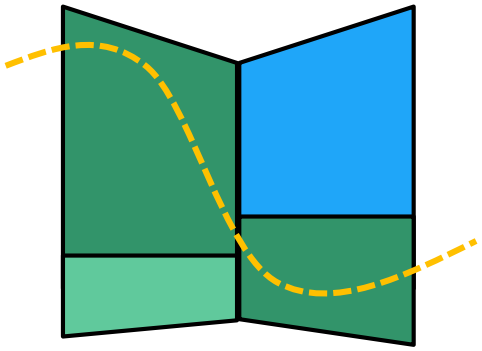
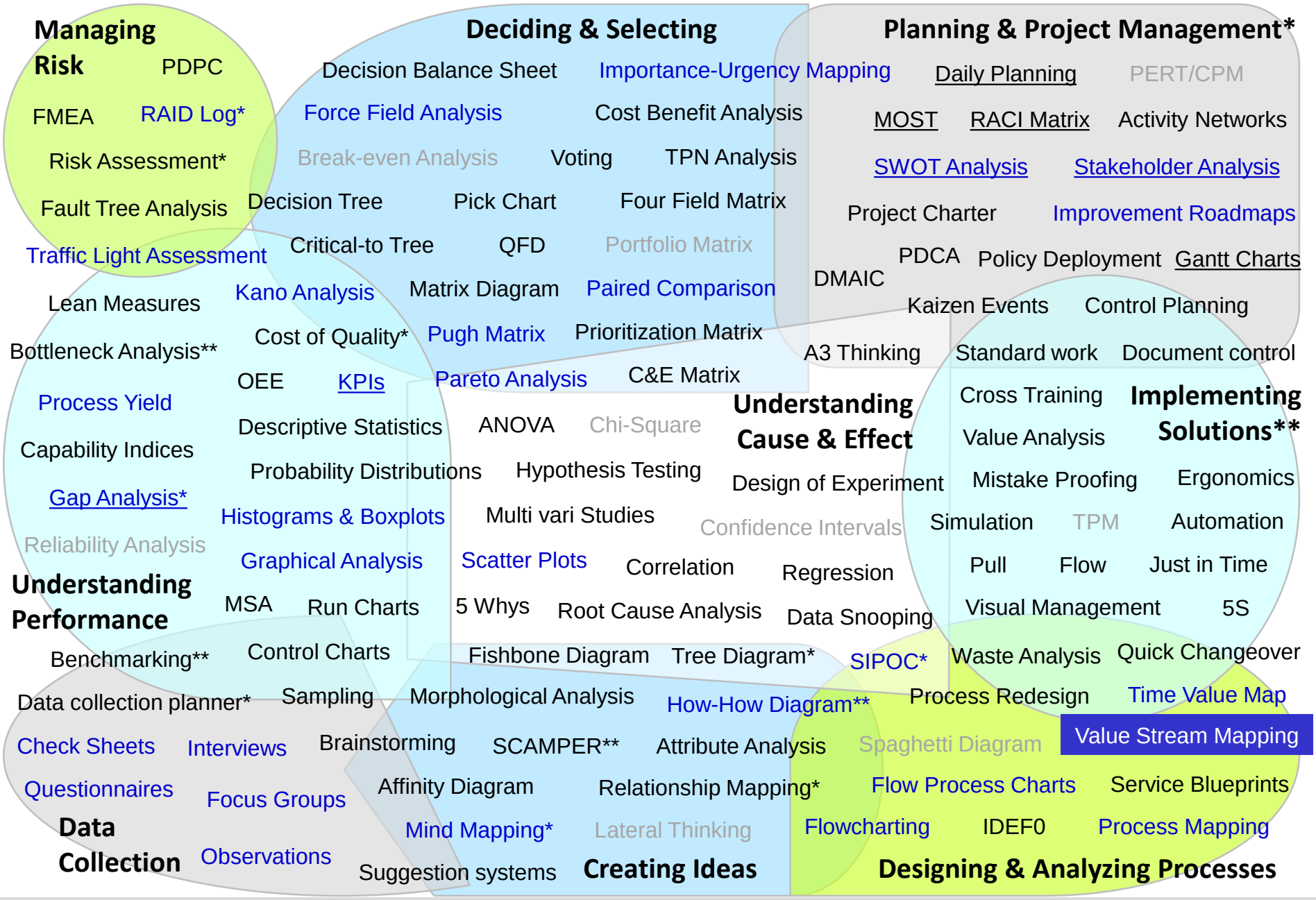
Continuous Improvement Toolkit

