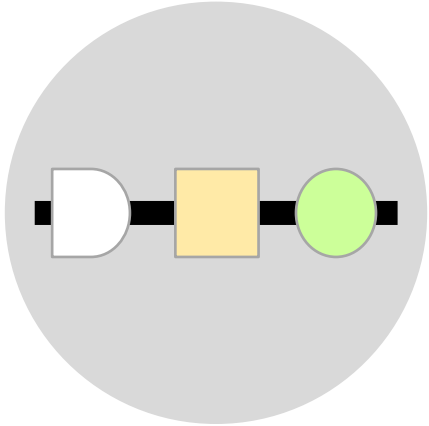
Continuous Improvement Toolkit

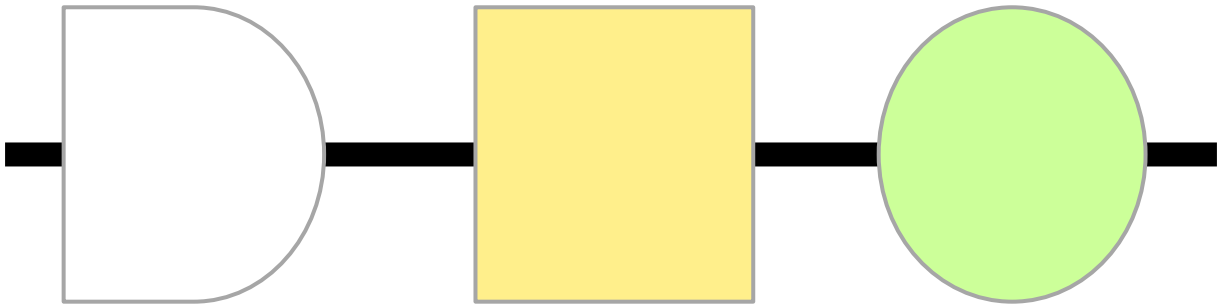
PROCESS SEQUENCE CHART



PROCESS SEQUENCE CHART

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

Used to record the activities that make up a process to determine which steps add value and which do not.



PROCESS SEQUENCE CHART

Preferred over other process mapping techniques when the process is **sequential** in nature and contains no or few decision points.

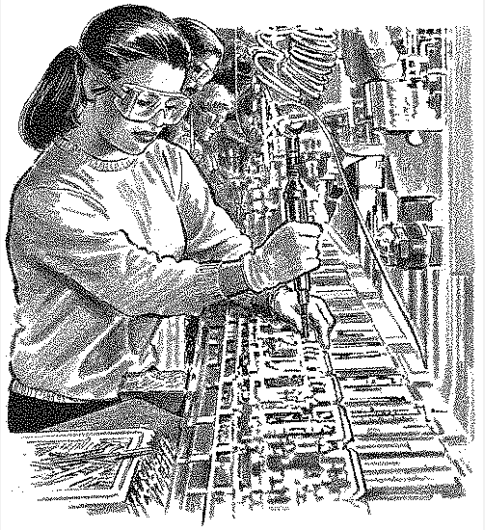
Often includes the activities of an individual, a team, a machine, a system, or combinations of all

PROCESS SEQUENCE CHART

A useful feature of the process sequence chart is that it can be drawn up as the process is **happening**. So, it provides an accurate description of the process.

By observing and recording, you can for example follow a part, noting how and when it is operated, moved, inspected and stored.

This ensures that what is actually happening gets recorded.



PROCESS SEQUENCE CHART

Later when analyzing the process, some steps become obvious candidates for improvement, such:

- Non-value-adding activities.
- Long delays.
- Excessive transportation.

PROCESS SEQUENCE CHART

Can be used to **analyze** value-added and non-value added activities.

Helps identifying all types of waste within a product's value stream.

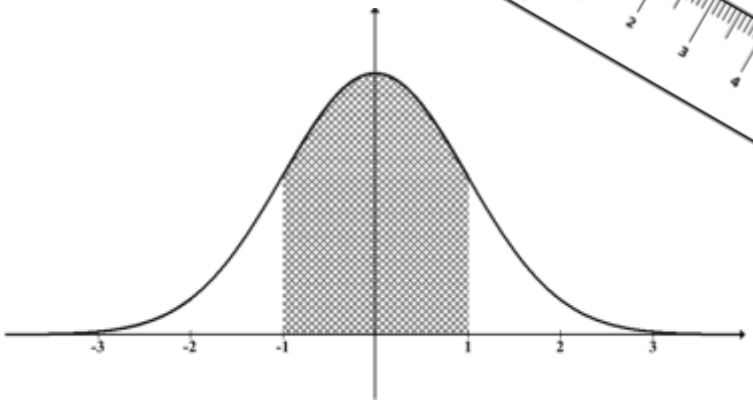
PROCESS SEQUENCE CHART

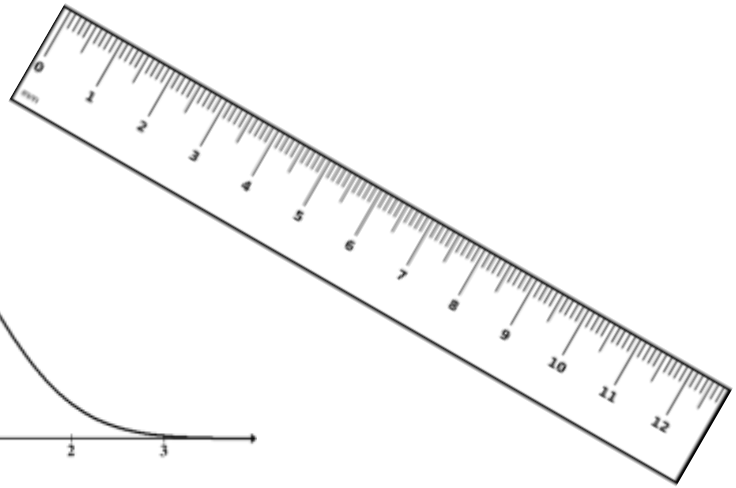
Used to show all the operation, inspection, storage, and transportation activities that exist in a process.

