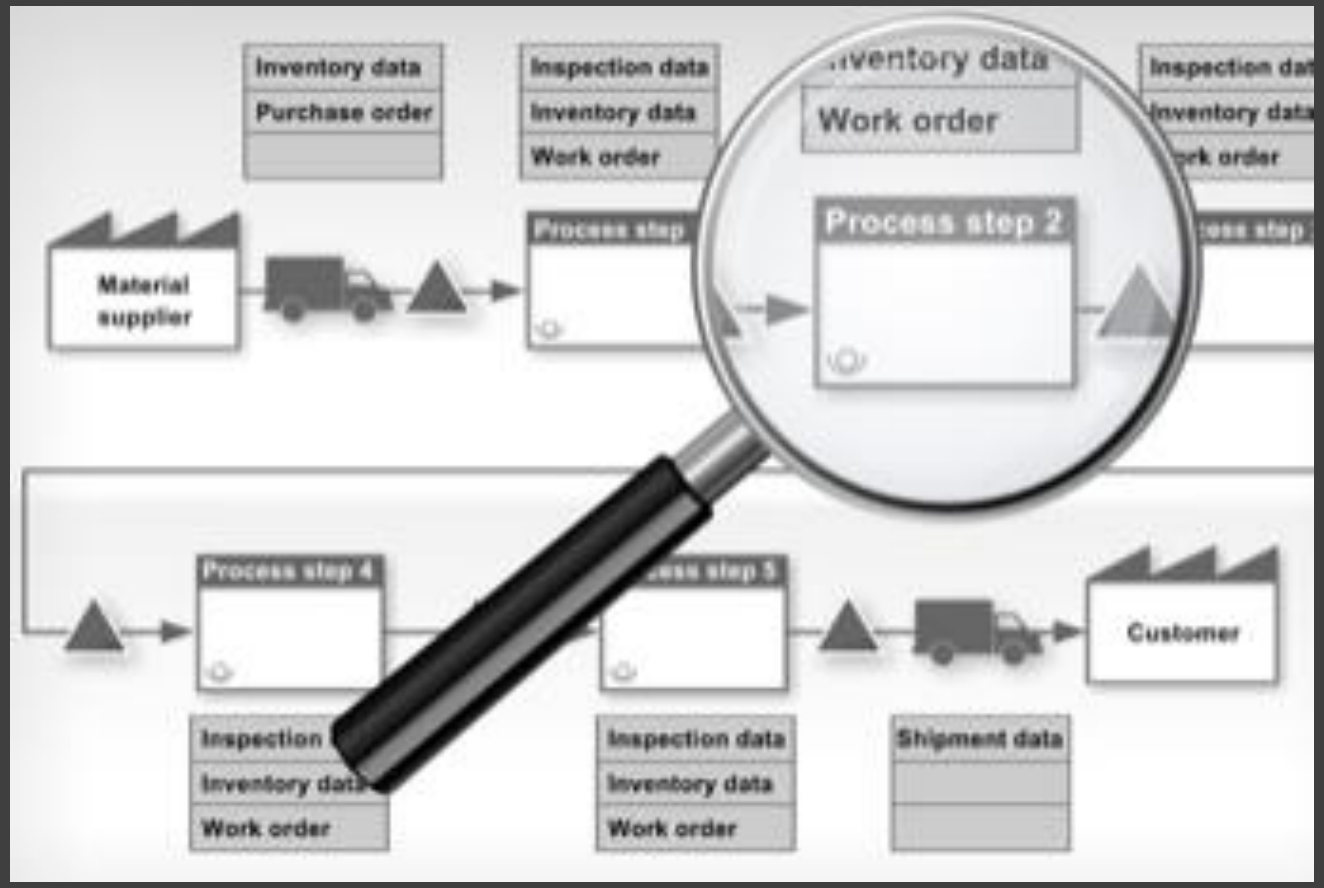
It is beneficial to identify opportunities to remove waste from the process.



Value stream graphics

Value stream maps use a standardized set of graphic symbols to represent the activity.

