

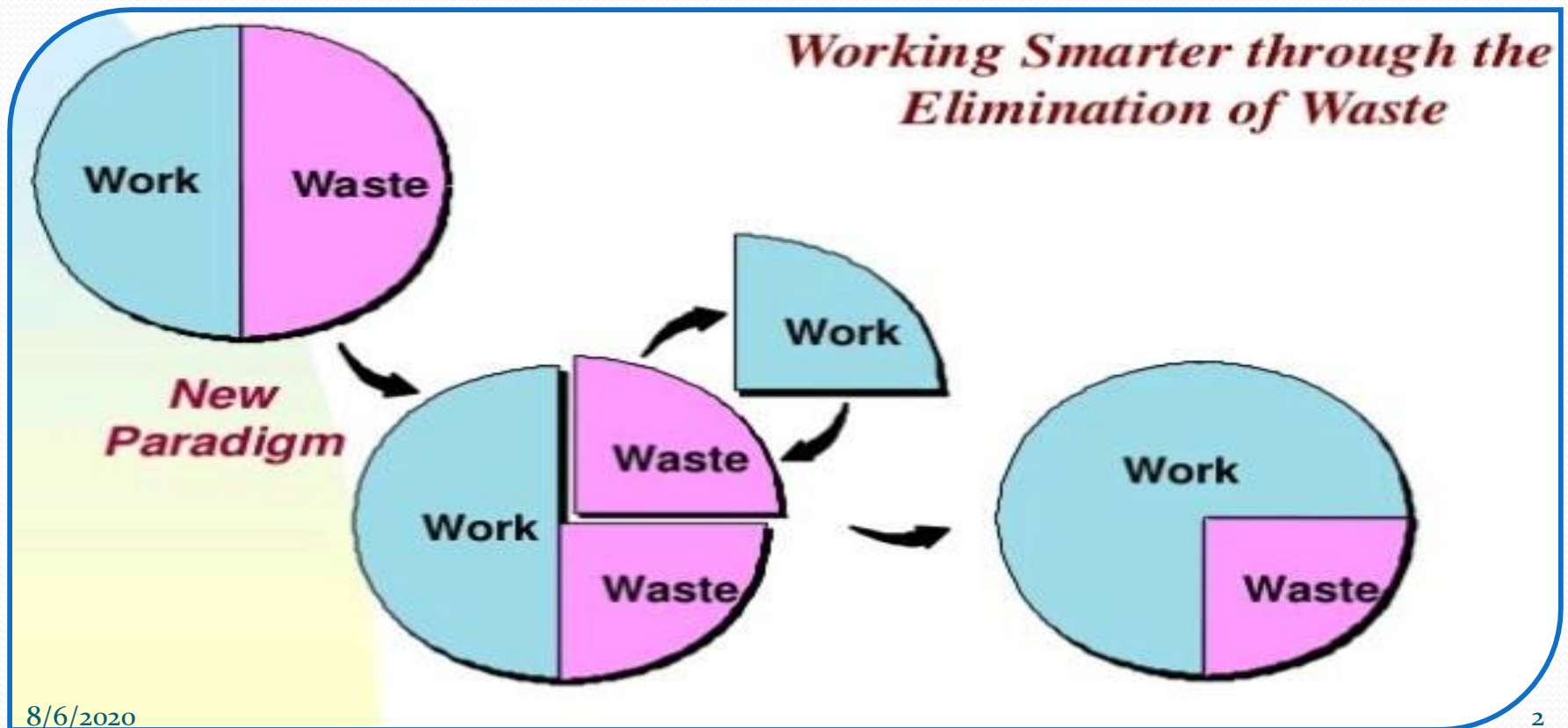
Chapter two

Lean production system

By Rukiya Nuray

Definition of Lean production ?

Lean production, also known as the Toyota Production System, means **doing more with less**—less time, less space, less human effort, less machinery, less materials—while giving customers what they want.



Lean Philosophy

- Customer First
 - No defect shall be passed to the “customer”
- People Are The Most Important Asset
 - People’s ingenuity will eliminate waste and lead to a better job
- Continuous Improvement
 - There is always more to improve
- Shop Floor First
 - The shop floor is where value is added

Why Lean ?



Organizational Pressure

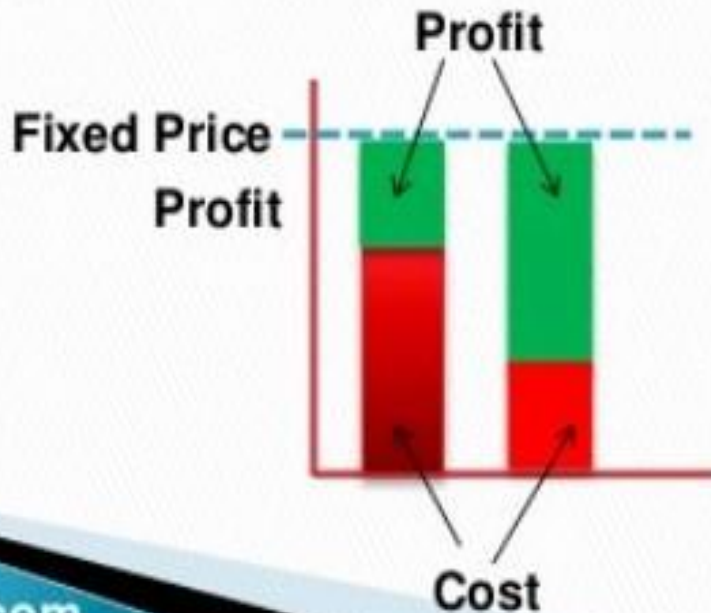
Why Lean ?