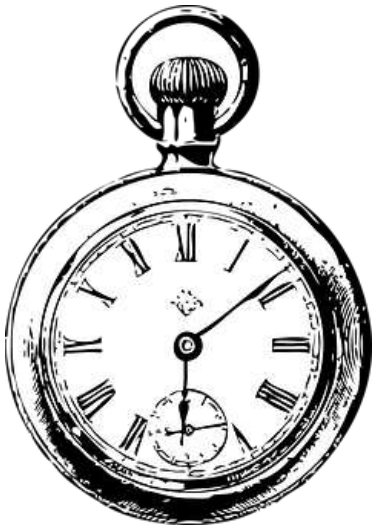
- From the receiving through the plant to the shipping
- From order-taking through scheduling to delivery
- From raw material through production to the hands of the customer
- From concept through detailed design to product launch

PROCESS SEQUENCE CHART

Tracks **performance measures** such as cycle times, error rates, and distance travelled.

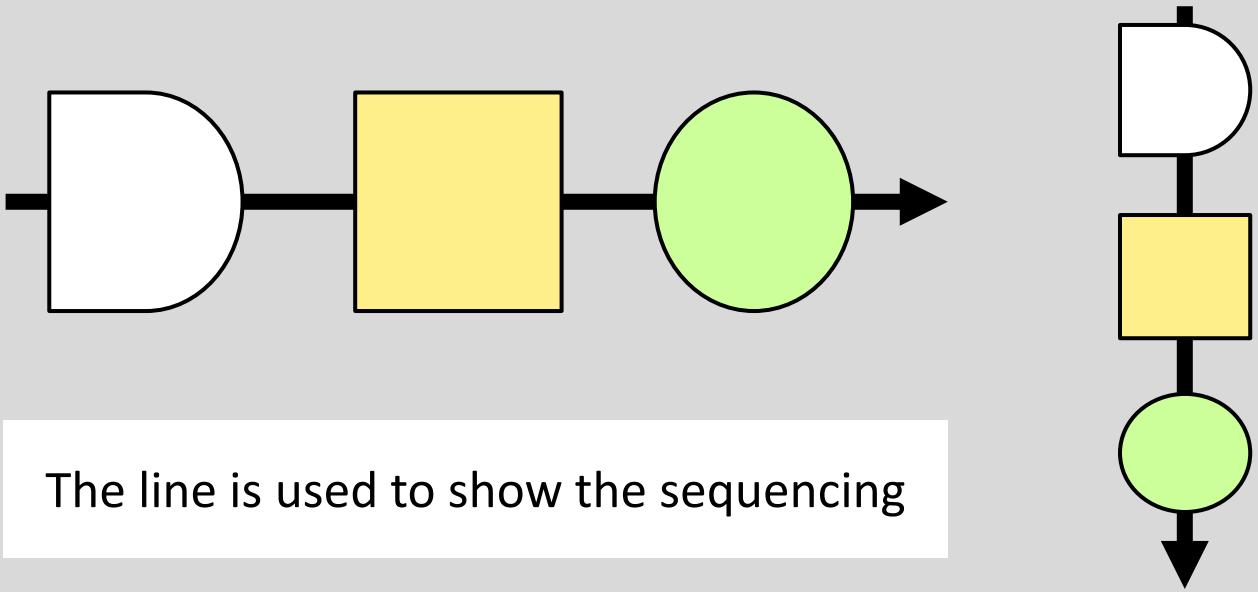






PROCESS SEQUENCE CHART

The record of the process steps is made along a vertical or horizontal line.

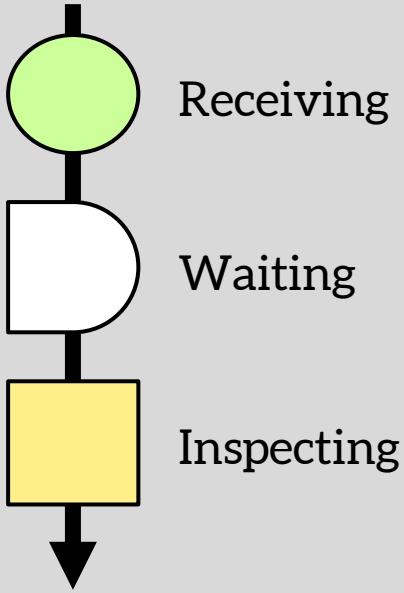


The line is used to show the sequencing

PROCESS SEQUENCE CHART

The process activities are displayed using common **symbols** along with **text**.

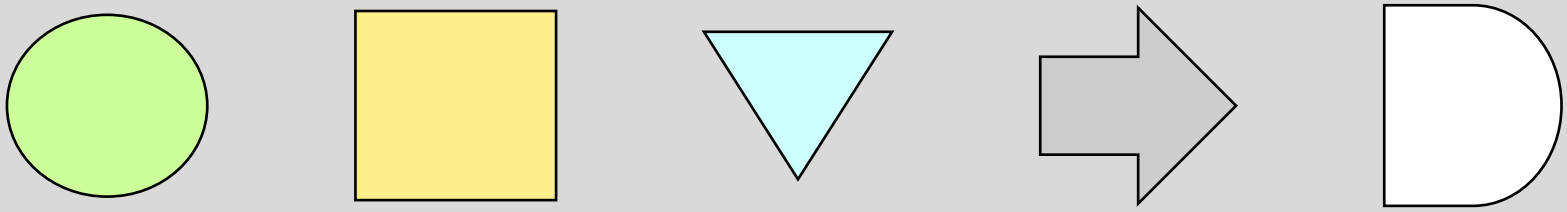
The **symbols** indicate the type of activities being undertaken



The **text** briefly describe the activities

PROCESS SEQUENCE CHART

Common categories and symbols are . . .



Operation **Inspection** **Storage** **Transport** **Delay**

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

Other categories and symbols can be used depending on the situation

PROCESS SEQUENCE CHART

Common categories and symbols are . . .

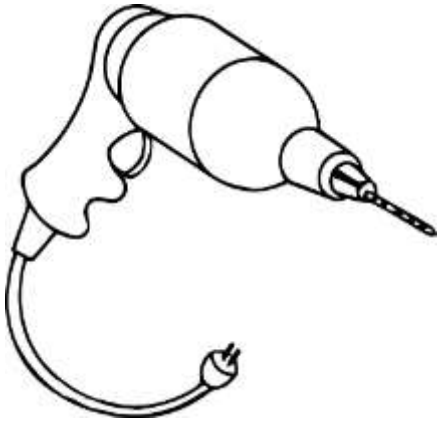
Operation	Produce, change, add or process something.
Inspection	Checking of items for quality and/or quantity.
Storage	The storing of items until later time.
Transport	The movement of items or people between areas.
Delay	The temporary waiting of something or somebody.