Value chain analysis

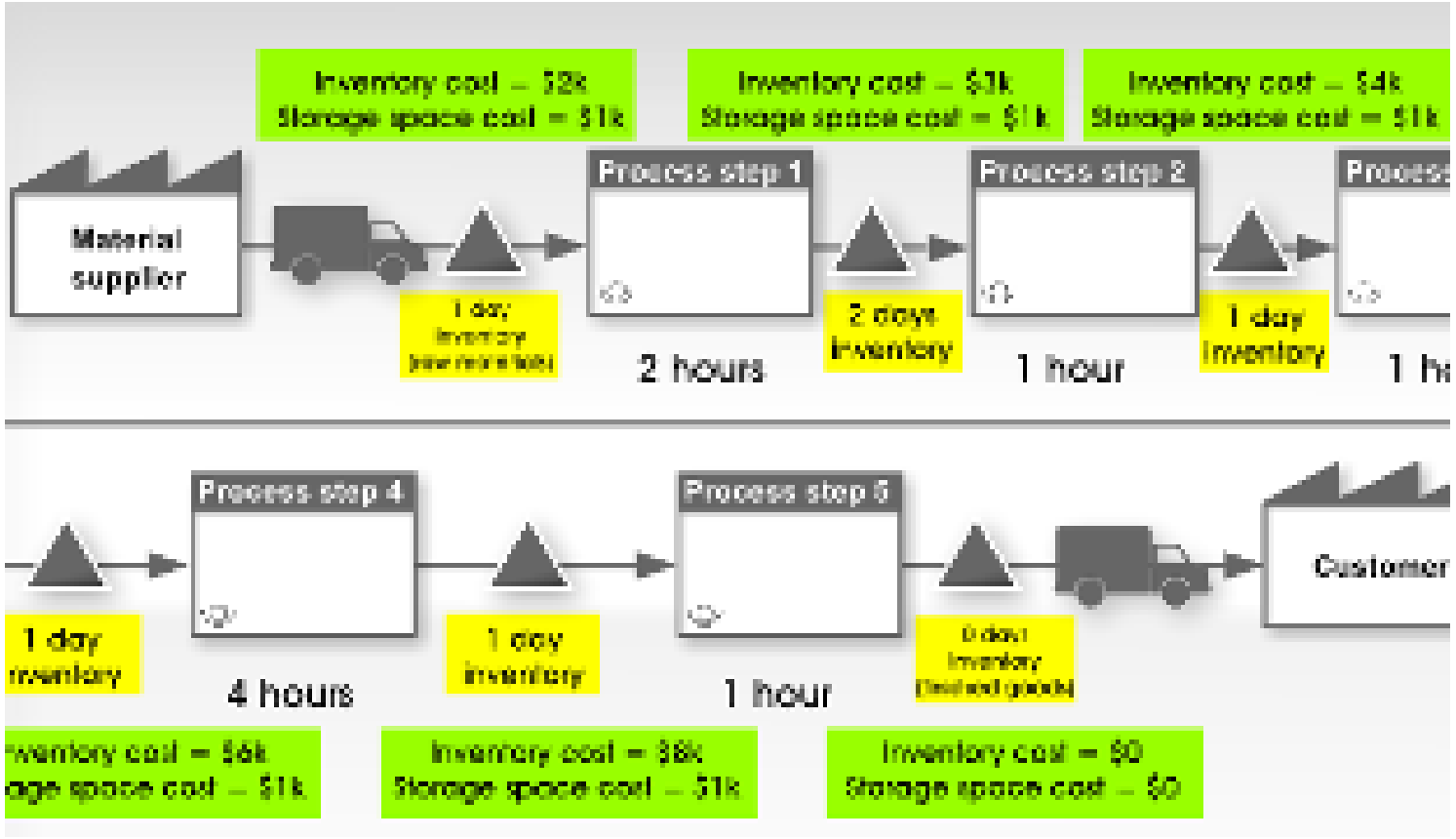


After the mapping is completed, the value analysis should be performed, with the objective to reveal the hidden waste amid the organization.

How to Become Lean by Value Stream Maps

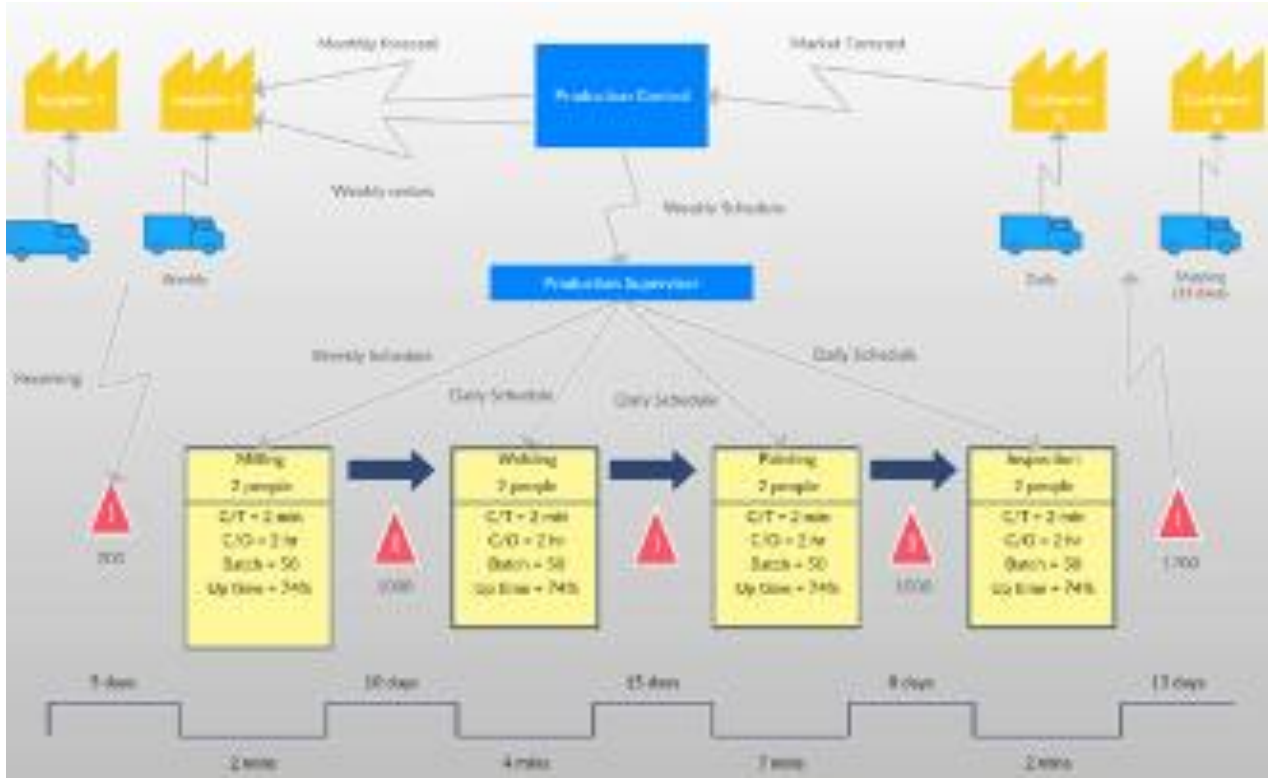
- Timing - to identify and reduce the time waste
- Inventory expense - to analyze the value/cost of inventory
- Process steps - to remove the redundant processes
- Pull-system - to reduce inventory
- Suppliers - to reduce waste and cost of whole supply chain