key to profitability

Thus the key to profitability is :Cost reduction

Old equation: $\text{Cost} + \text{Profit} = \text{Price}$

New equation: $\text{Price} - \text{Cost} = \text{Profit}$



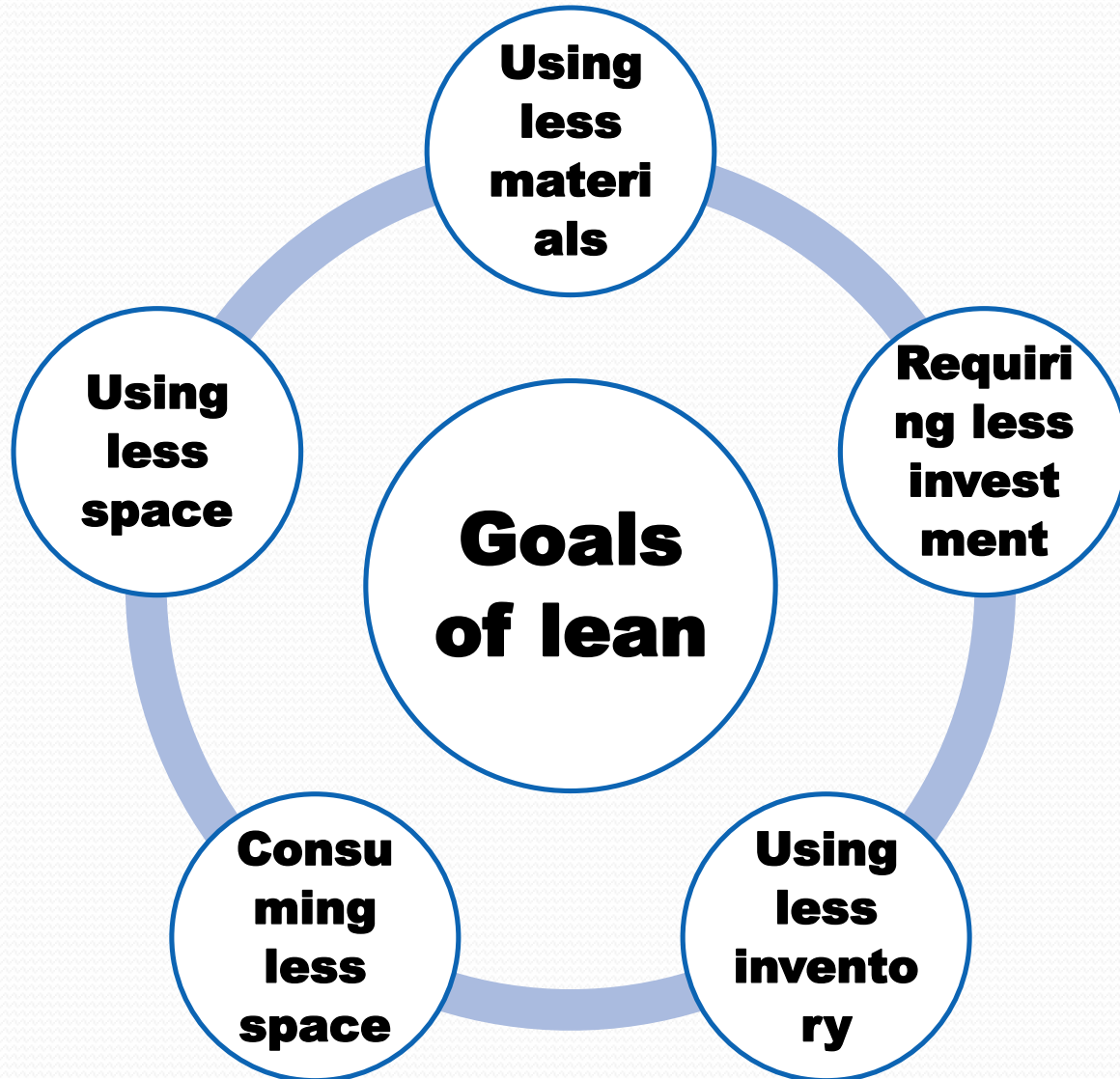
But we must reduce cost
without

- Affecting our team members
- Increasing our maintenance budgets
- Weakening our company in the long term