PROCESS SEQUENCE CHART

Common categories and symbols are . . .

Operation Produce, change, add or process something.

Examples: Drilling a hole in metal and serving a customer at a call center.

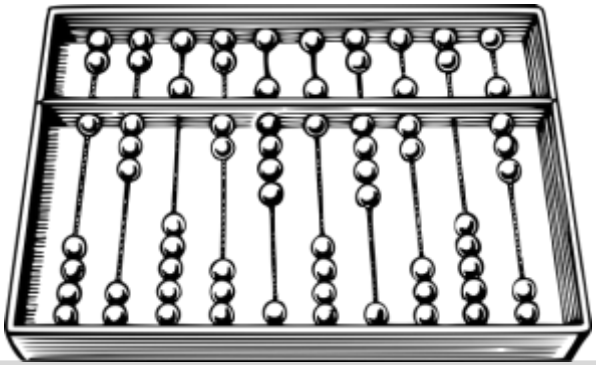


PROCESS SEQUENCE CHART

Common categories and symbols are . . .

Inspection Checking of items to ensure correct quality and/or quantity. Does not add or change anything.

Examples: Checking for defects, measuring the dimensions of a product, counting a received products, and getting feedback from a customer.

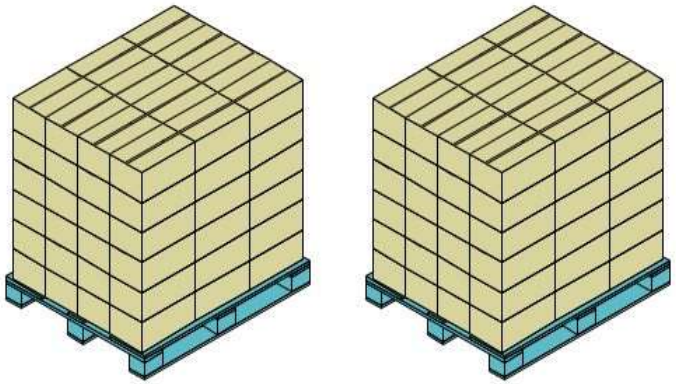


PROCESS SEQUENCE CHART

Common categories and symbols are . . .

Storage The storing of something until later time.

Examples: Storing of finished goods in a warehouse and storing of the received supplies in a storeroom as inventory.

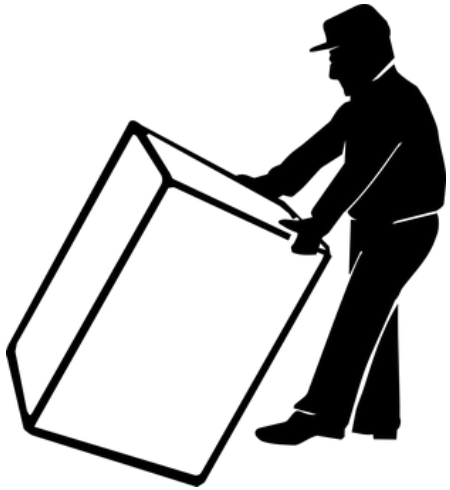


PROCESS SEQUENCE CHART

Common categories and symbols are . . .

Transport The movement of people, materials, documents, tools, or other items from one location to another.

Examples: A forklift moving pallets from a warehouse into a loading bay, a conveyer carrying a partially completed product from one machine to the next, and a customer walking from sales floor to cashier.



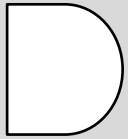
Methods can be:

- Truck
- Forklift
- Crane
- Trolley
- Conveyer
- Hand

PROCESS SEQUENCE CHART

Common categories and symbols are . . .

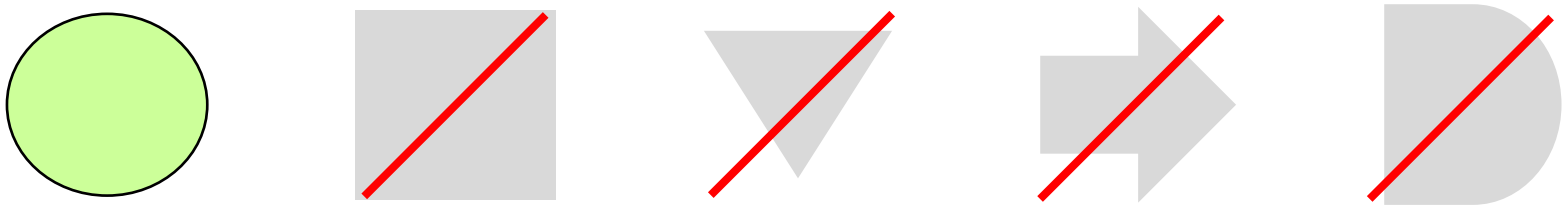
Delay The temporary waiting of something or somebody.



Examples: The time spent waiting for maintenance and repair activities, and the time the customer spent waiting in a queue.

PROCESS SEQUENCE CHART

Value-Added Activities and Waste



Operation | Inspection | Storage | Transport | Delay

Only **operations** will add value (**BUT not all operations!**)

Inspection, storage, delay, and transportation activities will add no value from the **customer's viewpoint**

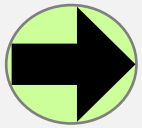
PROCESS SEQUENCE CHART

Other symbols may be used . . .