Pull Value Stream



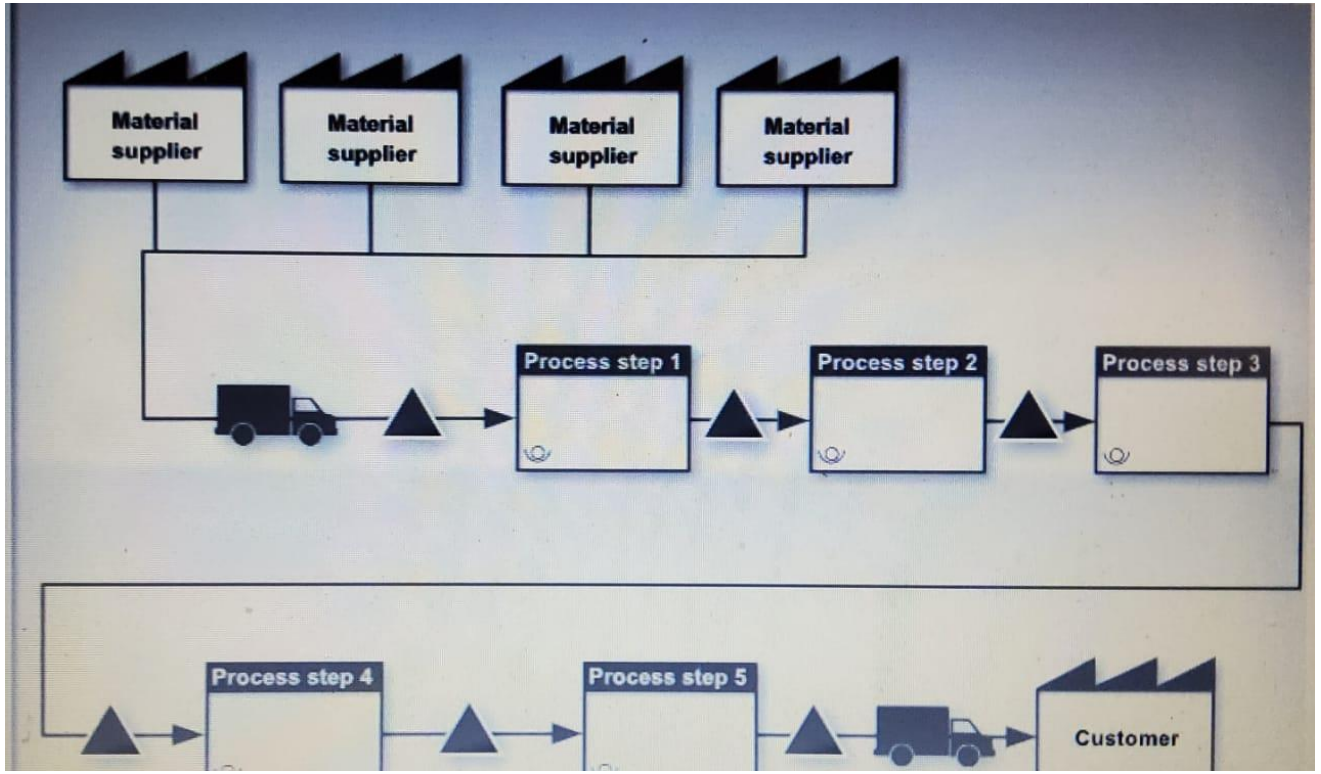
- There will be no excess of inventory that needs to be stored, thus reducing inventory levels and the cost of carrying and storing goods.

Suppliers and the Value Stream Map



- It includes all the suppliers.
- It's a tool for reducing waste and improving efficiency, it will benefit the suppliers as well.

Page 20-30. Value stream map and Opportunities



- Value stream maps are extended to increase all the suppliers included in the product chain.
- The manager has to find opportunities using the value stream map to reduce cost and drive out costs that will benefir the supplier