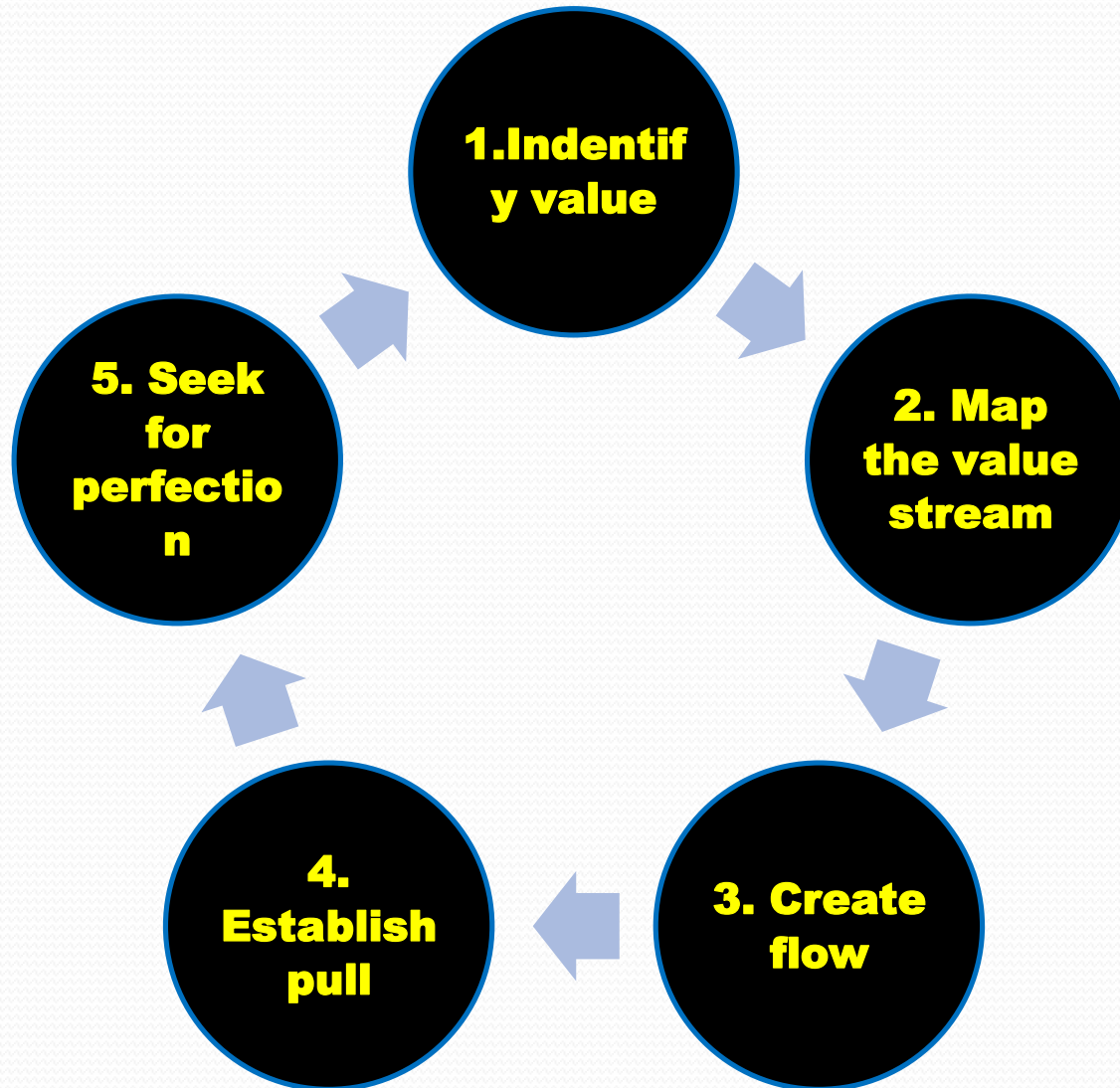
Objective of lean

- **Meet customer demand**
- **Eliminating non value added activities**
- **Minimize WIP**
- **Create flexibility on style change over**
- **Creating multi skilled operators responding quickly for style changeover**

Goals of lean



Principle of lean thinking



1	steps	Description
	Identify the Value and Map value stream	<p>The set of all specific end-to-end and linked actions, processes and functions necessary to transform information or raw materials into the product expected by the customer, and then provide post-delivery customer support. Actions either a.) create value; b.) create no value but are necessary or unavoidable; c.) creates no value and can be eliminated. Action focuses in minimizing non-value added activities.</p>
2	Create flow	<p>With non-value added activities eliminated, next all bottlenecks to the smooth flow of information or material processing (indicated by work-in-process—WIP) are removed.</p>
3	Establish pull	<p>Deliver the value when it is expected by the customer (“just-in-time”), and use this to “pull” value from all “upstream” activities.</p>
4	Seek for perfection	<p>Lean is not a “STATE”, BUT A “JOURNEY” in which continual improvement is sought to make processes better and better—as measured by their value delivery.</p>

Lean thinking

Traditional thinking

Move the metal! Make your numbers!

Make as much as you can. Go as fast as you can. (Push system)

Make big batches and move them slowly through the system. (Batch and queue)

Leader = Boss

Lean thinking

Stop production, so that production never has to stop! (Jidoka concept)

Make only what the customer has ordered. (Pull system)

Make things one at a time and move them quickly through the system. (Flow)

Leader = Teacher

Traditional thinking	Lean thinking
<p>We have some standards. (Not sure where they are or if they're followed)</p>	<p>We have simple visual standards for all important things.</p>
<p>Engineers and other specialists create standards. The rest of us do what we're told.</p>	<p>The people closest to the work develop standards and pull in specialists as required.</p>
<ul style="list-style-type: none"> •Problems are not visible •Only grunts go to the shop floor. •Do-Do-Do-Do! 	<ul style="list-style-type: none"> •Make problems visible. •Go and see for yourself. •Plan-Do-Check-Act (PDCA)

Lean Manufacturing Tools Used in Garments Industry

1. Quality control Tools involved in lean manufacturing process:

- Pareto Chart
- Fish Born Diagram
- Control charts

2. **5 S System:** 5S is the first step to implement lean manufacturing, it helps to **keep workplace organize and clean**. It is actually tools of continuous improvement

3. **Just in time (JIT):** This tool is one of the important tool for LEAN manufacturing .It defines the **PULL Demand model** instead of PUSH Demand model in earlier system which is **mostly control** the following activities

1. **Purchase**
2. **Production**
3. **distribution.**

Lean Manufacturing Tools Used in Garments Industry

4. KANBAN: This is also another important LEAN Manufacturing Tool. Which will mainly focusing on **over Production**. There are mainly two types of Kanban.

5. Kaizen: Kaizen is the Japanese term for continuous improvement within a business, operations or productive process.

Some of the areas where kaizen activities and programs can be of great benefit include:

- Individual plant and machinery
- Entire production lines
- Raw material procurement and utilization
- Labor utilization
- Production processes and tasks

BENEFITS OF LEAN

KEY PARAMETERS	RESULTS FROM LEAN IMPLEMENTATION
Reduction in production cost	3.44% & 14.28%
Productivity improvement	10% to 50%
Reduction in production lead time	8% to 25%
Garment quality improvement	10% to 35%
Reduction in production cycle time	12.5% to 33%
Annual saving	Up to 44%

Customer Focus

Our core goal is to provide the **highest quality, at the lowest cost, in the shortest time by continually eliminating MUDA or waste**. But today customers have broader expectations. Thus, Lean companies have added **safety, environment, and morale** to their core goals. Hence, the acronym

PQCDSM:

- **Productivity**
- **Quality**
- **Cost**
- **Delivery time**
- **Safety and environment**
- **Morale**

We must confirm on a daily basis that our activities are advancing **PQCDSM**.