Rework or scrap point

Inspection while operating

Decision



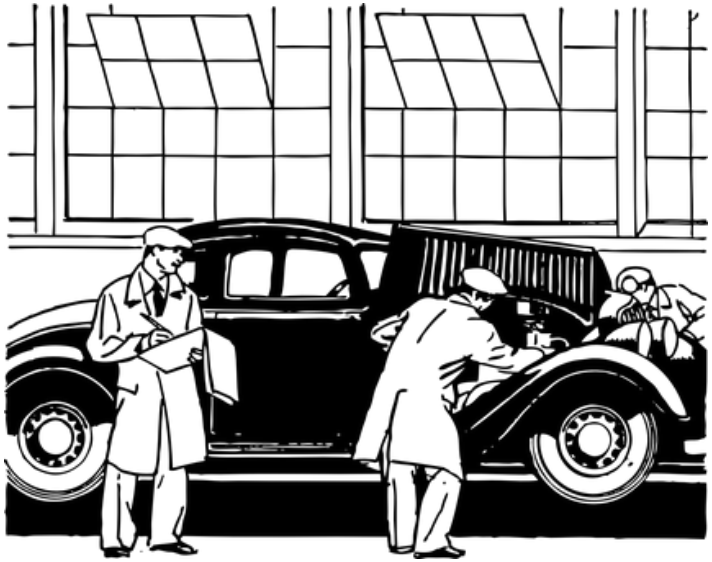
Operating while transporting

Longer-term storage (or when storage is larger than a container)

Operating while being in storage

PROCESS SEQUENCE CHART

Care should be taken when **choosing the right category**, as a delay of a machine could be an inspection made by an operator or a transportation activity.



PROCESS SEQUENCE CHART

There are three **common types** of process sequence charts, based on what is being charted . . .

Man-type charts

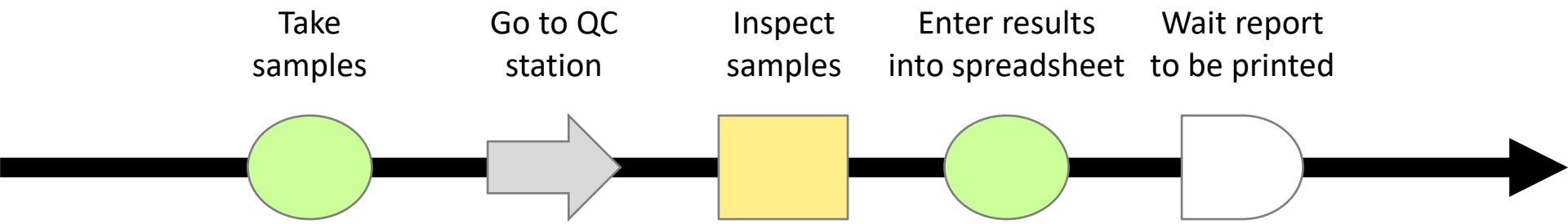
Material-type charts

Equipment-type charts

PROCESS SEQUENCE CHART

Man-Type Chart

Shows the actions of a person or group of people

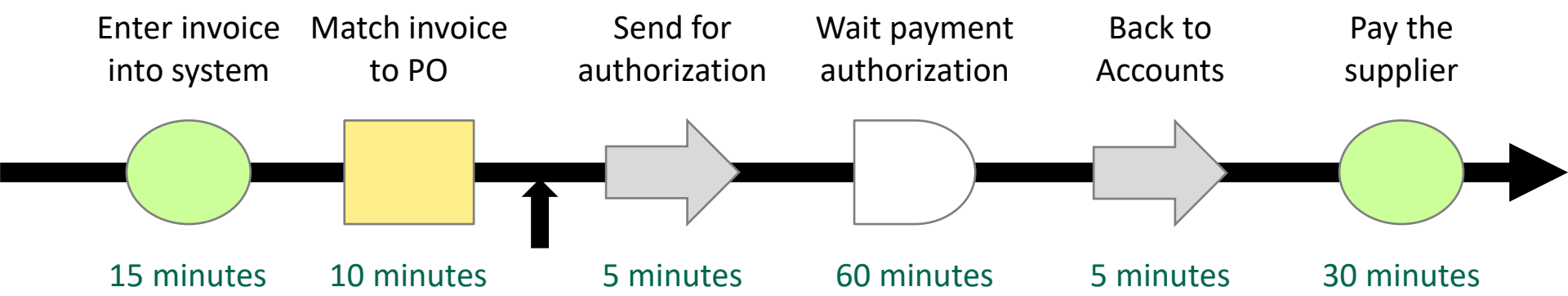


Samples Inspection

PROCESS SEQUENCE CHART

Material-Type Chart

Shows what happens to a product or item as it moves

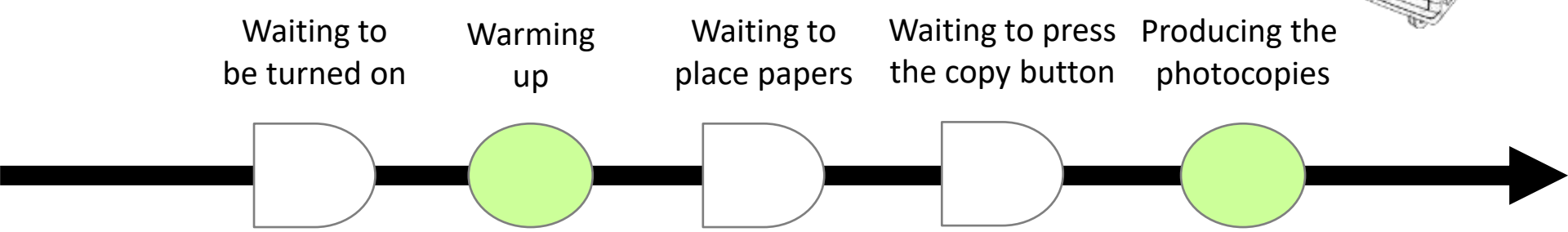


Supplier Invoice Processing

PROCESS SEQUENCE CHART

Equipment-Type Chart

Shows how a tool or an equipment is used

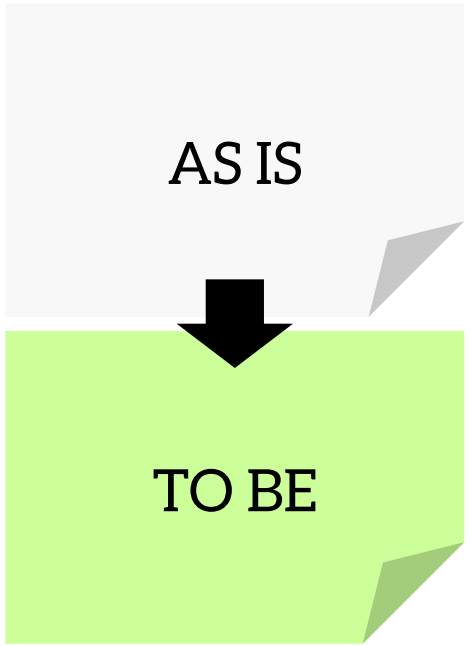


Use of an office copy machine

PROCESS SEQUENCE CHART

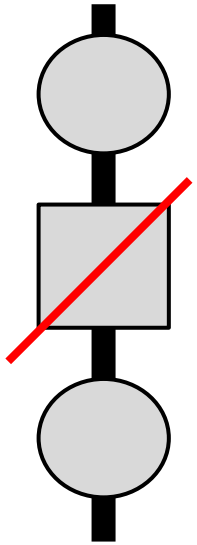
A good practice is to chart the **present process** as well as the **future process** in order to drive change and continuous improvement.

