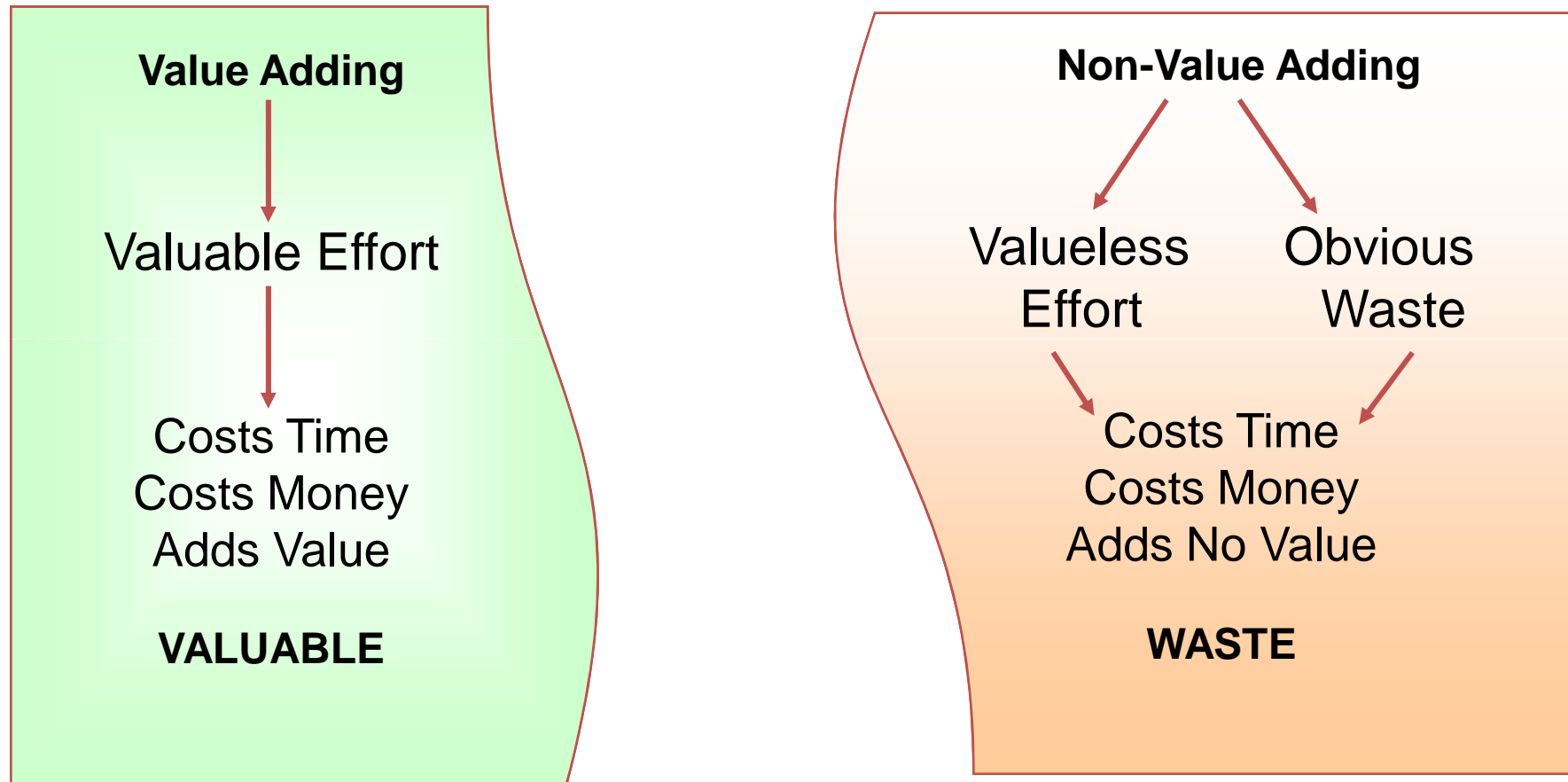


The seven wastes of lean

What is a non-value adding operation?

Types of Work



Where do we draw the line between Waste & Non-waste elements?

Definition of waste

TOYOTA defines waste as:

"anything other than the minimum amount of equipment, materials, parts, and working time absolutely essential to production."