Otherwise, it's pure MUDA.

DEFINING VALUE

Value is like a **diamond**. Here are some common definitions:

1. Value is what the customer is **willing to pay for**.
2. Value is an activity that changes the **form, fit, or function of a product**.
3. Value = Quality/Cost.

Types of Wastage in Textile and Apparel Sector

There are mainly two types of wastage in textile and apparel industry, where one is **normal wastage and another one is abnormal wastage.**

1. Normal Wastage:

Normal wastage is the wastage which is **inherent in the manufacturing process** even when the manufacturing process is carried out in **efficient and effective operating condition.**

This may occur due to the following reasons:

- The exact measurement of some materials is not feasible.
- There may be a difference between the unit of purchase and unit of produced.
- Due to the evaporation, shrinkage etc.

The cost of this wastage has to be **added to the manufacturing cost.**

Thus the normal wastage becomes the part of **manufacturing cost.**

2. Abnormal Wastage:

Abnormal wastage is any types of wastage apart from **the normal wastage**. This may be due to poor **material handling, negligence, poor process standards, rework etc.**

There are a key difference between **normal wastage and abnormal wastage**.

In case of abnormal wastage, the cost of abnormal wastage should **not be added into the manufacturing cost**.

8 Forms of Waste

Muda, Mura, & Muri



8 Forms of Waste

1. **WASTED HUMAN TALENT**
2. **DEFECTS**
3. **INVENTORY**
4. **OVERPRODUCTION**
5. **WAITING TIME**
6. **MOTION**
7. **TRANSPORTATION**
8. **PROCESSING WASTE**

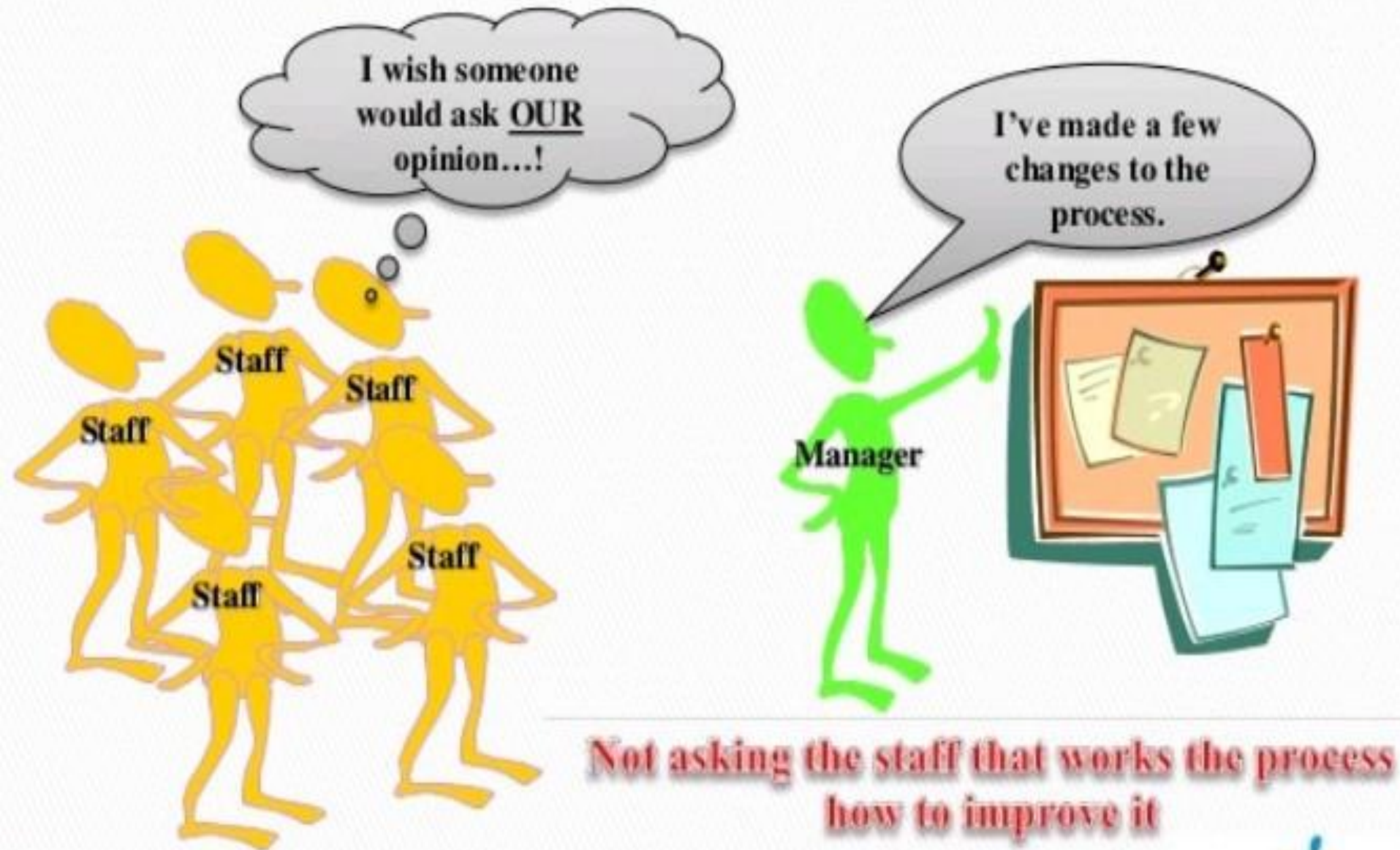
1. Under-utilized Human resources

The lack of involvement and participation of the employees in **improving operations, quality and safety** will come under this category.