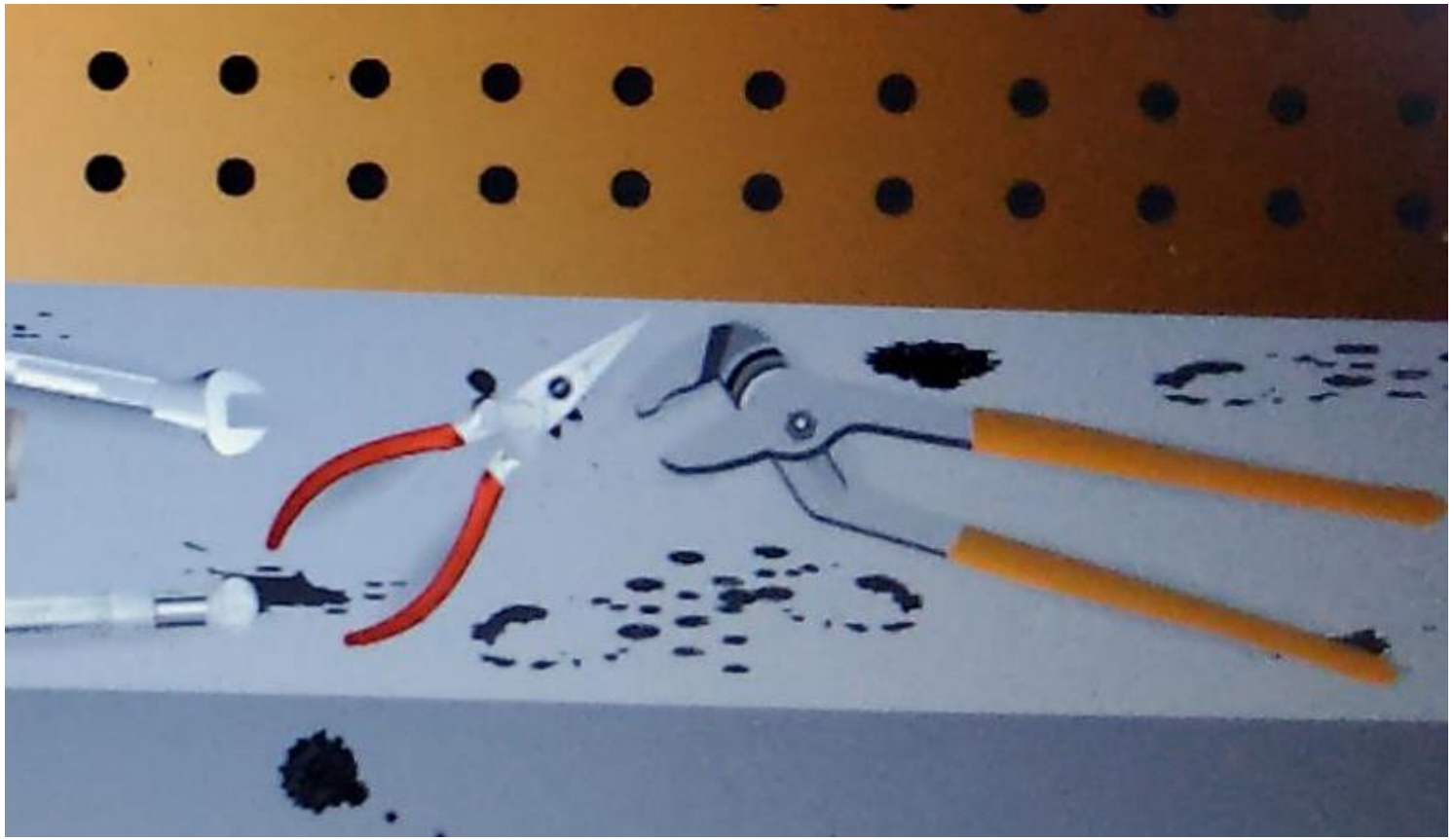
5 S

5s is a lean manufacturing tool that helps Improve productivity and sustain it.

- 5 S was developed in Japan uses five words which with 's' to describe the process.
- 5 S ensures that the workplace is organized in such a way that everything needed to perform is always in the most efficient location.

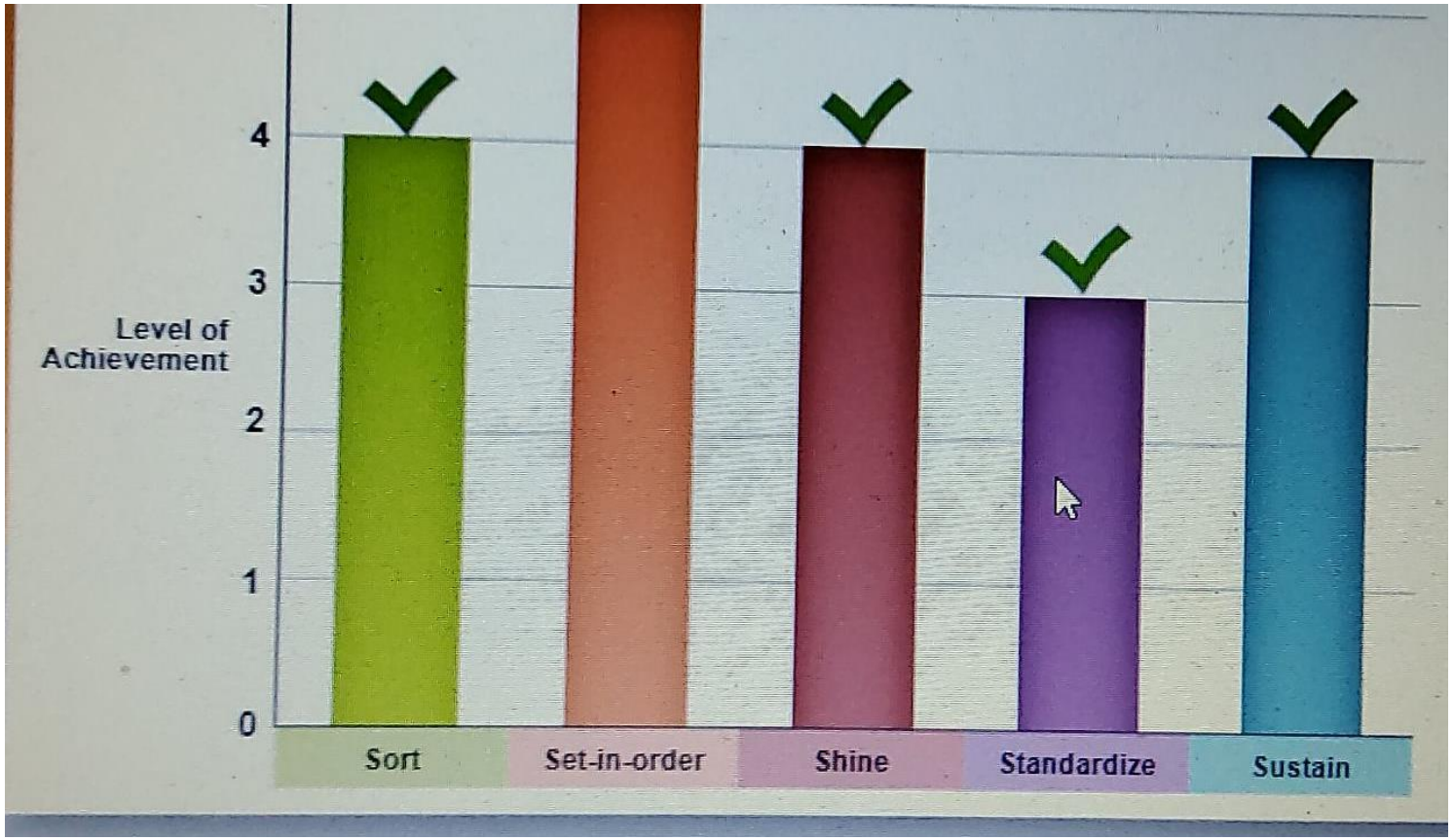
1. Sort
2. Set-in-order
3. Shine
4. Standardize
5. Sustain

Sort and Set-in-order



- Sort is a process of prioritizing and using only of what is required and discarding everything that is not required from the workplace.
- Items that are only used on occasion are placed in a storage area.
- Set-in-order is process done after sorting in which items are arranged in an optimal location near the operator to improve efficiency.
- Serious thought should be given on the frequency of movements and ergonomics.
- Ergonomics is study of people in their working environment. The goal is to eliminate discomfort and risk of injury due to work

Shine, Standardize & Sustain



- Shine is process of cleaning the workplace everyday after the work is done.
- Standardize involves establishing the best practices and then documenting these in a standard procedure or work instruction
- It involves processes like arranging work area in same manner, Performing task and processes in the same manner.
- Sustain this step insures that the efforts involved in establishing the first 4 S are maintained.