A typical approach is to chart the present process first and then propose the improvement on a second chart.

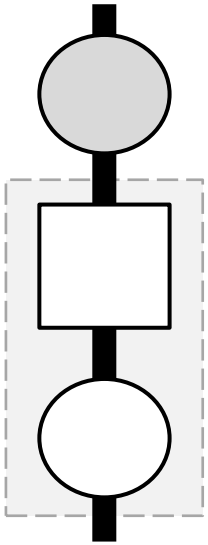


PROCESS SEQUENCE CHART

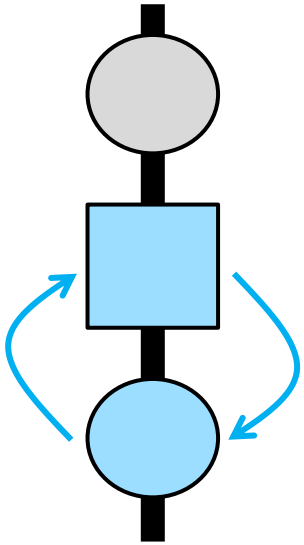
When charting for the future, each step is subject to . . .



Elimination



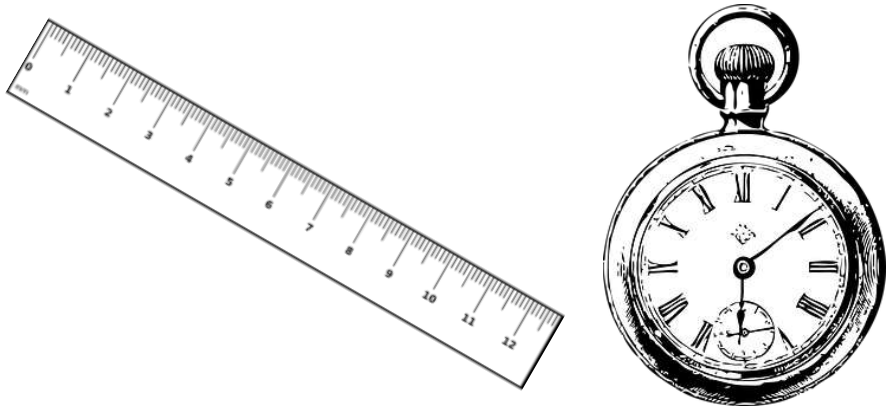
Combination



Change sequence

PROCESS SEQUENCE CHART

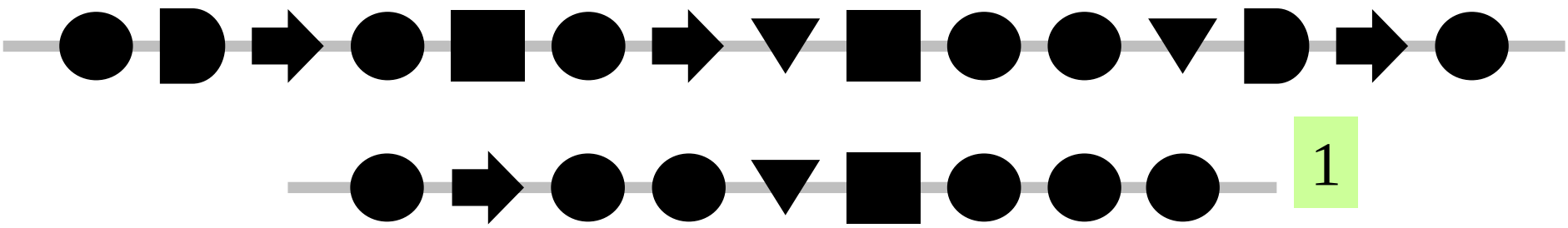
The time for each process step and the distance travelled should be **calculated**.



The reduction of both will help in cost reduction and will **justify** any improvement proposal

PROCESS SEQUENCE CHART

Improvements can be achieved as a result of the reduction of the number of steps, the reduction of the time for any of the steps, and the reduction of the distance travelled.



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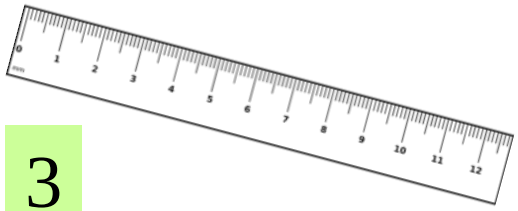


3

2

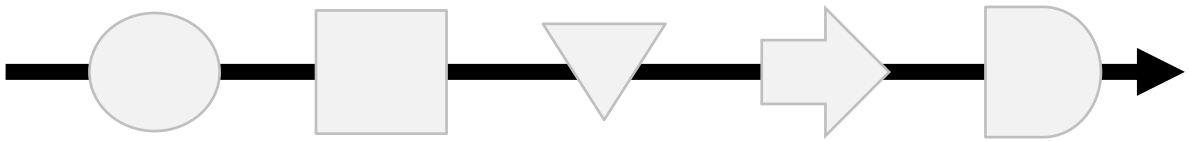
PROCESS SEQUENCE CHART

How to Construct a Process Sequence Chart?

1. With your team, **describe the process**, the scope and the boundaries.

2. Observe the process, then record the activities as they happen, noting for example how and when a part is operated, moved, inspected and stored.

3. Draw on a line the process activities as observed using the standard set of symbols.

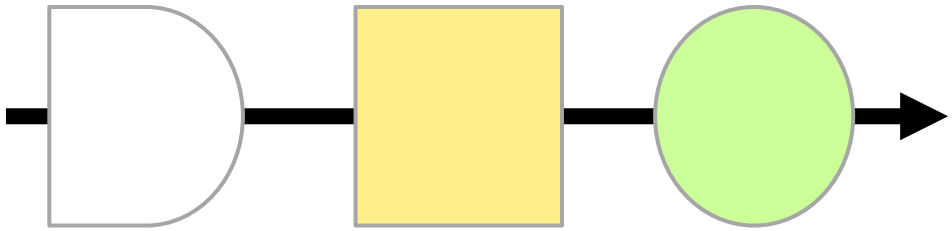


PROCESS SEQUENCE CHART

How to Construct a Process Sequence Chart?