Causes of Under-utilized Human Resources

- **Old thinking, politics and the business culture**
- **Poor hiring practices**
- **Low or no investment in training**
- **Low pay and high turnover strategy**
- **Management thinking**

1. Wasted Human Talent



2. Defects

Occurrence of defects that arise because of manufacturing problems **demands correction or re-work** which is a **huge amount of waste**. It requires additional resources and time to correct defects before shipping or replace parts that are scrapped due to defects. These defects can be eliminated by **error proofing i.e.**, designing the process in such a way that the product is produced one way, which is the **correct way, and every time**.

Causes of Defects

- Little or no process control
- Poor quality standards or inconsistent quality standards
- Lack of or little planned equipment preventive maintenance
- Inadequate education/training/work instructions
- Product design (Process cannot produce to quality)

2. Defects



A negative outcome from process failure

3. Inventory

This is one of the most frequent types of waste and one of the most expensive to have. It represents the material between operations due to large lot production or processes with long cycle times.

Causes of Excess Inventory

- Compensating for inefficiencies and unexpected problems
- Product complexity
- Unleveled scheduling
- Poor market forecast
- Unbalanced workload
- Unreliable shipments by suppliers

3. Inventory



Items in greater quantities than can be immediately processed or used.

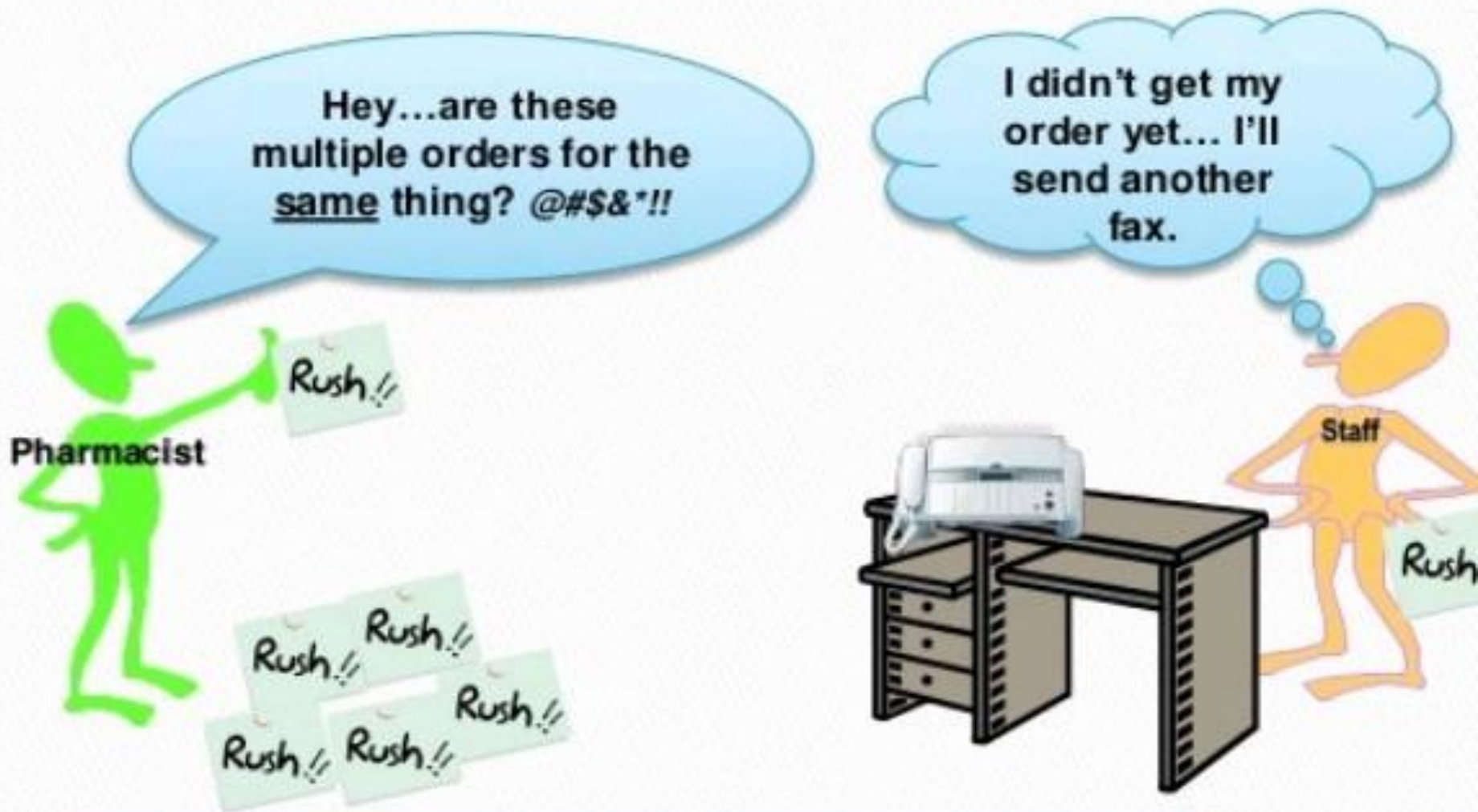
4. Over-Production

Producing more than what is sold or produce before it is required is over production. It is visible as storage of material. A product that cannot be sold or has to be dumped at a **reduced price** becomes **a burden and can be considered as waste**. Producing product before the customer needs makes the parts / products to be stored and ties up money in inventory.

Causes for Over Production

- **Misuse of automation**
- **Just-in-case logic**
- **Long process setup**
- **Unleveled scheduling**
- **Unbalanced work load**
- **Redundant inspections**

4. Over Production



Generating more work than is really required

5. Waiting

Any time that is non-value added where the operator must stop producing **good parts and wait for materials or instructions or equipment downtime** is huge loss in manufacturing and come under this category.