Kaizen

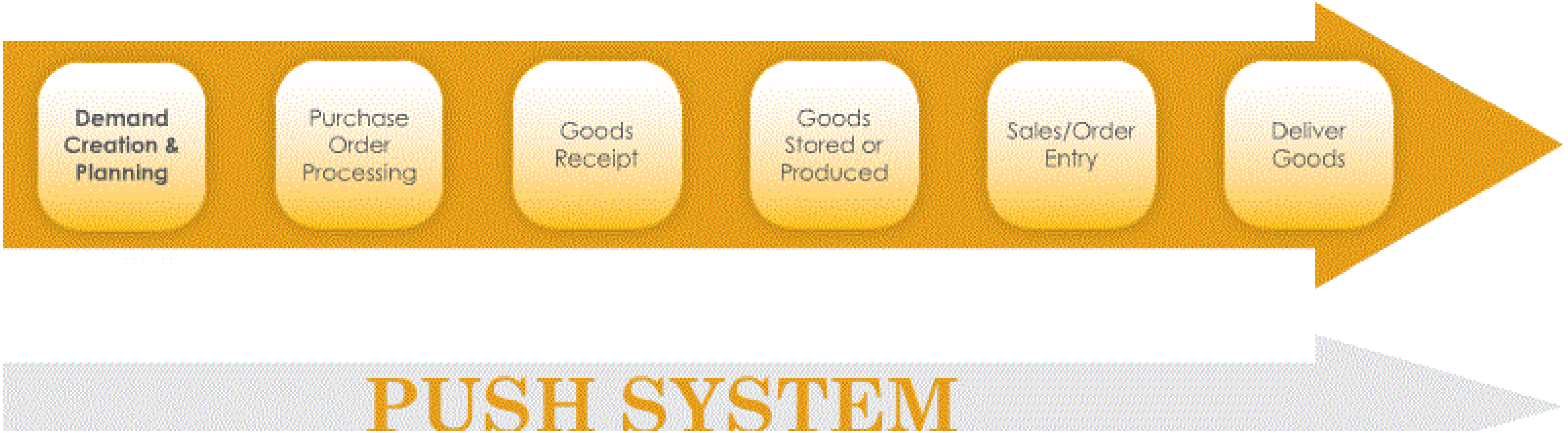
- Kaizen is term associated with improvement or change for the better.
- Kaizen event is an exercise that brings together a cross-functional term to see where the area of opportunities are arising for process improvement.
- Kaizen events takes time and if management does see the value in this time, there are other cultural adjustments that must be made before kaizen can be successfully implemented.

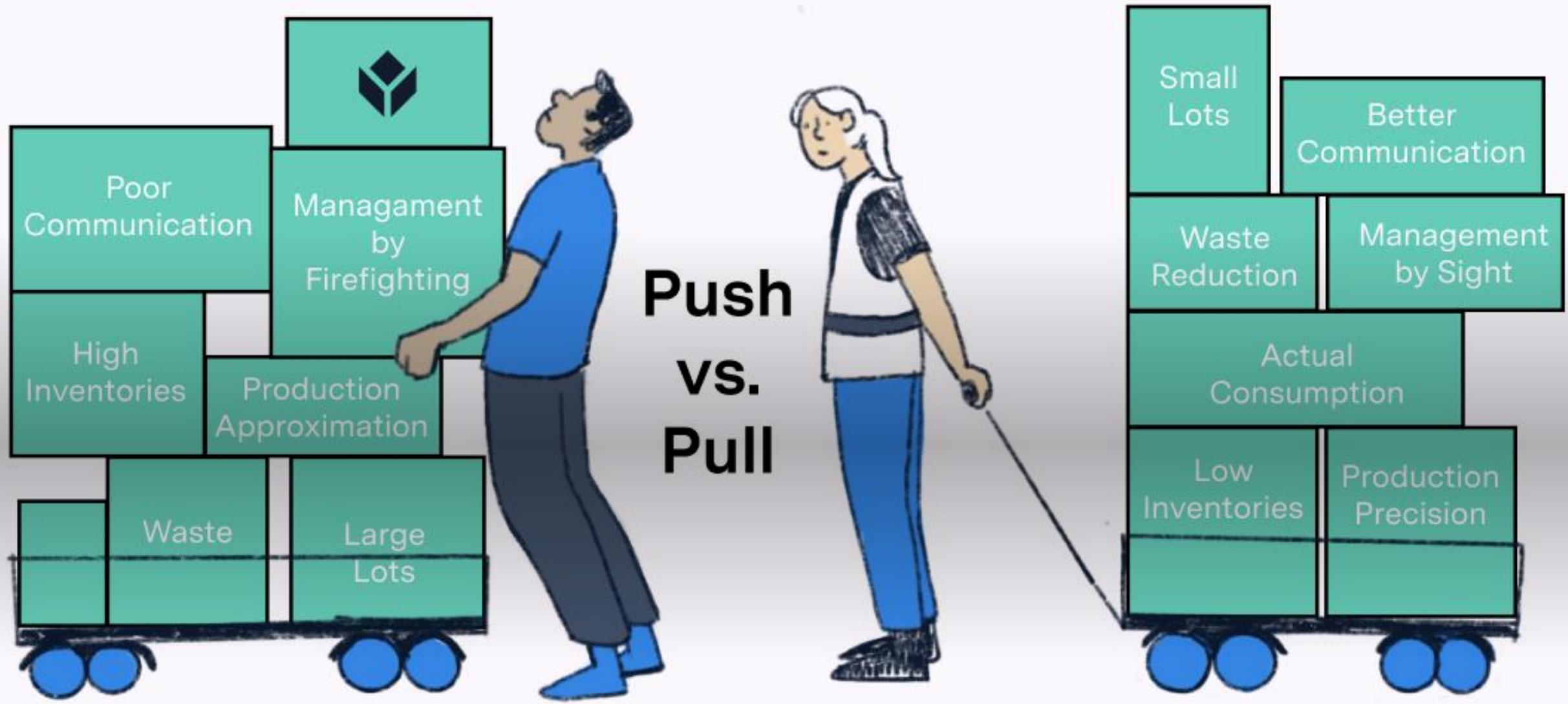
Pull Systems

- Pull systems are part of the Lean manufacturing principles, born in the late 1940s. A lean pull system aims to create a workflow where work is pulled only if there is a demand for it.
- A pull system experiences increased customer satisfaction as products are manufactured specifically to fulfill their requests. Since products are made in small quantities, quality issues will be identified faster than with a push system, This system also experiences less inventory as products are not made until they are needed
- The pull system is also called a JIT system because it operates Just in time in delivering finish goods