Value Stream Mapping

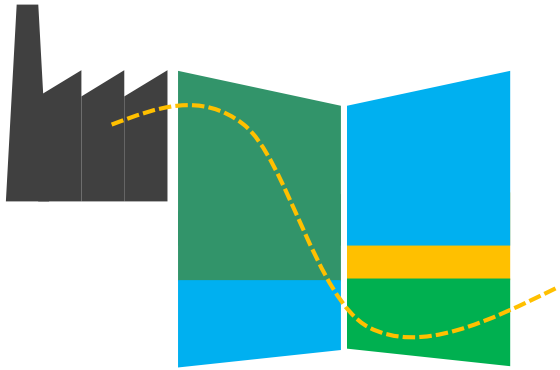


The Continuous Improvement Map



- Value Stream Mapping

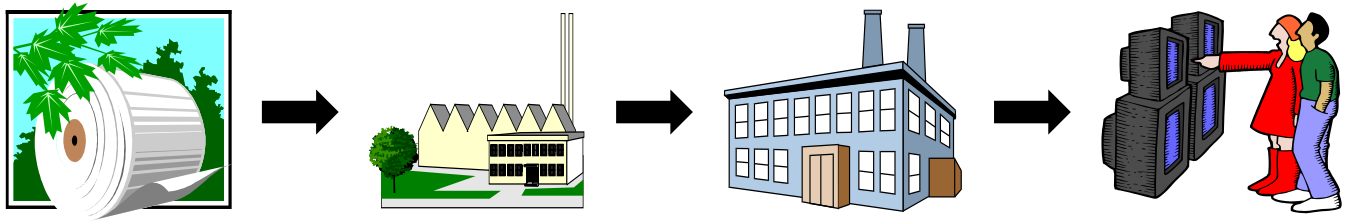
- A high-level visual representation of a business process.
- Helps to understand the flow of value as perceived by the customer.
- Helps identify and eliminate waste (Muda).
- Helps make the process as close to lean as possible.
- Considered as an improvement tool rather than just a definition of how the process operates or should operate.



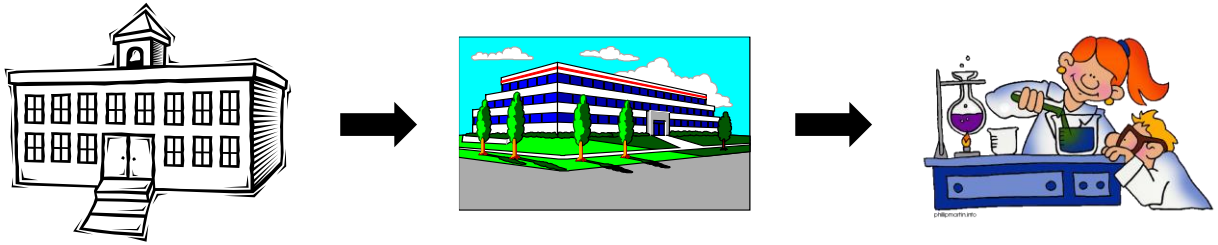
- Value Stream Mapping

- It is often associated with **manufacturing**.
- It can also be applied in:
  - Product development.
  - Service related industries: e.g. healthcare, hospitality and logistics.

Manufacturing

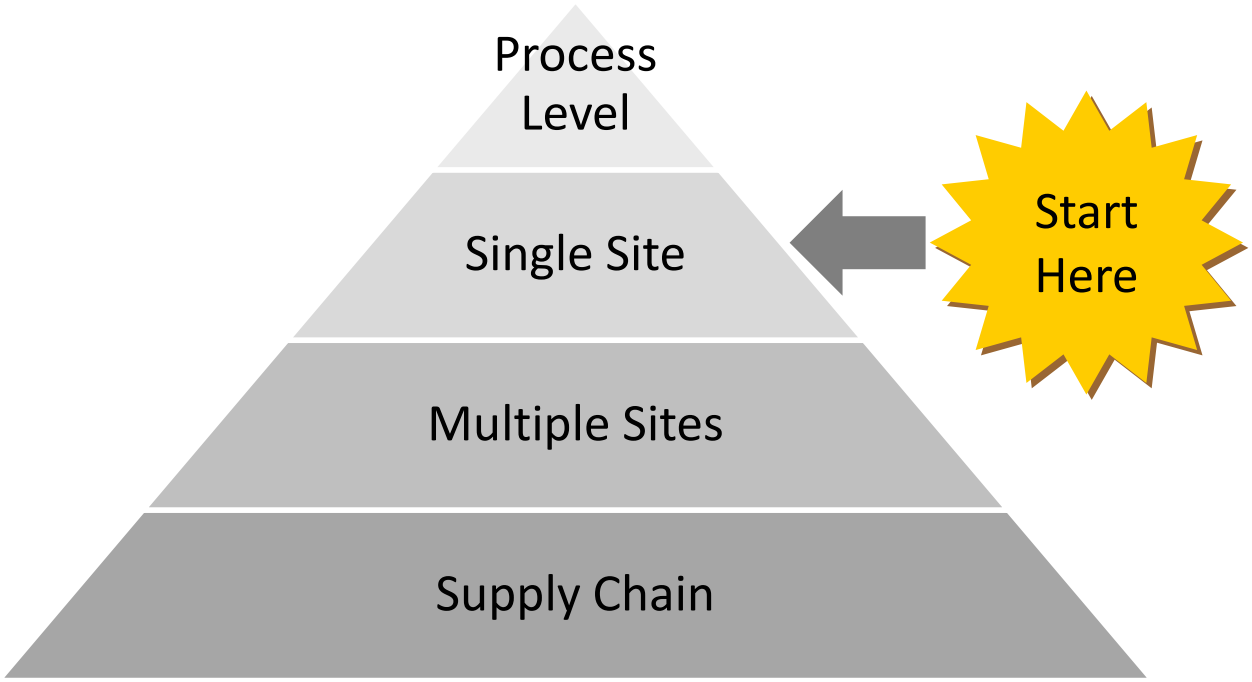


Services



- Value Stream Mapping

- Used when you want improve an end-to-end process in a single site.



- Value Stream Mapping

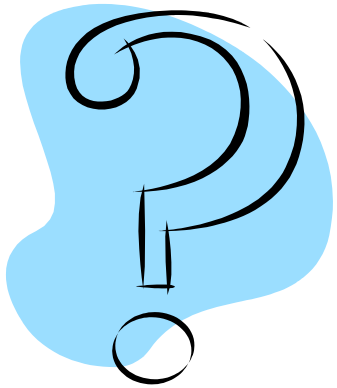
- Considered as:
  - A strategic tool.
  - A change management tool.
  - A communication tool.