4. **Label** each process step with a brief description using as few words as possible.

5. Add further **details** as necessary including the distance travelled, error rates, and the time take to perform each activity.

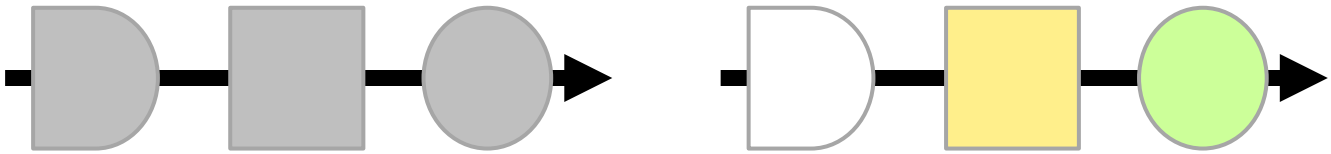


PROCESS SEQUENCE CHART

How to Construct a Process Sequence Chart?

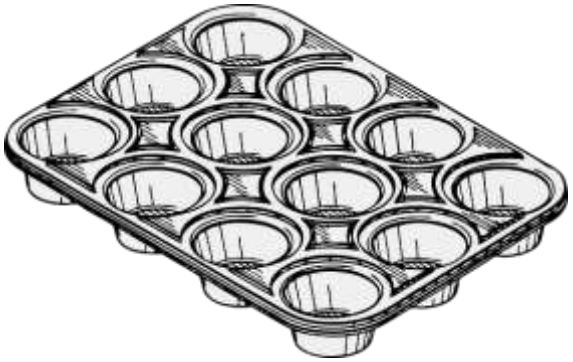
6. Identify problem areas and **improvement opportunities**.

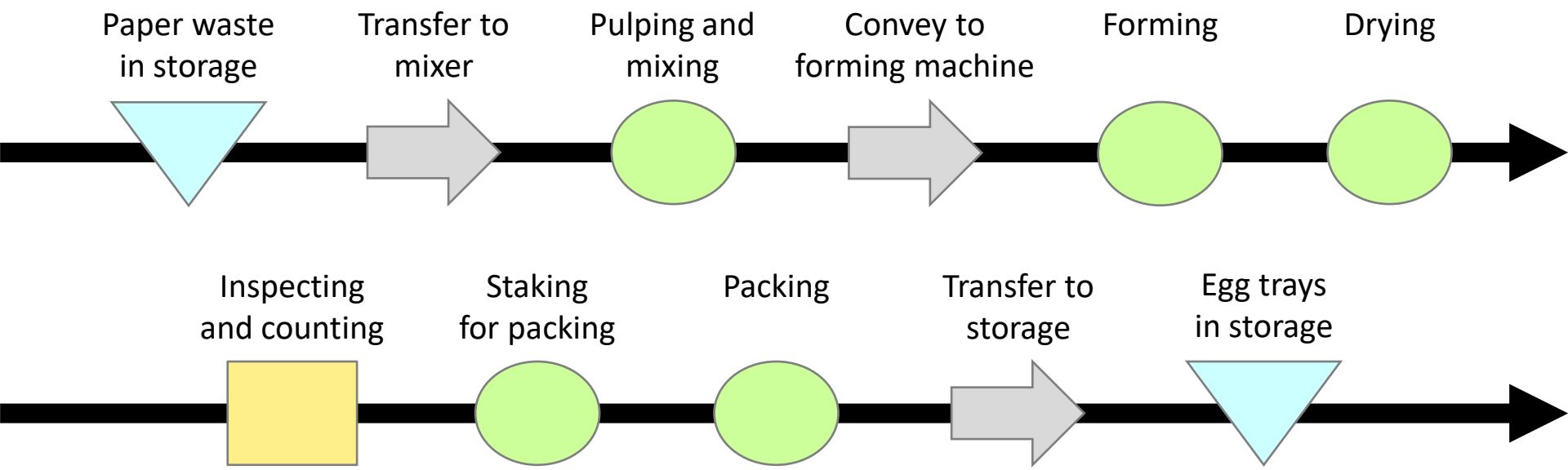
7. Produce the **proposed chart** trying to reduce waste and increase the percentage of the value-added activities.



PROCESS SEQUENCE CHART

Example – The Present Method of an Egg Tray Production Process

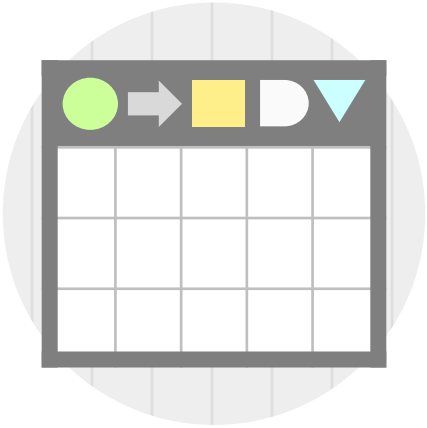




PROCESS SEQUENCE CHART

Process Chart

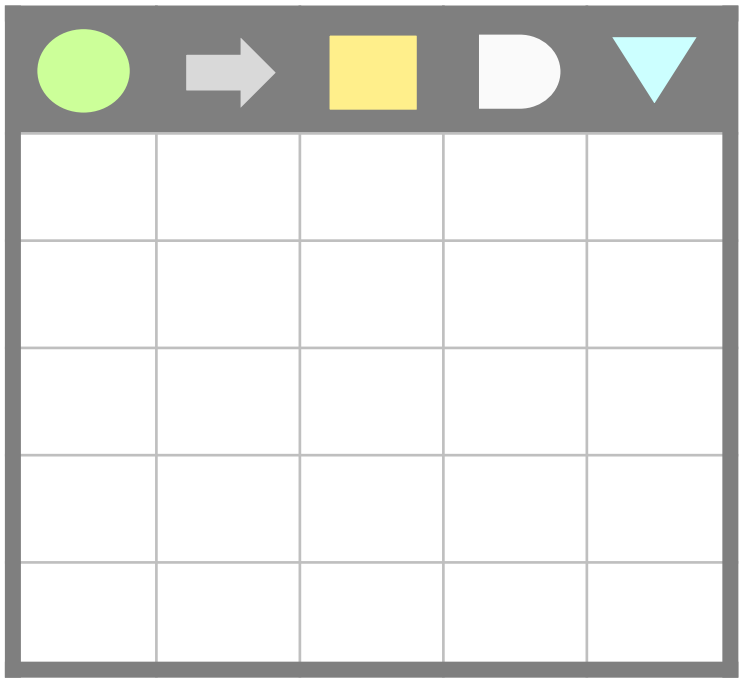
Presenting the process activities and the related information in the form of a table.