Push Systems

- Manufacturing system in which production is based on a projected production plan and where information flows from management to the market, the same direction in which the materials flow. This is how many traditional production and project management environments have worked. This is effectively the opposite of how a pull system works.





Make all we can just in case

Make what's needed when we need it

Advantages of Pull System Over Push System

- The purpose of implementing a pull system is to build products based on actual demand and not on forecasts. By doing so, your company can focus on eliminating waste activities in the production process. As a result, you'll be able to optimize your resources and reduce the possibility of overstocking.

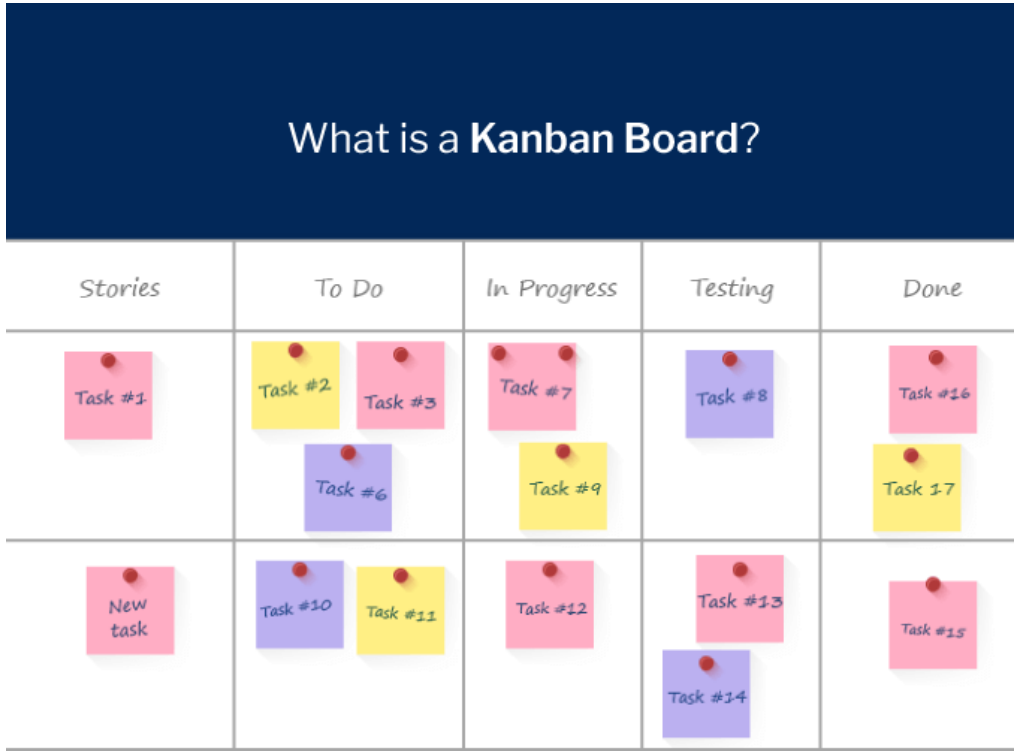
- Just-in-time" is a production model where deliverables are produced in order to meet actual demands and avoid overstocking and push strategies.

Lean Tools

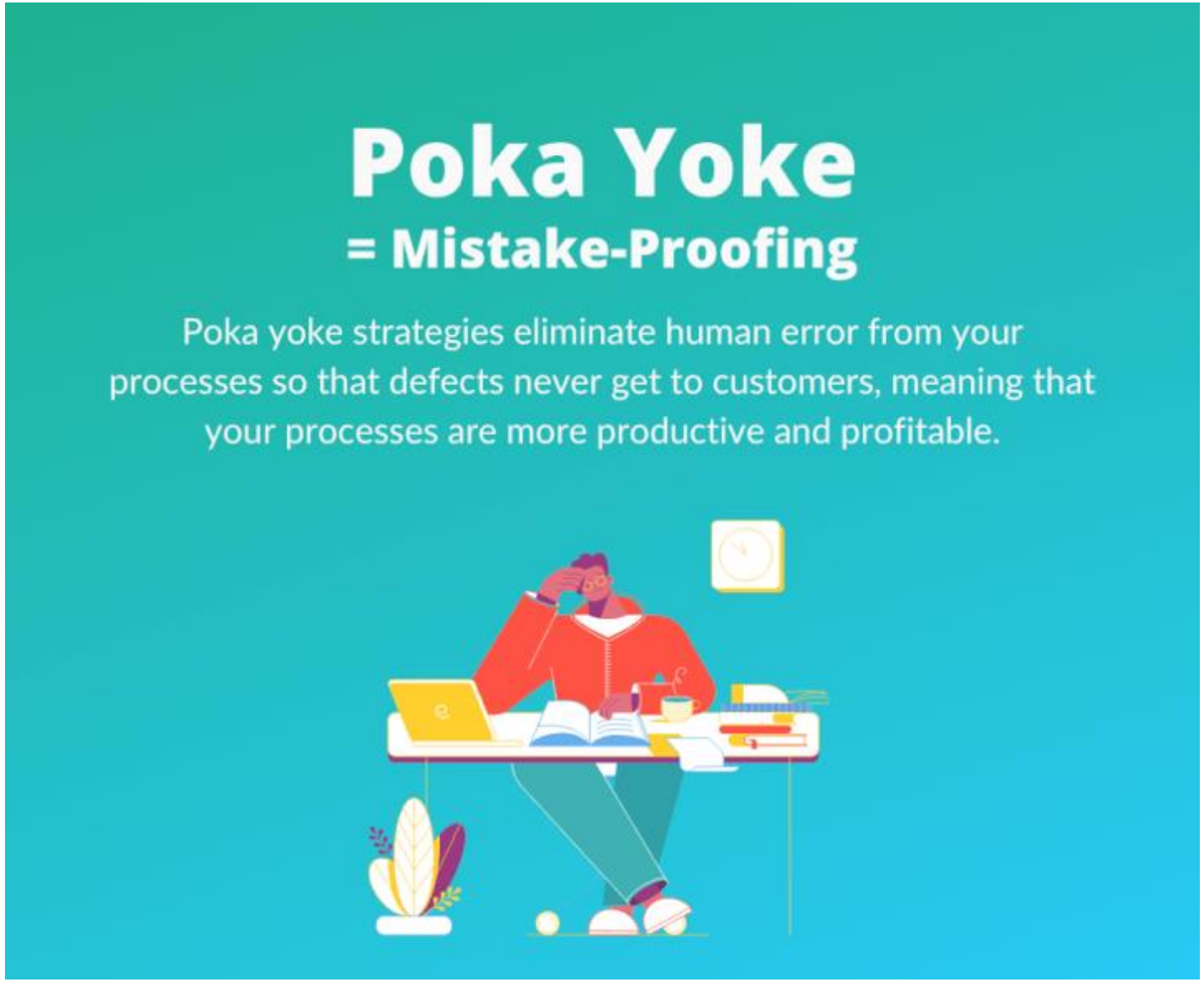
- Kanban
- Poka-Yoke
- TPM
- Standard work