- A collection of value and non-value added processes that produce **a good, a service or a combination of both**.

- Value Stream Mapping

- Helps identify opportunities for reducing waste and improving quality.
  - By making the non-value added activities more easy to identify.

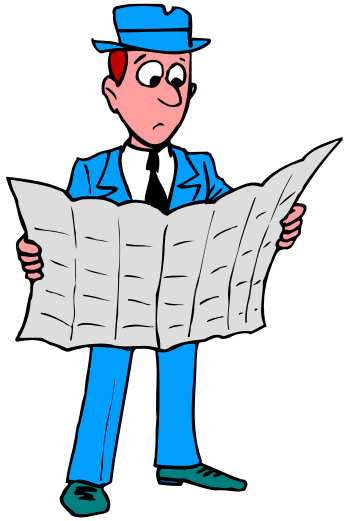
- Effectively communicates where to focus the continuous improvement efforts to deliver more value.



- Value Stream Mapping

VSM is preferred over other process mapping techniques:

- When you want to find out the Lean opportunities that exist in your core processes.
- When you want to know the various inventories and delays exist in your processes.
- When you want to know the various business systems used by your processes.
- When you want to improve productivity, utilization and load distribution of staff.

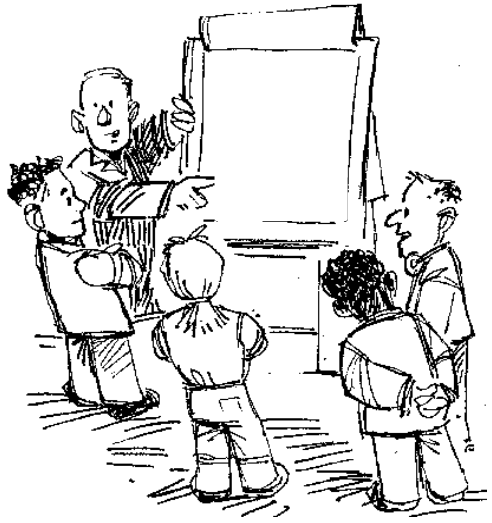


- When you want to know the effectiveness of your customer service approach.
- When you want to present the health of your processes to the top management.

- Value Stream Mapping

Benefits:

- Gives the opportunity to understand what happens today.
- Helps discussing the needed improvements.
- Enables to see the big picture from beginning to end.
- Enables to see where problems lie within processes:
  - Non-value added activities.
  - Delays.
  - Rework.
  - Bottlenecks.
  - Excessive inventory levels.
  - Other forms of waste.
- Helps establishing a future state vision.

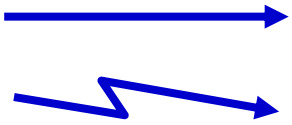


- Value Stream Mapping

- For example, the team may see an opportunity for maximizing the production rate to match the rate of customer demand.

- Value Stream Mapping

- A **value stream** is the set of all activities required to convert raw materials to a finished product in the hands of the customer.
- It includes other functions such as order-taking, order communication and detailed scheduling.