An American definition of waste is:

"anything other than the absolute minimum resources of materials, machines, and manpower required to add value to the product."

(Hay 1988)

**These are subjective → "absolute minimum required"
they are a weak basis for agreement**

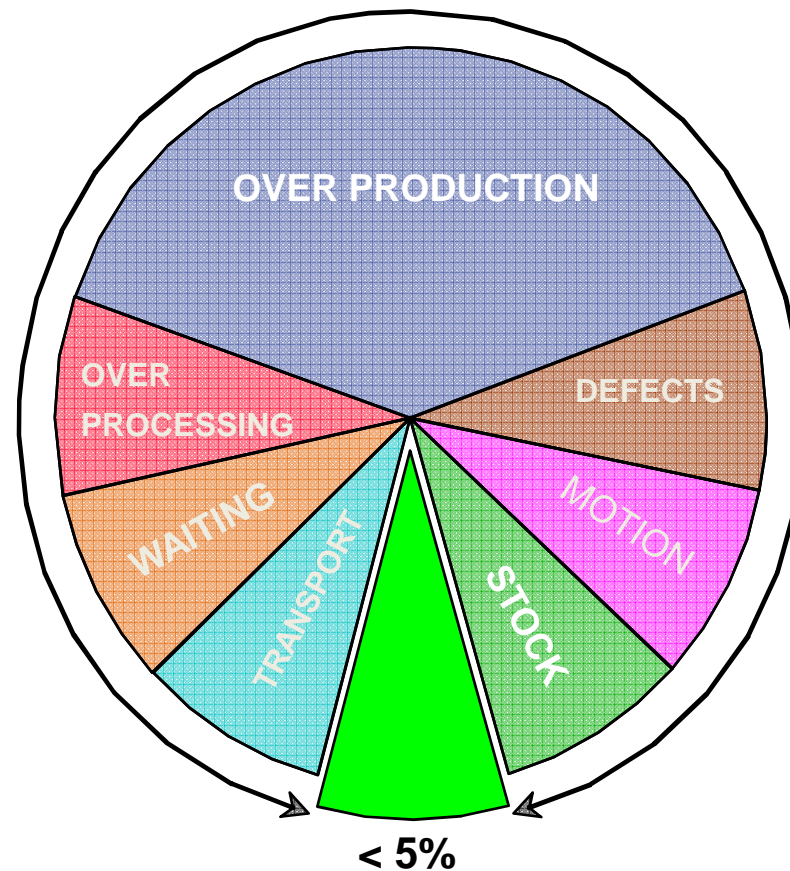
Waste

- Every activity should be considered as waste, unless it:
- **Meets an explicit customer requirement**
- **Cannot be shown to be performed more economically**

If the activity does not meet a known customer requirement or could be performed more economically, why continue in the same manner?

How much of what we do is waste?

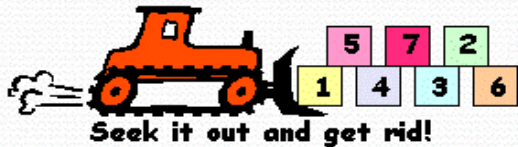
- Typically less than 5% of what we do is adding value;



The seven wastes

The 7 Wastes

MUDA is the Japanese word for WASTE.



Over Processing



Processing beyond the standard required by the customer.



Overproduction



To produce sooner, faster or in greater quantities than customer demand.



Inventory



Raw material, work in progress or finished goods which is not having value added to it.



Rework

Non right first time. Repetition or correction of a process.



Waiting



People or parts that wait for a work cycle to be completed.



Transportation



Unnecessary movement of people or parts between processes.



Motion



Unnecessary movement of people, parts or machines within a process.