PROCESS SEQUENCE CHART

Process Chart

Allows to record further information about each process step (time, distance, etc.).



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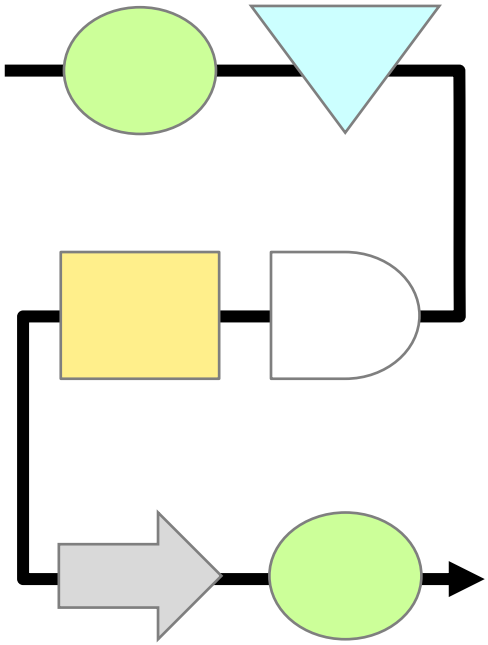


PROCESS SEQUENCE CHART

Process Chart

Step #	Time IN MINS	Distance IN METERS						VA/NVA	Process description

Helps estimating key metrics such as:

1. The percentage of the value-added activities to the total activities.
2. The total time to perform the process.
3. The distance travelled.

PROCESS SEQUENCE CHART

Process Chart

Example – Supplier Invoice Processing

Step #	Time IN MINS	Distance IN METERS						Process description
1	15		X					Enter invoice into system
2	10				X			Match invoice to PO
3	5	85		X				Send for authorization
4	60					X		Wait payment authorization
5	5	85		X				Bring back to Accounts
6	30		X					Pay the supplier

PROCESS SEQUENCE CHART

Process Chart

Example – Supplier Invoice Processing

Step #	Time IN MINS	Distance IN METERS						Process description
1	15		X					Enter invoice into system
2	10				X			Match invoice to PO
3	5	85		X				Send for authorization
4	60					X		Wait payment authorization
5	5	85		X				Bring back to Accounts
6	30		X					Pay the supplier

Number of steps	2	2	1	1		**6**
Time (minutes)	45	10	10	60		**125**
Distance (meters)	–	170	–	–		**170**

PROCESS CHART SUMMARY

PROCESS SEQUENCE CHART

Process Chart

Key Metrics

						Totals
Number of steps	2	2	1	1	0	**6**
Time (IN MINS)	45	10	10	60	0	**125**
Distance (IN METERS)	–	170	–	–	–	**170**

Process time equals the sum of all times and delays, except for the activities that can be done in parallel

Distance traveled equals the sum of all the distances

Value-added time = Value-added operation time / Total time

PROCESS SEQUENCE CHART

Process Chart

Key Metrics

						Totals
Number of steps	2	2	1	1	0	**6**
Time (IN MINS)	45	10	10	60	0	**125**
Distance (IN METERS)	–	170	–	–	–	**170**

Process time = 45 + 10 + 10 + 60 = 125 minutes

Distance traveled = 175 meters

Value-added time = 45 / 125 = 36%

PROCESS SEQUENCE CHART

Process Chart

Key Metrics

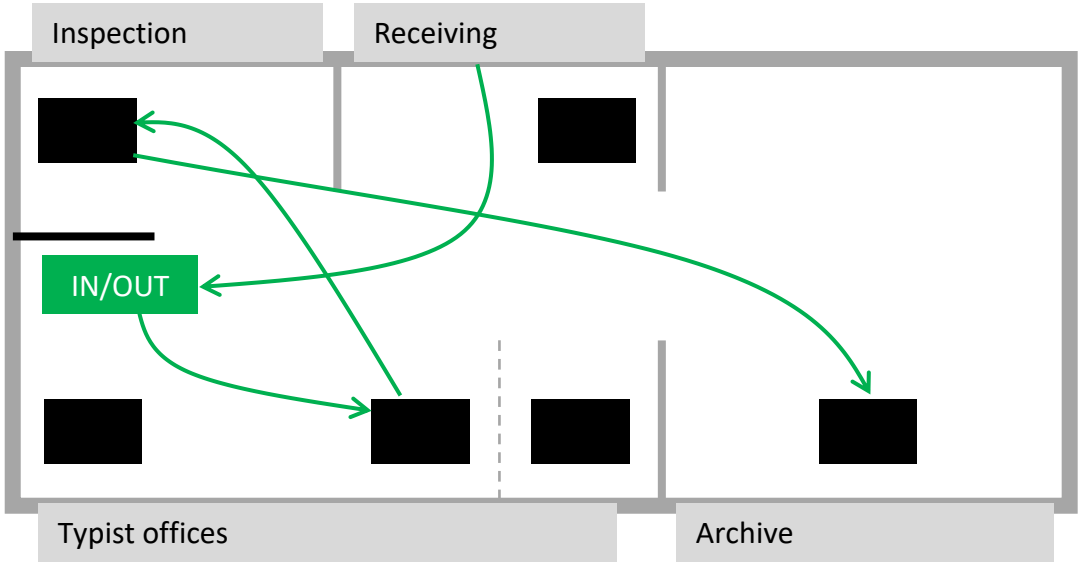
$$\textit{Annual Labor Cost} = [\textit{Process time in hours}] [\textit{Variable cost per hour}] [\textit{Number of times process performed per year}]$$

More advanced metrics can be calculated

PROCESS SEQUENCE CHART

Further Information

Process charting is sometimes used in conjunction with flow diagramming.