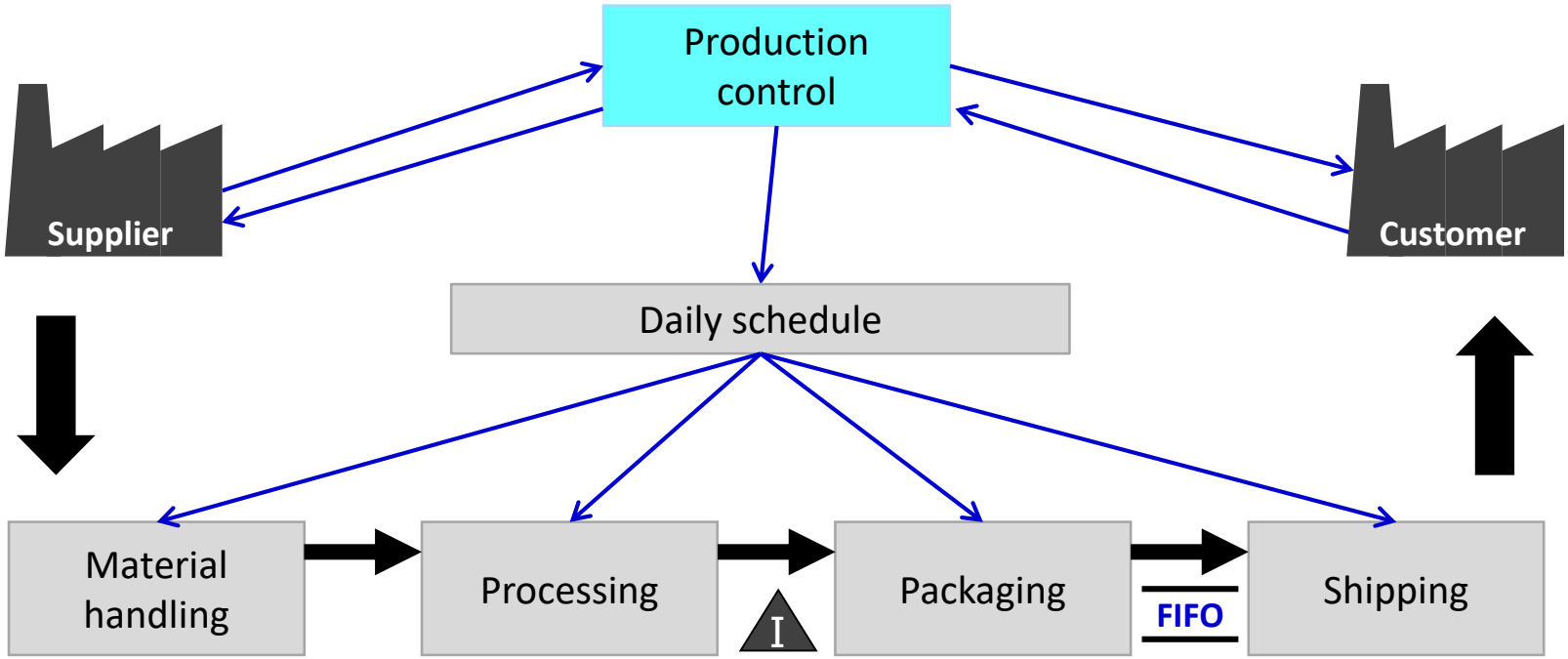


Manual/electronic information flow

Material flow

- Value Stream Mapping

- In manufacturing, it spans from the event the materials are received until the finished products are delivered to the customer.



Typical VSM for Manufacturing

- Value Stream Mapping

Material Flow:

- It is where products flow through the stream.
- It includes:
  - Processing.
  - Handling.
  - Transport.
  - Storage.

- It can be separated into different branches that rejoin again.
- You don’t need to map the flow of every part or product but the production of a single product or product family.
- Focus on long lead time and high volume products.

- Value Stream Mapping

Material Flow:

- A **Product Family Matrix** may be helpful.

Products	Press	Shape	Bend	Paint	Assemble
A	X	X		X	X
B	X		X	X	X
C			X	X	X
D		X		X	X

- Value Stream Mapping

Inventory:

- It is also important to look at the amount of raw materials, work in process (WIP), and finished products that are stored at any particular time.

Raw Materials

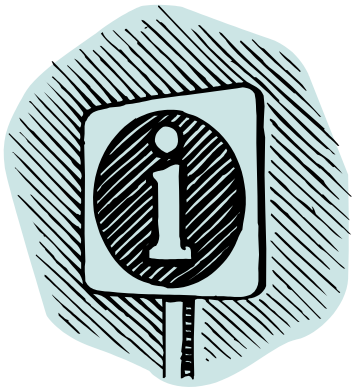
Work in Process

Finished Goods

- Value Stream Mapping

Information Flow:

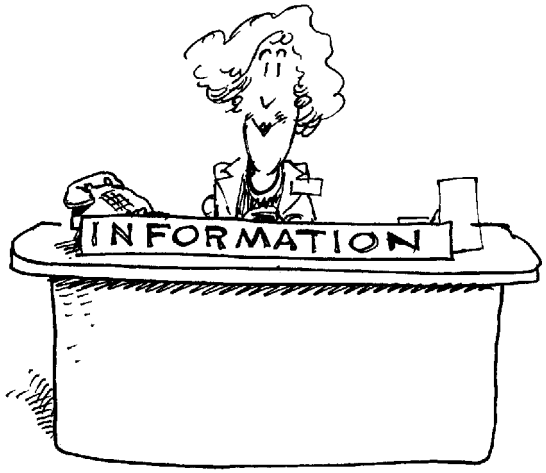
- VSM represents the information flow along with the material flow.
- It is critical to the effective and timely execution of any process.
- **It includes:**
  - Orders, instructions, schedules, approvals and reports.
  - Replenishment cards.
  - Verbal discussions and communication.