Causes of Wait Time Waste

- **Misuses of automation**
- **Unbalanced work load**
- **Unplanned maintenance**
- **Long process set-up times**
- **Upstream quality problems**
- **Unleveled scheduling**
- **Poor Communication**

5. Waiting



People waiting for items (patients, supplies, specimens, etc.) to process

6. Motion

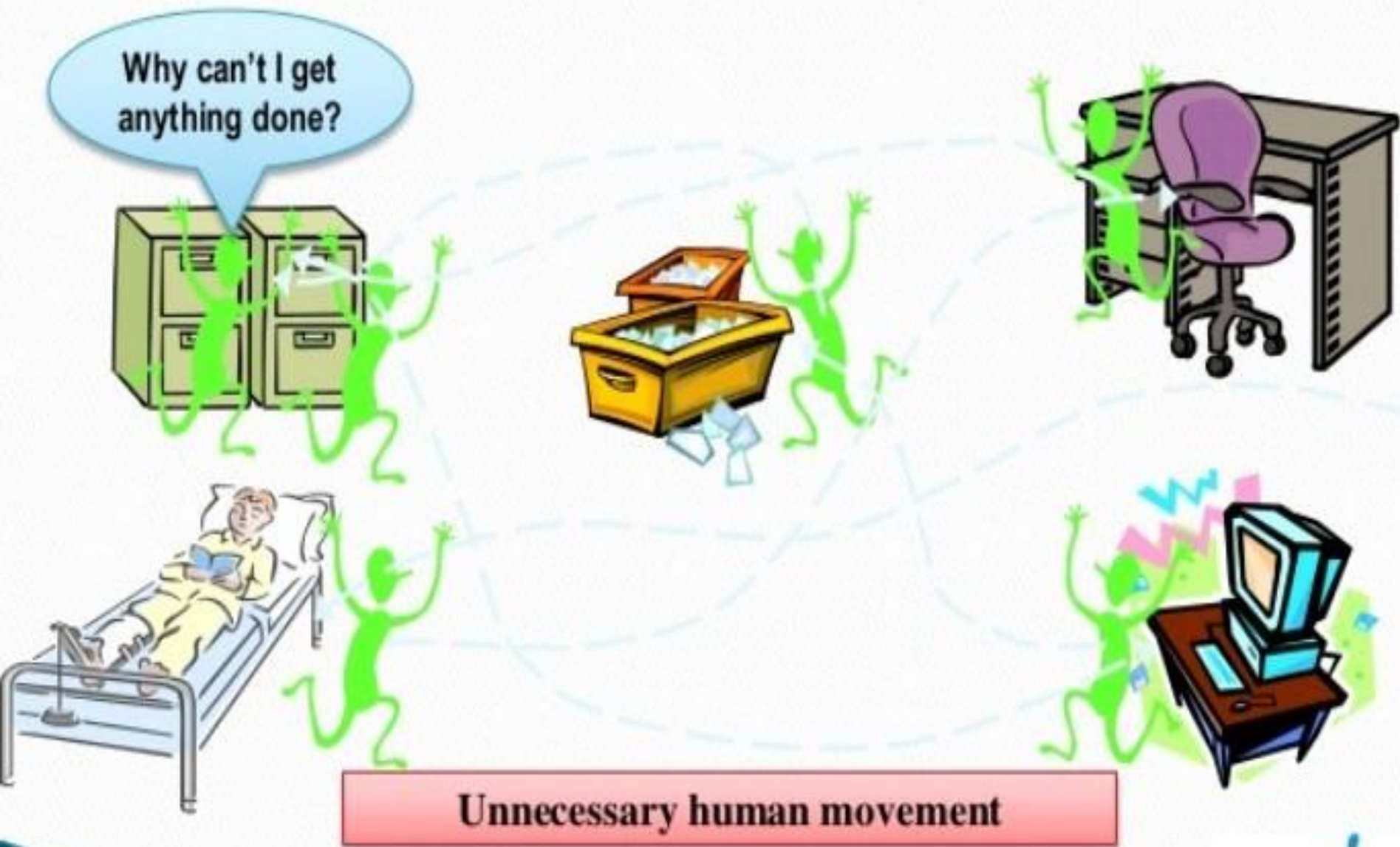
Any body **movement (motion)** that does not add value comes under this type of category. Few of the examples that come under this category are **looking for tools, walking many steps to get parts, more movements than necessary to perform an operation. Unnecessary or awkward operator motions** put undue stress on the body and cause waste.

Improvement in this area will result in **increase in productivity, reduced injury and decrease in work man's compensation claims.**

Causes of Motion Waste

- **Poor people/mach ineffectiveness**
- **Inconsistent work methods**
- **Failure to take ergonomic issues into consideration**
- **Poor facility or cell layout**
- **Poor workplace organization and housekeeping**