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Mnemonics to remember

- TIMWOOD

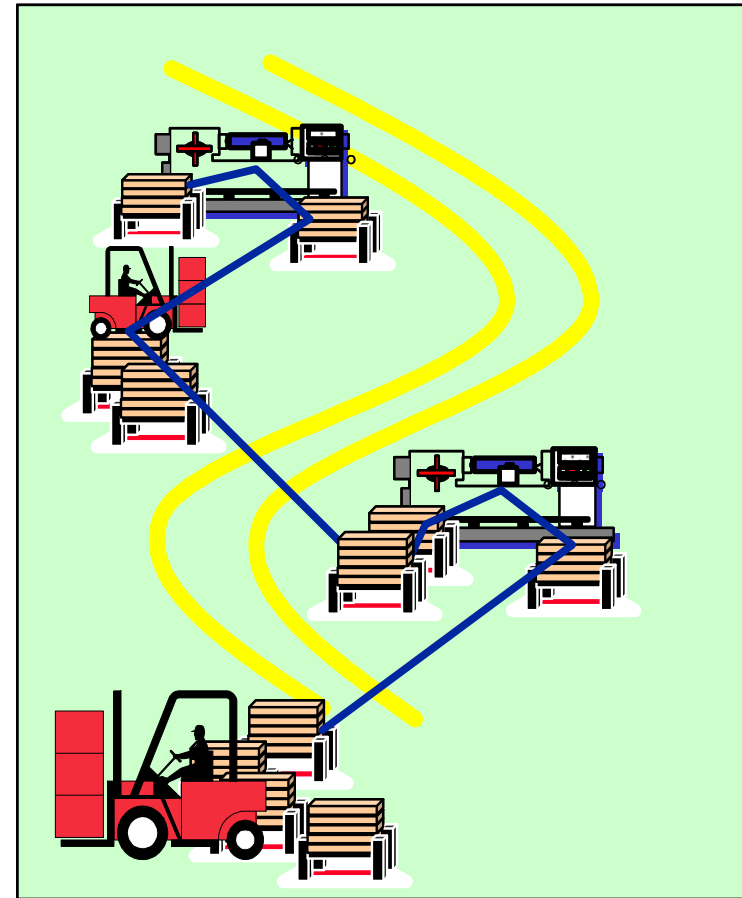
- Transport
- Inventory
- Motion
- Waiting
- Overproduction
- Over processing
- Defects

- × WORMPIT

- × Waiting
- × Overproduction
- × Rejects
- × Motion
- × Processing
- × Inventory
- × Transport

Transport

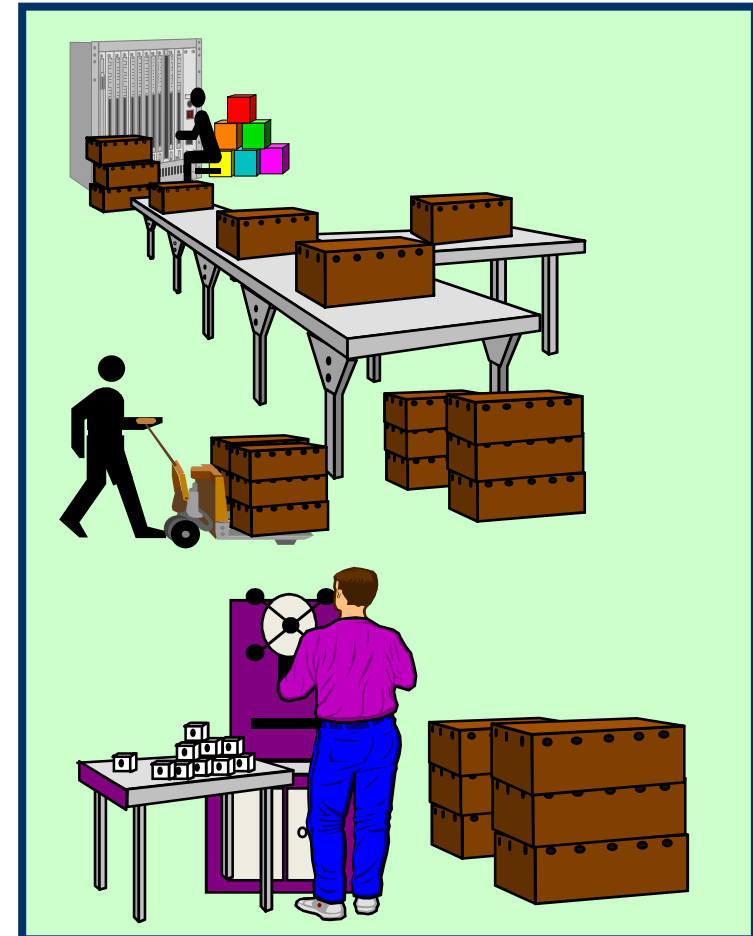
- Transport waste is material movement that is not directly associated with a value adding process
- Processes should be as close together as possible and material flow directly from process to process without any significant delays in between
- Excess transportation may be caused by :
 - Poor layouts
 - Large distance between operations
 - Lengthy, or complex material handling systems
 - Large batch sizes
 - Working to faster rate than customer demand (overproduction)
 - Multiple storage locations