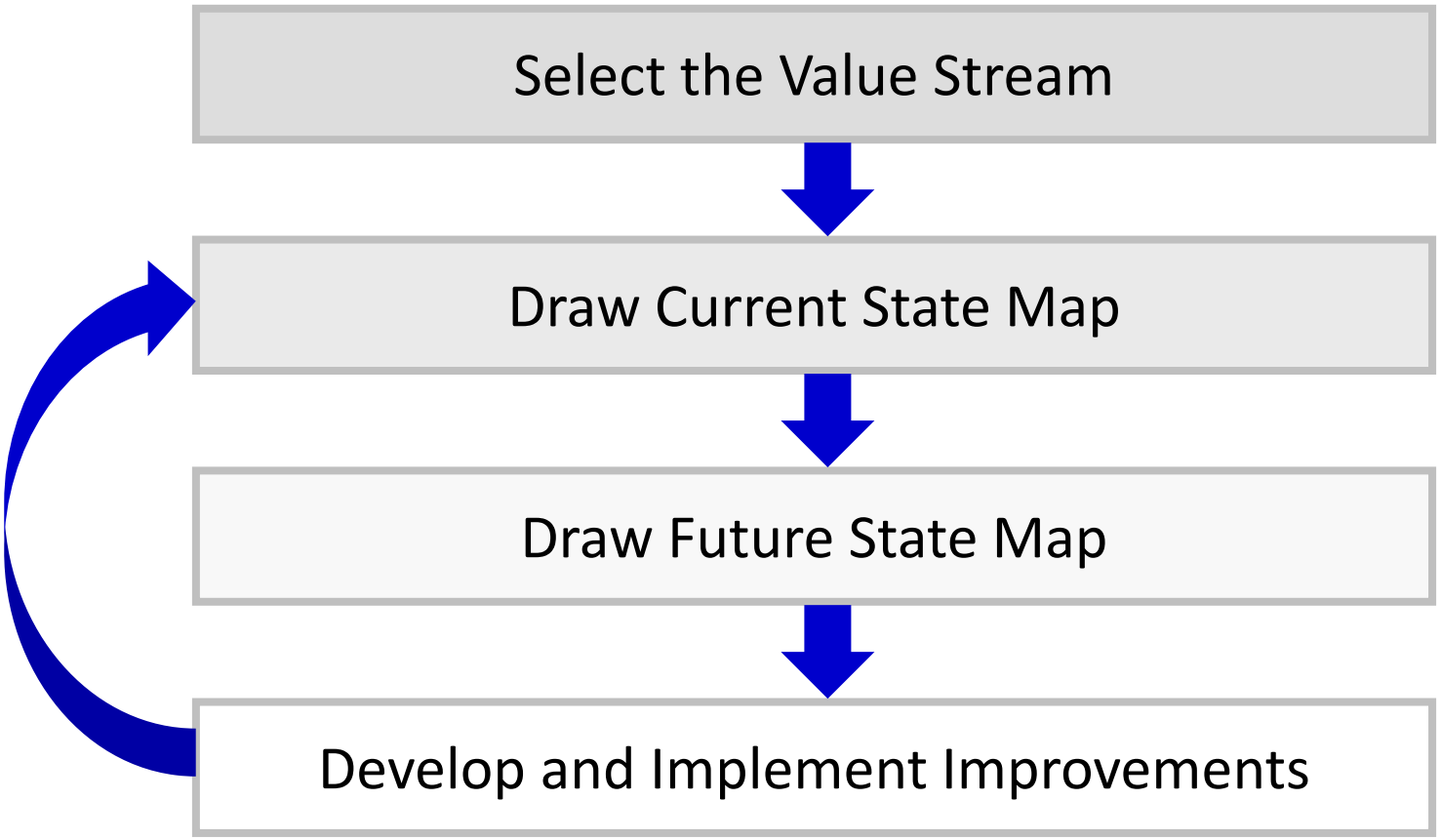
- Value Stream Mapping

- **There are two types of information:**
  - **Manual** – information that is passed on manually or verbally.
  - **Electronic** – information that is passed on via telephone, fax, email, etc.

We should map informal processes as well



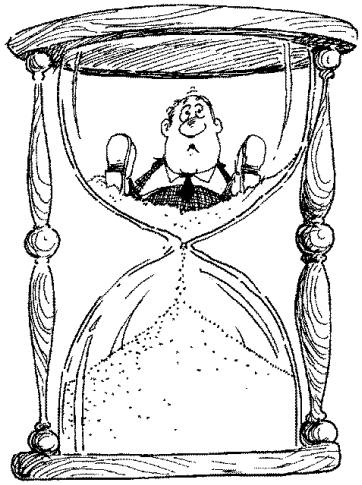
- Value Stream Mapping



- Value Stream Mapping

The Current State Map:

- Develops an understanding of how the value stream operates today.
- Helps identify the waste elements of the existing system.



Select the Value Stream

Draw the Current State

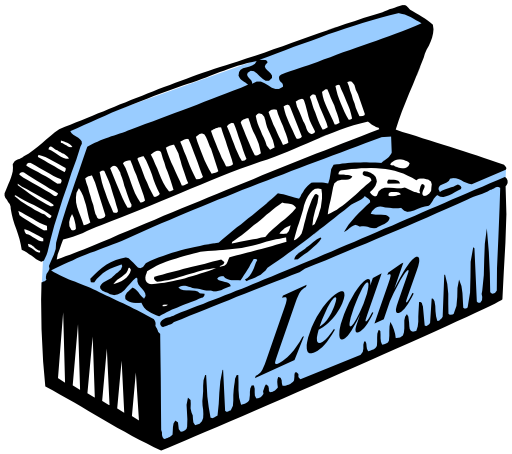
Draw the Future State

Plan & Implement Improvements

- Value Stream Mapping

The Future State Map:

- The blueprint that you want to achieve toward a more lean business system.
- It should be based on Lean principles such as flow, pull and perfection to create a more streamlined production flow.



Select the Value Stream

Draw the Current State

Draw the Future State

Plan & Implement Improvements

- Value Stream Mapping

Guidelines for Developing the Future State Map:

- Start only when the current state map is understood and agreed.
- Invite the people who are involved in the process.
- Look for steps in the process that can be simplified or eliminated.

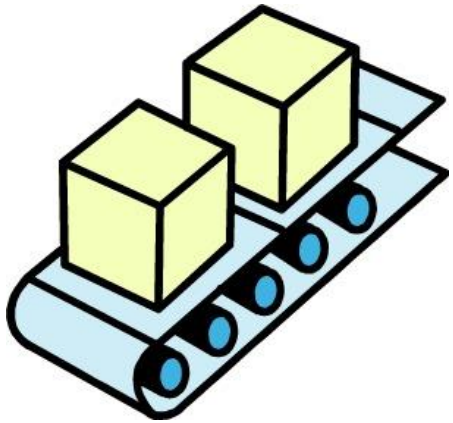
- Value Stream Mapping

Guidelines for Developing the Future State Map:

- **Look for:**
  - Build-ups of inventory.
  - Stock shortages.
  - High scrap and rework rates.
  - Long travel distances.
  - bottlenecks.
  - Significant variations in cycle times or demand levels.
  - Different time basis compared with key customers.
  - Lengthy checking or approval periods.
  - Too few or too many staff in key areas.
  - 5S and safety issues.