6. Motion



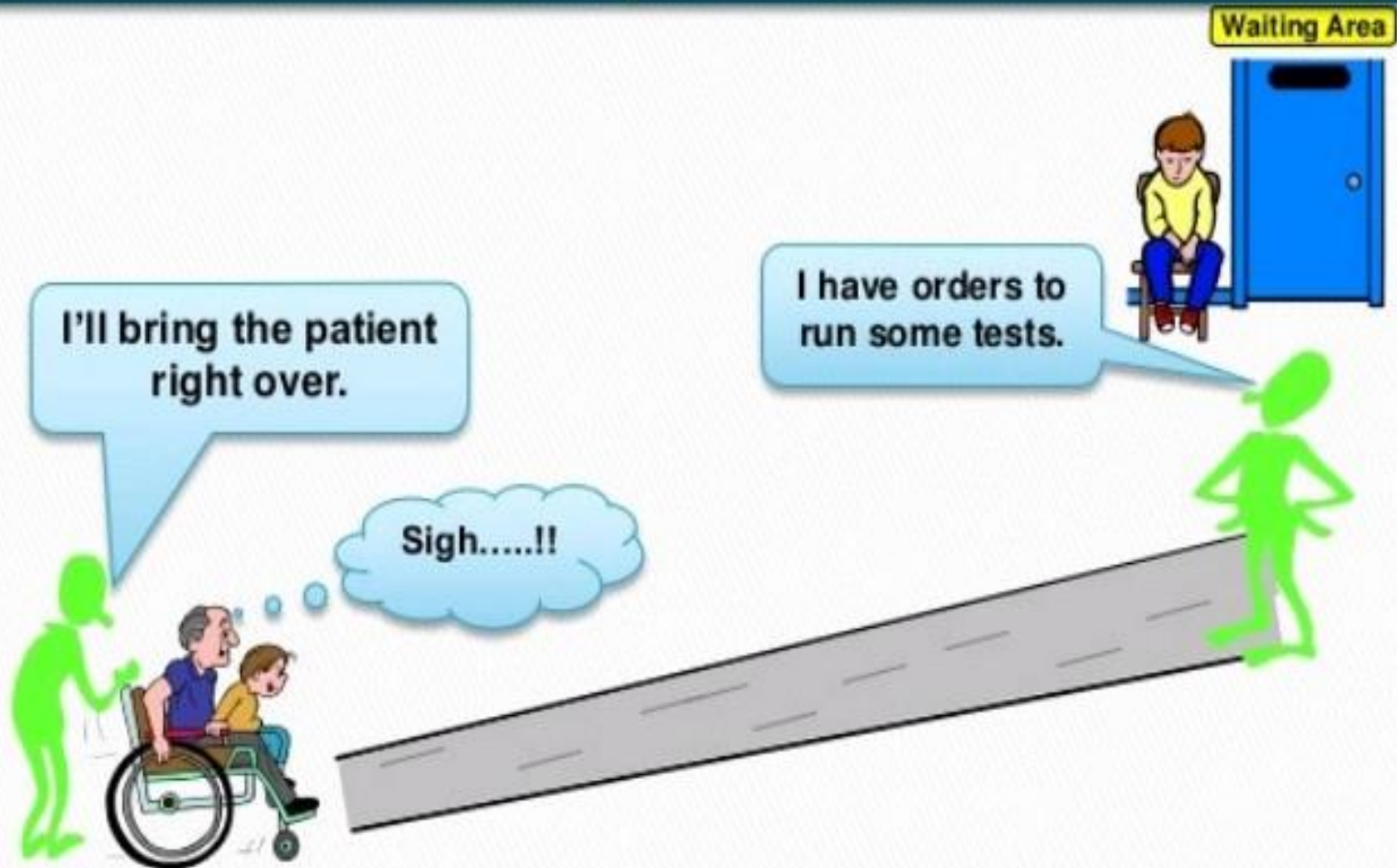
7. Transportation

Handling material extra or unnecessarily either to **production area or within production areas** is transportation waste. Transportation waste does not add any value to the product instead it **increases the time and energy spent**. The right strategy is to minimize or eliminate this waste rather than improving the transportation.

Causes of Transportation Waste

- **Poor plant layout**
- **Poor understanding of the process flow for production**
- **Large batch sizes, long lead times, and large storage areas**

7. Transportation



Unnecessary movement or relocation of items

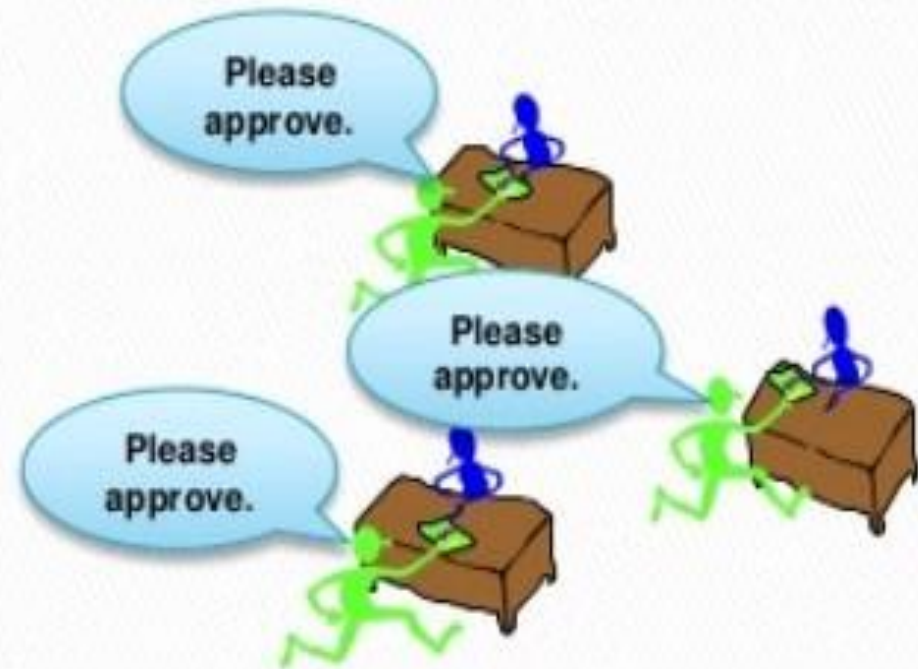
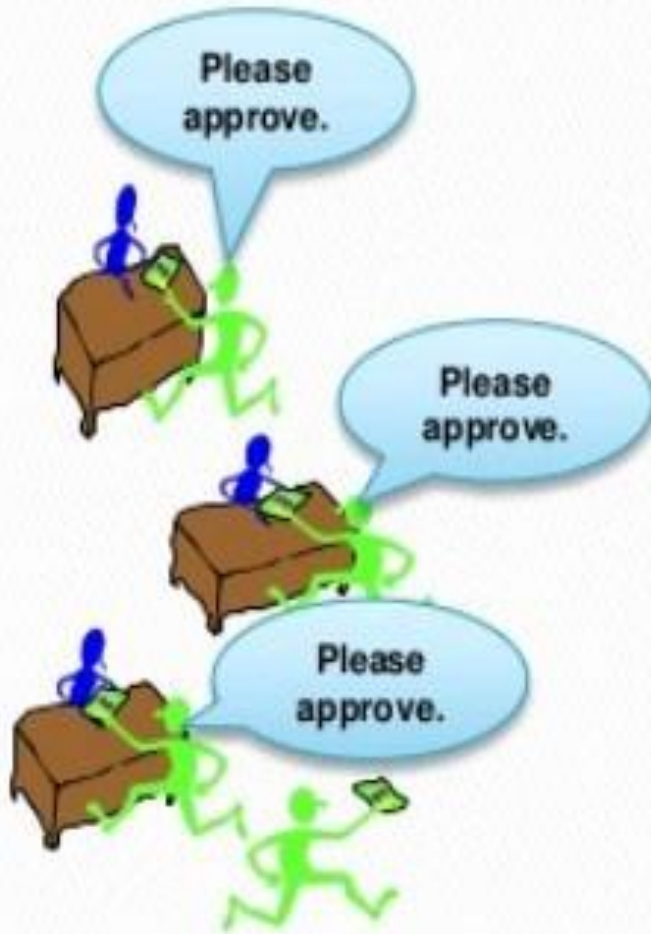
8. Extra processing