Poor layout exacerbates transportation wastes

Inventory

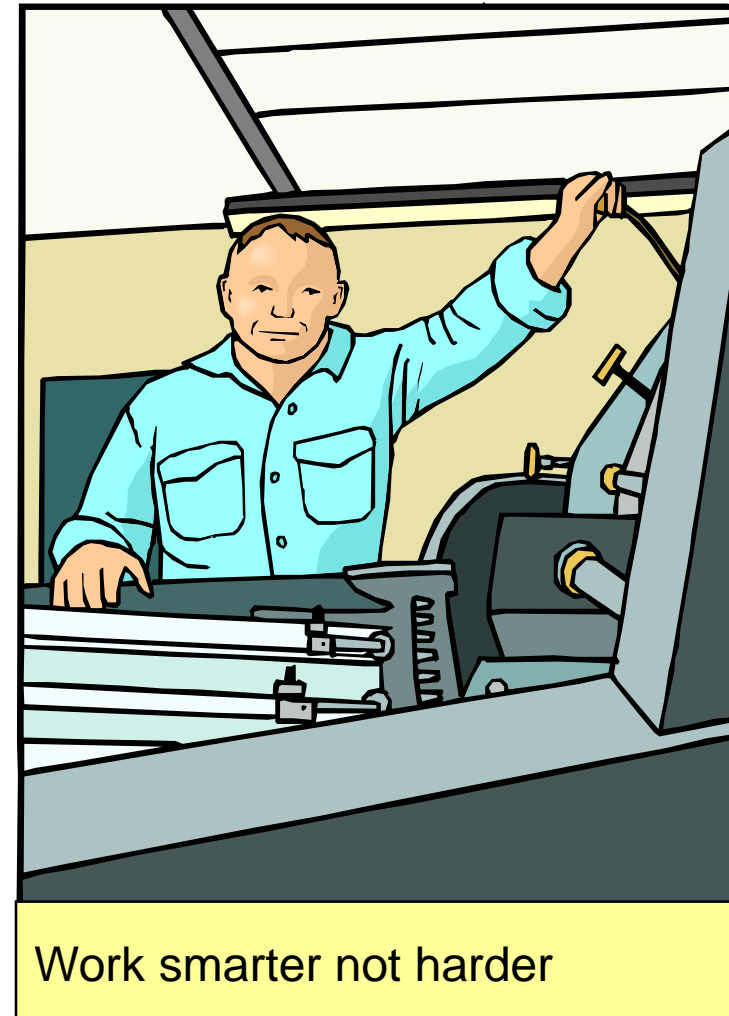
- Inventory waste is stock and work in process in excess of the requirements necessary to produce goods or services 'just in time'
- Unnecessary inventory that accumulates before or after a process is an indication that continuous flow is not being achieved
- Excess inventory can be caused by;
 - Lack of balance in work flow, forcing inventory build-up between processes
 - Large batch sizes
 - Failure to observe first in first out - stagnant materials
 - Incapable processes
 - Long changeover time