- Value Stream Mapping

Guidelines for Developing the Future State Map:

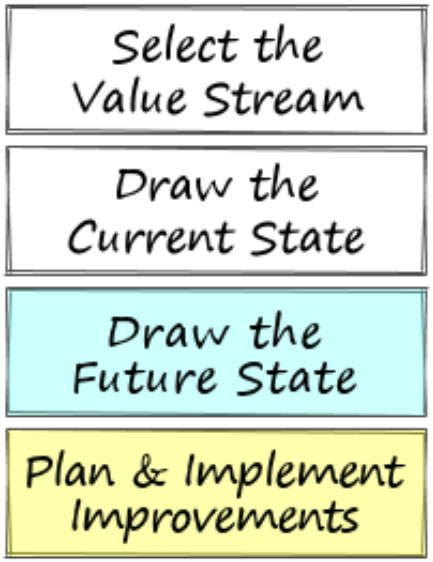


- Develop continuous flow wherever possible.
- Use **pull** and **kanban** systems and where continuous flow is not possible.
- Produce to **Takt time**.
- Send customer schedule to only one production process (the pacemaker process).
- Distribute the production of different products evenly.

- Value Stream Mapping

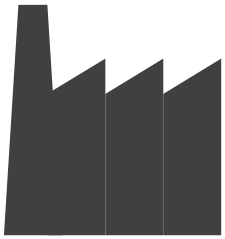
Implementation Plan:

- Should then be developed to get to the future state.
- Take into consideration the gaps between where are and where we want to be.
- A timetable should be put together with milestones, review periods and responsibilities.
- Remember that this is a project that needs to be owned, tracked and monitored throughout its life cycle.

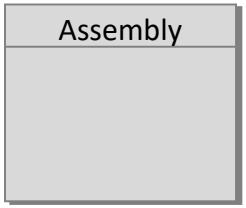


- Value Stream Mapping

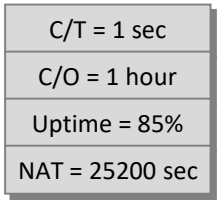
VSM Symbols:



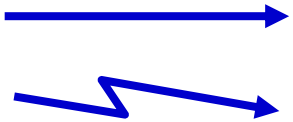
Outside body



Process



Data box

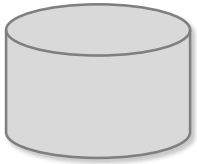


Manual/electronic information flow

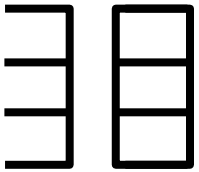
Material flow

Transport

No. of workers

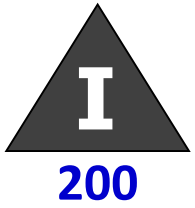


Business system

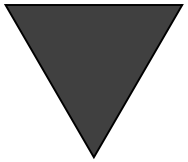


Controlled inventory/ safety stock

FIFO sequence

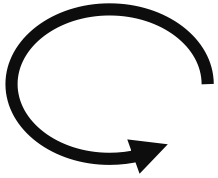


Inventory

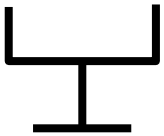


Signal Kanban

Push

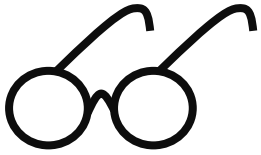


Physical pull

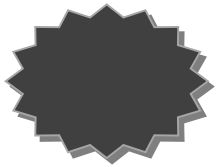


Kanban post

Load leveling



Go see



Lightening burst

- Value Stream Mapping

Process Box:

- Used to indicate the process name.
- Covers one area of continuous flow:
  - Where products flow without being stored, queued or delayed.

Coating
C/T = 2.3 seconds
C/O = 52 minutes
Uptime = 85%
NAT = 25,200 seconds
Scrap rate = 3.1%

- Value Stream Mapping

Date Boxes:

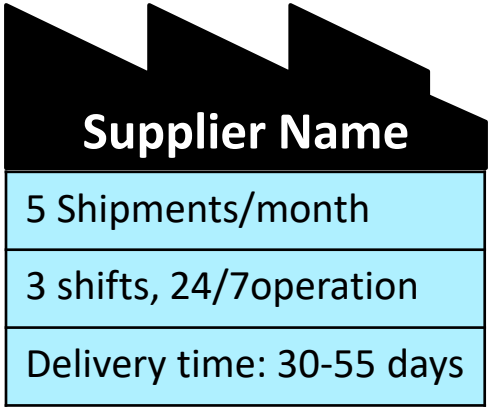
- Used to carry all data related to a specific process box.
- Can also be used to display data and performance information related to:
  - Inventory
  - Transportation
  - Important suppliers
  - Important customers

Coating
C/T = 2.3 seconds
C/O = 52 minutes
Uptime = 85%
NAT = 25,200 seconds
Scrap rate = 3.1%

- Value Stream Mapping

Date Related to Suppliers may Include:

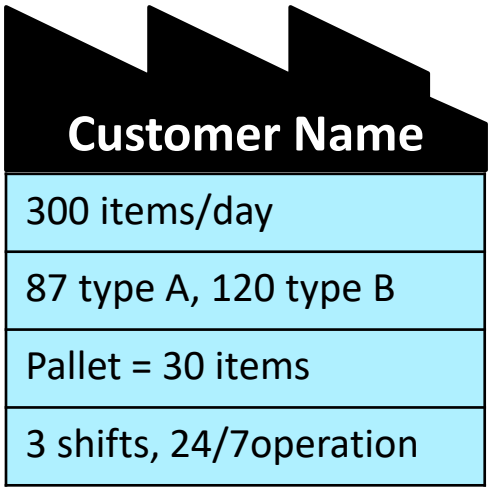
- Demand rate (items/day).
- Shipping frequency.
- Packaging size.
- Actual lead time.
- Required lead time.
- Error rate.
- Order adjustments.
- Supplier shift pattern.
- Number of suppliers.
- Different types of materials.