Doing more processing steps than the customer really requires is unnecessary. **Indistinct and unclear customer requirements** cause the manufacturer to add unnecessary processes, which add cost to the product. Extra processing waste can be **minimized** by asking questions **like why a specific processing step IS needed and why a specific product is produced.**

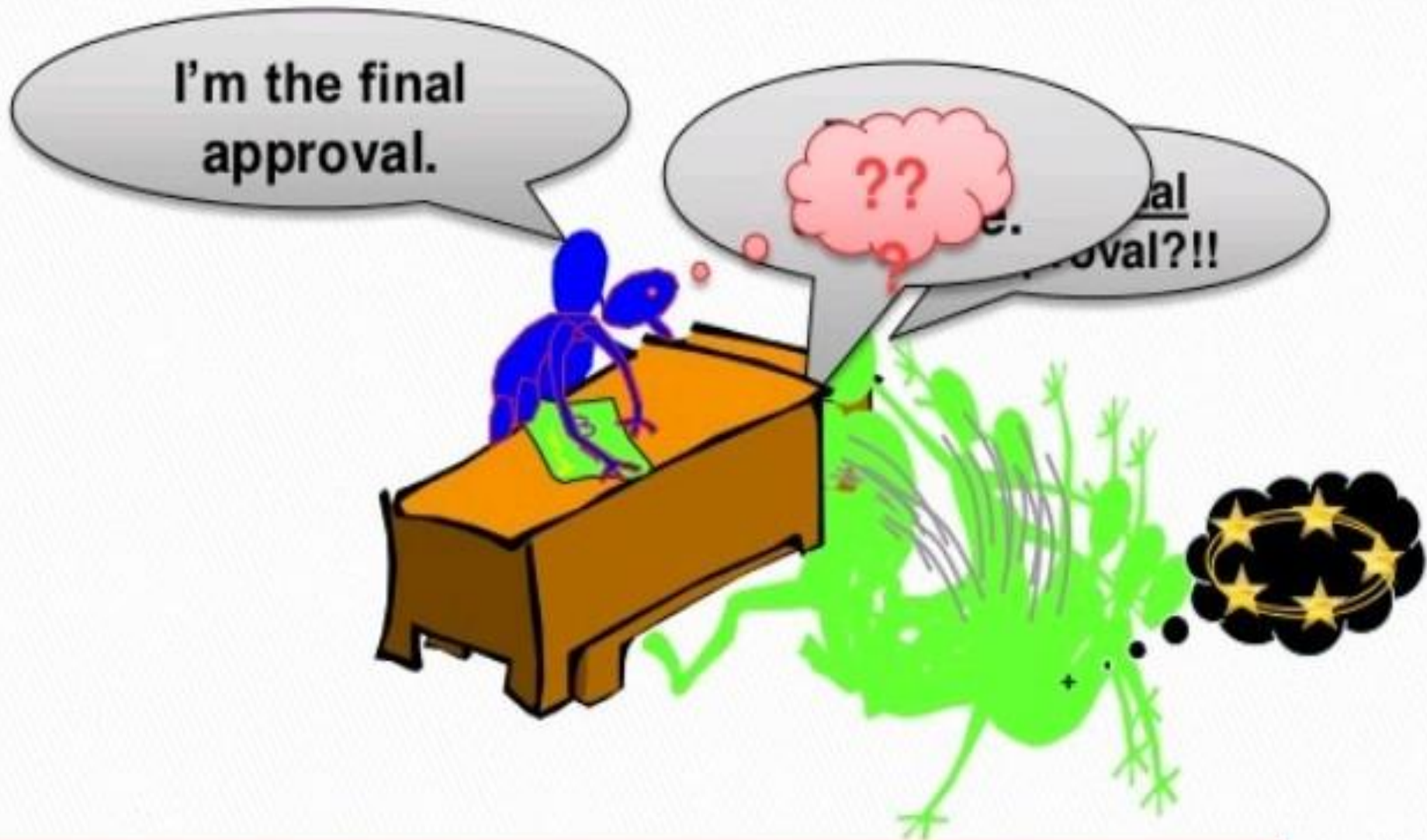
Causes for Extra Processing Waste

- Customer true requirements not properly defined
- Product changes without process changes
- Lack of communication or Extra copies

8. Over Processing



8. Over Processing



Applying effort to activities that are not required in the process

Thank
You !!