Stock wastes space and effort

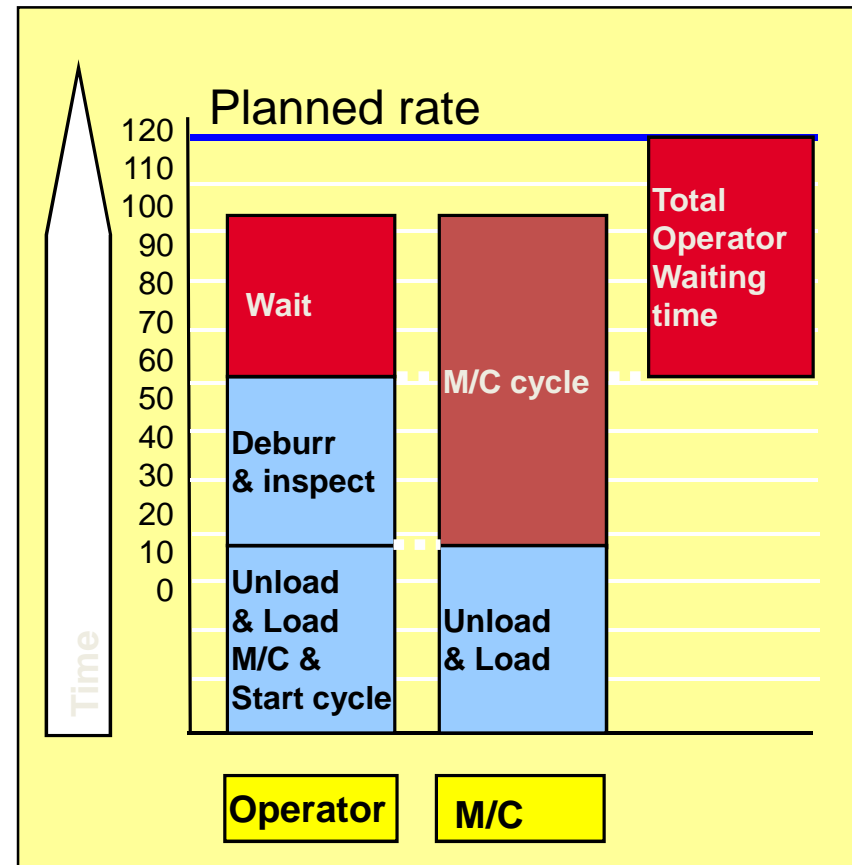
Motion

- Waste of motion is any motion of man and / or Equipment that does not add value to the product or service
- Wasteful motion is caused by:
 - Poor workstation layout - excessive walking, bending reaching
 - Poor method design - transferring parts from one hand to another
 - Poor workplace organisation
 - Large batch sizes
 - Reorientation of materials



Waiting

- Waste of waiting is any idle time produced when two interdependent processes are not completely synchronised
- Operators are kept waiting, or simply work slowly whilst the machining cycles
- Waiting results from:
 - Poor man / machine coordination
 - Long changeovers
 - Unreliable processes / quality
 - Batch completion, not single piece transfer between operations
 - Time required to perform rework



Waiting time results from failure to synchronise activities

Overproduction

- Overproduction is the worst kind of waste because it causes other wastes and obscures the need for improvement
- Overproduction waste results from producing more (or faster) than required
- Overproduction is caused by
 - Large batch sizes
 - Unreliable processes
 - Unstable schedules
 - Unbalanced cells or departments
 - Working to forecast / inaccurate information not actual demand



Avoid overproduction by
balancing supply to demand

Over-Processing

- Over processing is putting more into the product than is valued by the customer,
 - painting of unseen areas
 - unnecessarily tight tolerances
 - cleaning and polishing beyond the level required
- The goal is to do only the level of processing to match that which is useful and necessary
- Over-processing is caused by:
 - No standardisation of best techniques
 - Unclear specification / quality acceptance standards



Clear, standardised instructions
avoid over-processing

Defects

- Waste of correction includes additional work performed on a product or service
- Caused by no, or unclear operating procedure / specifications
- Defects are caused by
 - Inadequate training
 - Skills shortage
 - Incapable processes
 - Incapable suppliers
 - Operator error
 - Excessive stock
 - Transportation



Right first time avoids scrap & rework

Additional wastes

- Creativity



- Resources



- By products

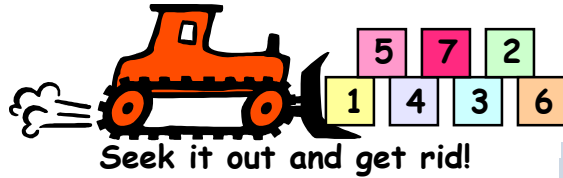


The 7 wastes

An 8th waste is the wasted potential of people



MUDA is the Japanese word for WASTE.



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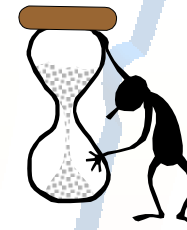
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Motion



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