- Value Stream Mapping

Date Related to Customers may Include:

- Customer demand (items/day).
- Shipping frequency.
- Packaging size requirement.
- Actual lead time.
- Required lead time.
- Error rate.
- Order adjustments.
- Customer shift pattern.
- Number of customers.
- Product mix.

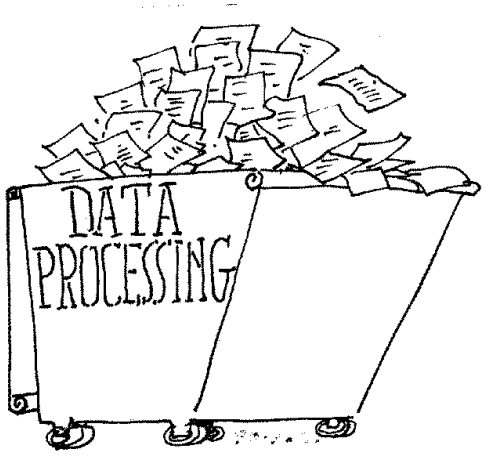


- Value Stream Mapping

Date Related to Each Process may Include:

- Cycle time (CT).
- Changeover time (C/O).
- Net available working time (NAT).
- Production rate (i.e. units/day).
- Scrap rate / % defects.
- Machine uptime %.
- Processing time.
- Maximum capacity.
- Overall equipment effectiveness.
- Number of operators.
- Number of product variations.

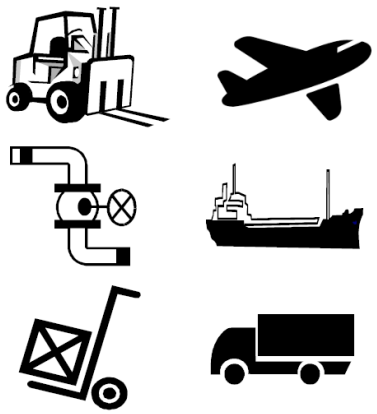
Data Box	
C/T	VAT
P/T	C/O
NAT	OEE



- Value Stream Mapping

Transportation .. Inventory:

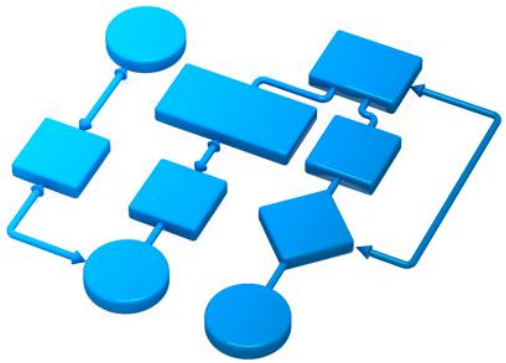
- Lot size.
- Transportation time.
- Number of product types.
- Distance traveled.
- Transportation frequency.
- .
- Amount of inventory.
- Queue or delay time.
- Number of product types.
- Inventory type.



- Value Stream Mapping

How to Conduct a Value Stream Mapping Exercise:

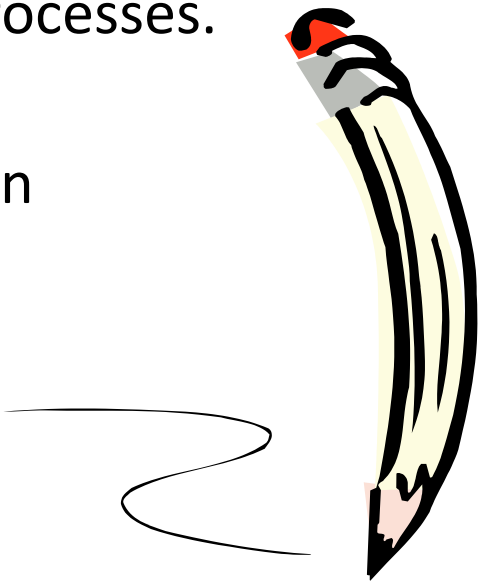
- Establish the team and include people working in the process, process owners and planners.
- Identify the product and the value stream.
- Physically walk the flow starting from the customer then work upstream through the process.
- Capture all relevant data and performance information as you walk.
- Always record what you see not what you are told is normally there.
- Walk the information flow and collect examples of relevant records.



- Value Stream Mapping

How to Conduct a Value Stream Mapping Exercise:

- Draw the map on a large piece of paper (consider zoning the map).
- Start with the material flow including processes, inventory, delays and transportation.
- Map the information flow and the secondary processes.
- Complete the data boxes.
- Add the VSM timeline and any other information you feel is relevant to the map.
- Identify the non-value added activities, delays, rework, bottlenecks, and other form of waste.



- Value Stream Mapping

Zone the Map:

Title and Date

Information flow
External customers and suppliers
Secondary processes

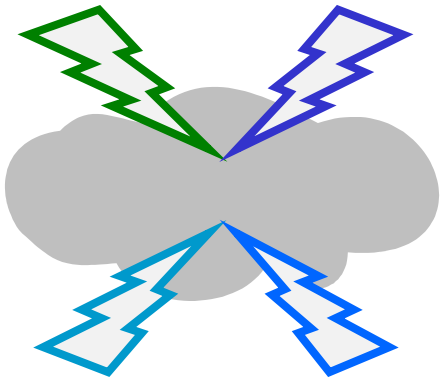
Material flow
Primary processes
Delays / inventory between processes

Timeline
VSM calculations

- Value Stream Mapping

How to Conduct a Value Stream Mapping Exercise:

- Brainstorm how to eliminate waste. Ask questions like:
  - Are things done in the right sequence?
  - Does information arrive on time?
  - Can any paper work be eliminated?
  - Are existing systems used in optimum way?
  - Is automation possible?
  - Is information available, reliable and up-to-date?
  - Is information really used in decision making?
  - Are there any quick wins possible?