KANBAN

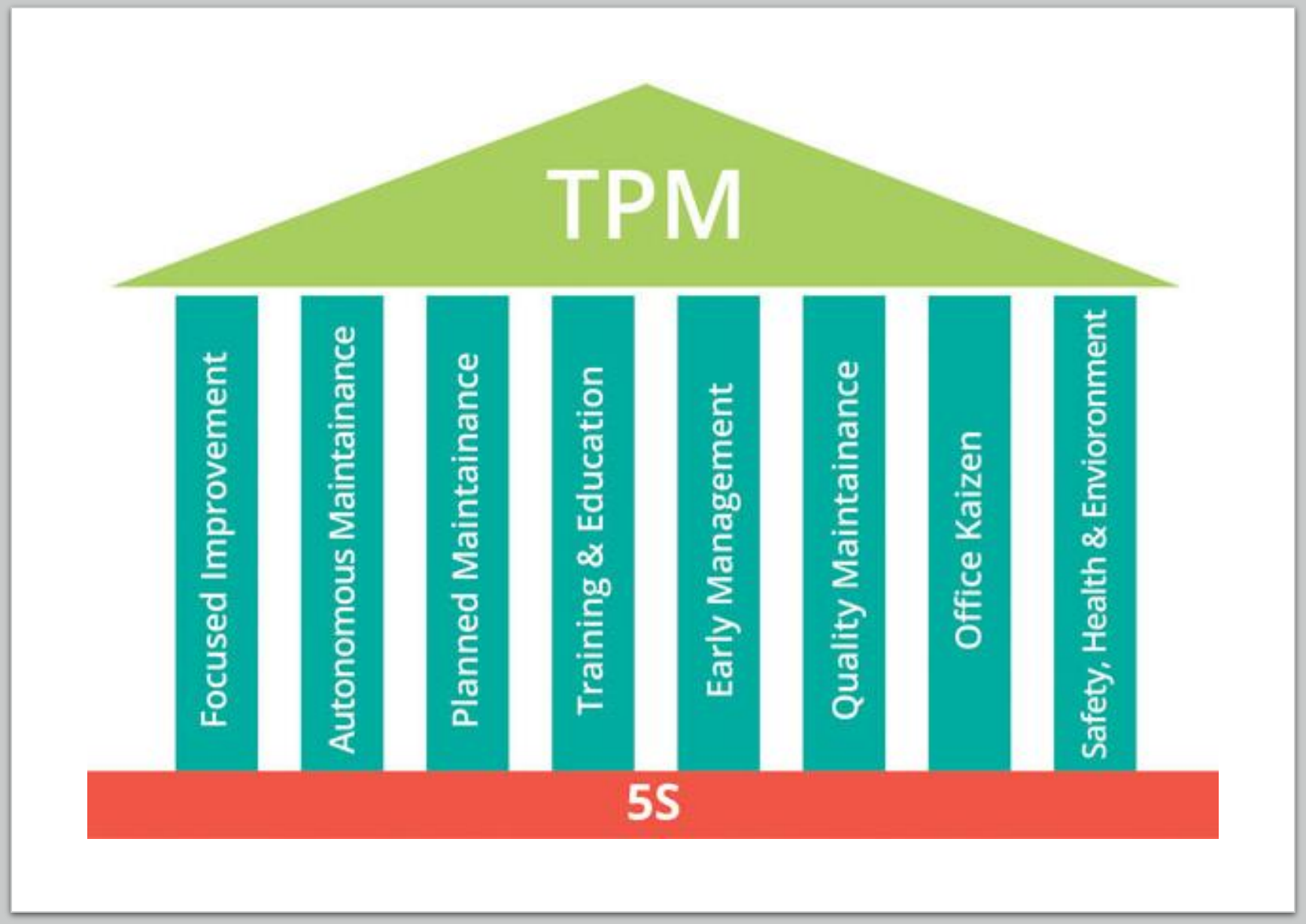
- **Kanban** is a Japanese word, Describes **"Visual Signal"**. For Kanban Teams, every work item is represented as a separate card on the Board.
- The main purpose of representing work as a card on the **Kanban** board is to allow team members to track the progress of work through its workflow in a highly visual manner.