A Flow Diagram

A drawing that is used to analyze the movement of materials, items or people.

PROCESS SEQUENCE CHART

Further Information

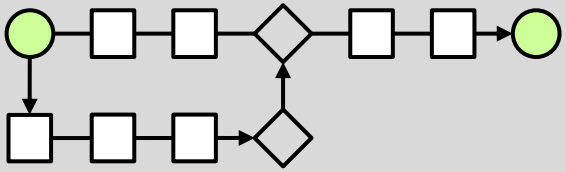
Costing the present and future charts will be required to justify any future improvement proposal.

PROCESS SEQUENCE CHART

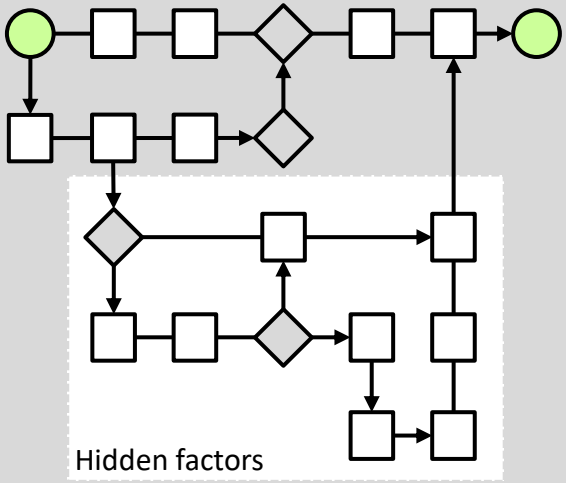
Further Information

What do we think of a process is not necessary what it actually is . . .

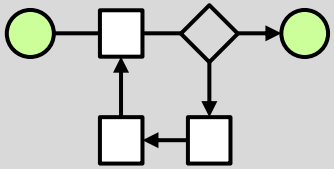
What you think it is



What it actually is



What you would like it to be

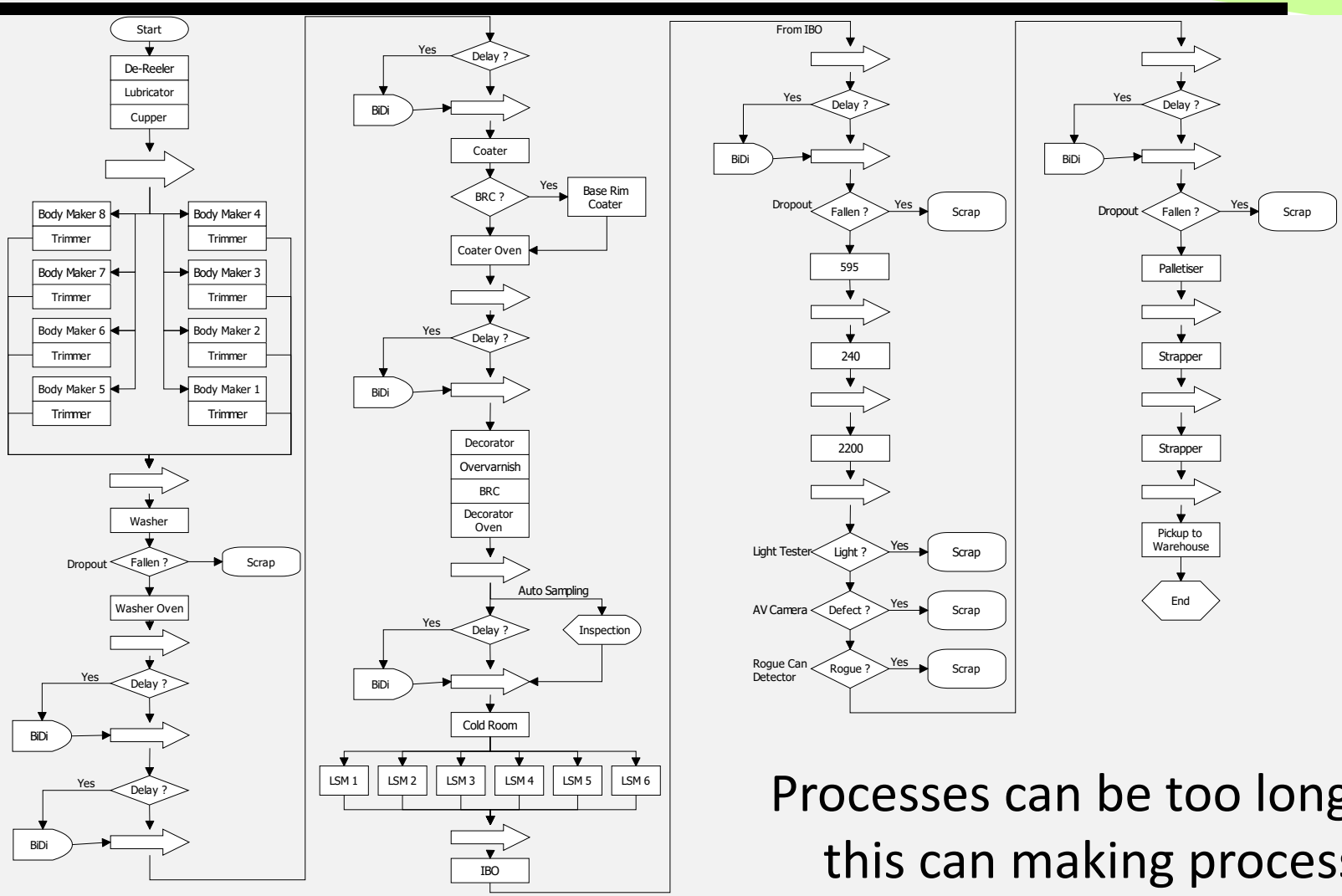


PROCESS SEQUENCE CHART

Further Information - Common Process Problems

Non-value adding steps	Errors and rework	Duplication
Bottlenecks	Long cycle times	Excessive delays
Missing steps	Too many inspections	Complex procedures
Departure from procedure	Dead ends	Costly steps

PROCESS SEQUENCE CHART



Processes can be too long as this can making process

PROCESS SEQUENCE CHART

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