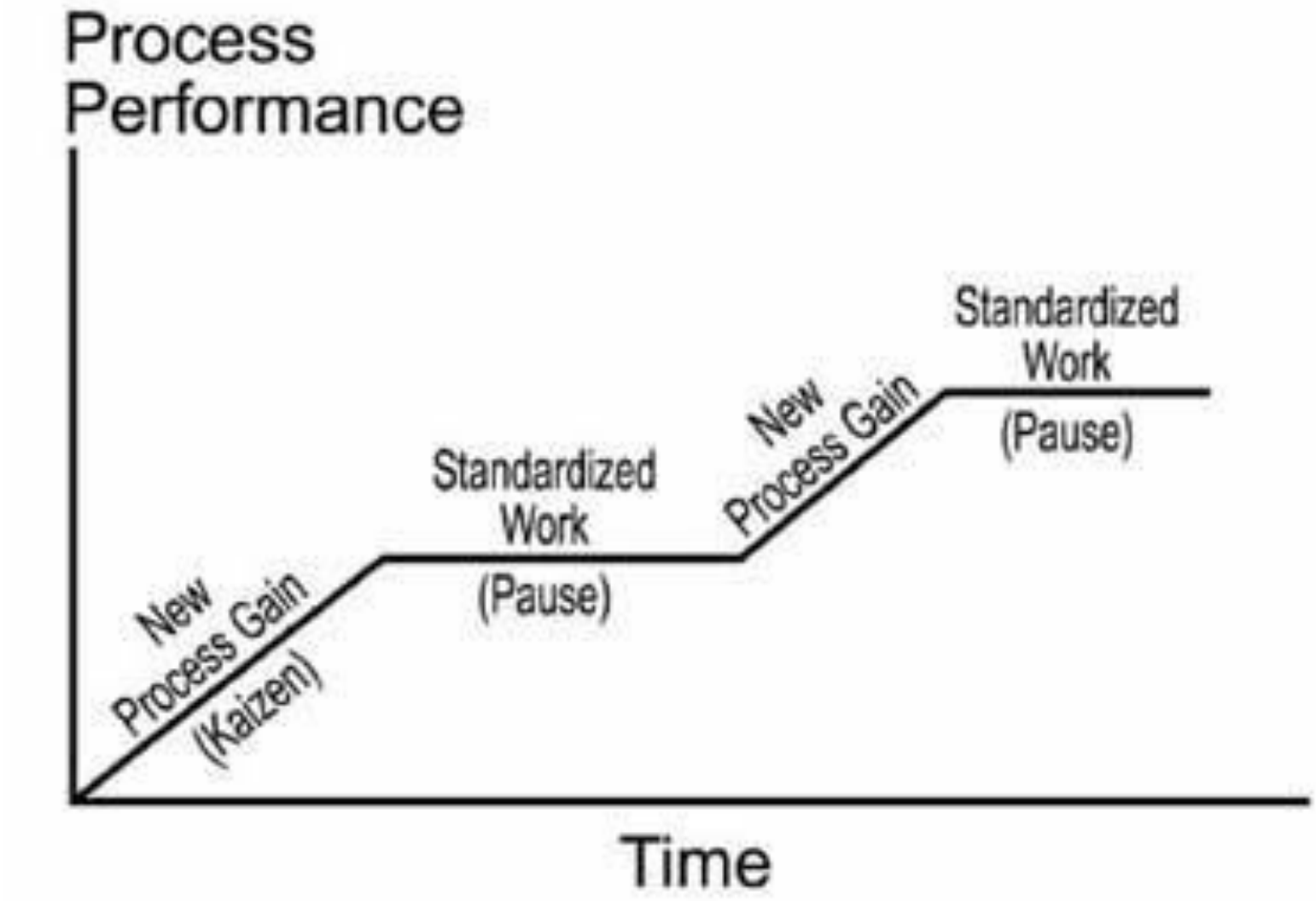
POKA-YOKE


Poka Yoke
= Mistake-Proofing
Poka yoke strategies eliminate human error from your processes so that defects never get to customers, meaning that your processes are more productive and profitable.

TPM


TPM
Focused Improvement
Autonomous Maintainance
Planned Maintainance
Training & Education
Early Management
Quality Maintainance
Office Kaizen
Safety, Health & Enviornment
5S

STANDARD WORK



Value added and non-value-added activities

Criteria	Identifying
It is done right at the first time It changes or transforms the product It creates value that is recognized by the customer	 **Value Added activities**: These **activities** are those which **adds value** to a business process or product and **for** which customer is willing to pay.
	 **Non-Value-Added activities**: Activities which do **not add** any **value** to the product or service but are an inherent part **of** the process.

Waste: All non-value-added activities in Lean

O

Over production

Make too much of a product
Make a product too early
Make a product faster than needed

M

Excess Motion

Excessive movement within workplace
Occurs when equipment & material are not properly arranged

W

Waiting

Occurs when materials are late, setups too long or machines down
Controlled through careful scheduling and effective TPM programs

I

Inventory

Materials that customer doesn't need
It costs money to track, store and maintain

M

Excess Movement of Material

Occurs in plants that are poorly arranged

D

Defect correction

Mistakes and errors that needs to be reworked
ISO system are the best tools to eliminate defects

P

Excess Processing

Doing more work than necessary
Careful examination of each process steps and its value to the customer

C

Lost Creativity

Most expensive type of waste
Deficient management system and lack of employee involvement

Conclusion

- Lean manufacturing improves efficiency, reduces waste, and increases productivity.
- VSM is an effective tool for improving communication processes across all business functions, especially in manufacturing and production lines.
- **Lean thinking** is a business methodology that aims to provide a new way to think about how to organize human activities to deliver more benefits to society and value to individuals while eliminating waste.
- **The aim of lean thinking** is to create a lean enterprise, one that sustains growth by aligning customer satisfaction with employee satisfaction, and that offers innovative products or services profitably while minimizing unnecessary over-costs to customers, suppliers and the environment. The basic insight of lean thinking is that if you train every person to identify wasted time and effort in their own job and to better work together to improve processes by eliminating such waste, the resulting enterprise will deliver more value at less expense while developing every employee's confidence, competence and ability to work with others.