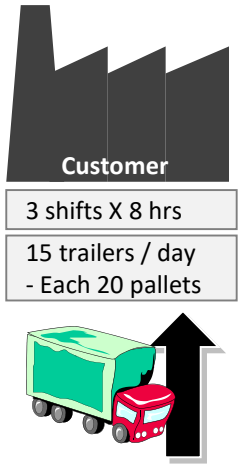


- Visualize the ideal state and develop a future state map.
- Plan and implement actions to achieve the future state.

- Value Stream Mapping

Example:

Start with customer requirements



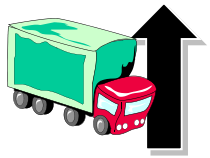
- Value Stream Mapping

Example:

Draw material flow and add process data

3 shifts X 8 hrs

15 trailers / day
- Each 20 pallets



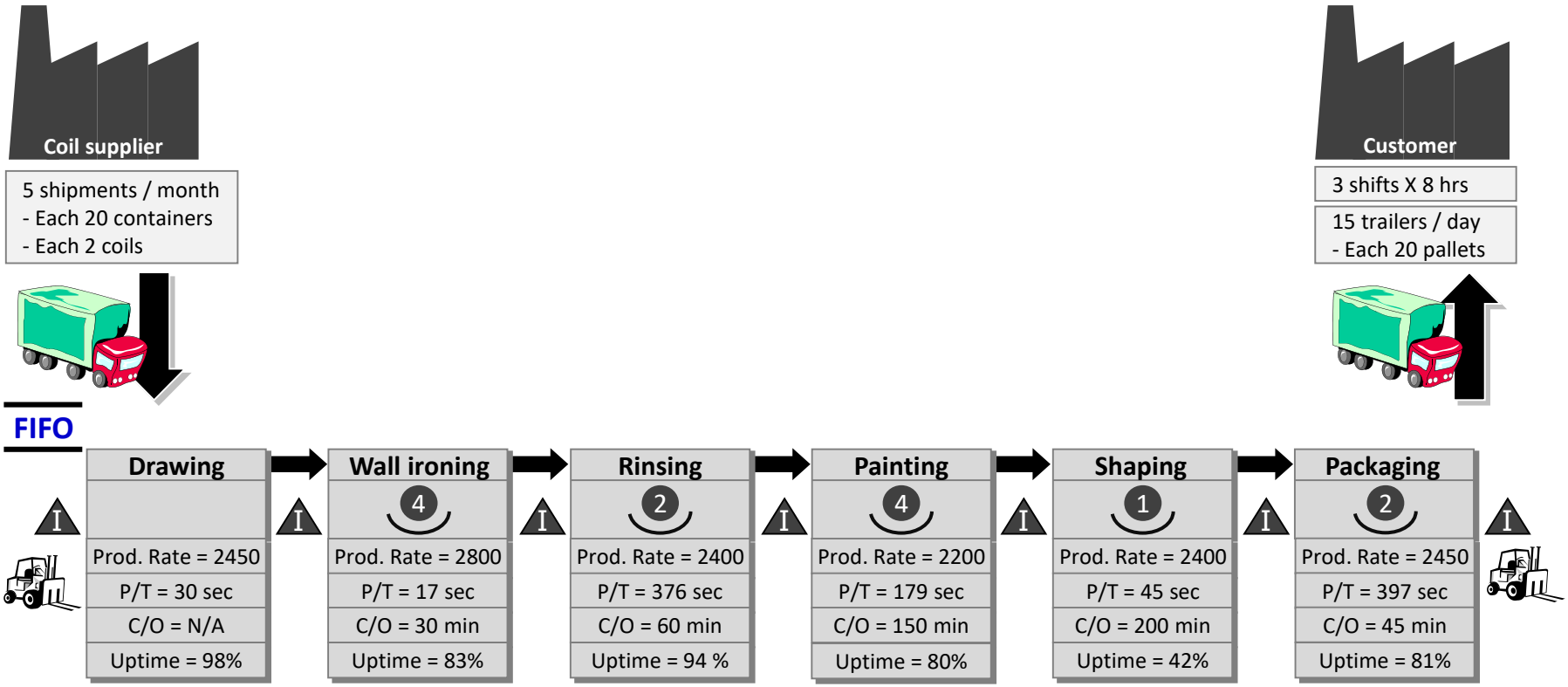
FIFO

Drawing	Wall ironing	Rinsing	Painting	Shaping	Packaging
	4	2	4	1	2
Prod. Rate = 2450	Prod. Rate = 2800	Prod. Rate = 2400	Prod. Rate = 2200	Prod. Rate = 2400	Prod. Rate = 2450
P/T = 30 sec	P/T = 17 sec	P/T = 376 sec	P/T = 179 sec	P/T = 45 sec	P/T = 397 sec
C/O = N/A	C/O = 30 min	C/O = 60 min	C/O = 150 min	C/O = 200 min	C/O = 45 min
Uptime = 98%	Uptime = 83%	Uptime = 94 %	Uptime = 80%	Uptime = 42%	Uptime = 81%

- Value Stream Mapping

Example:

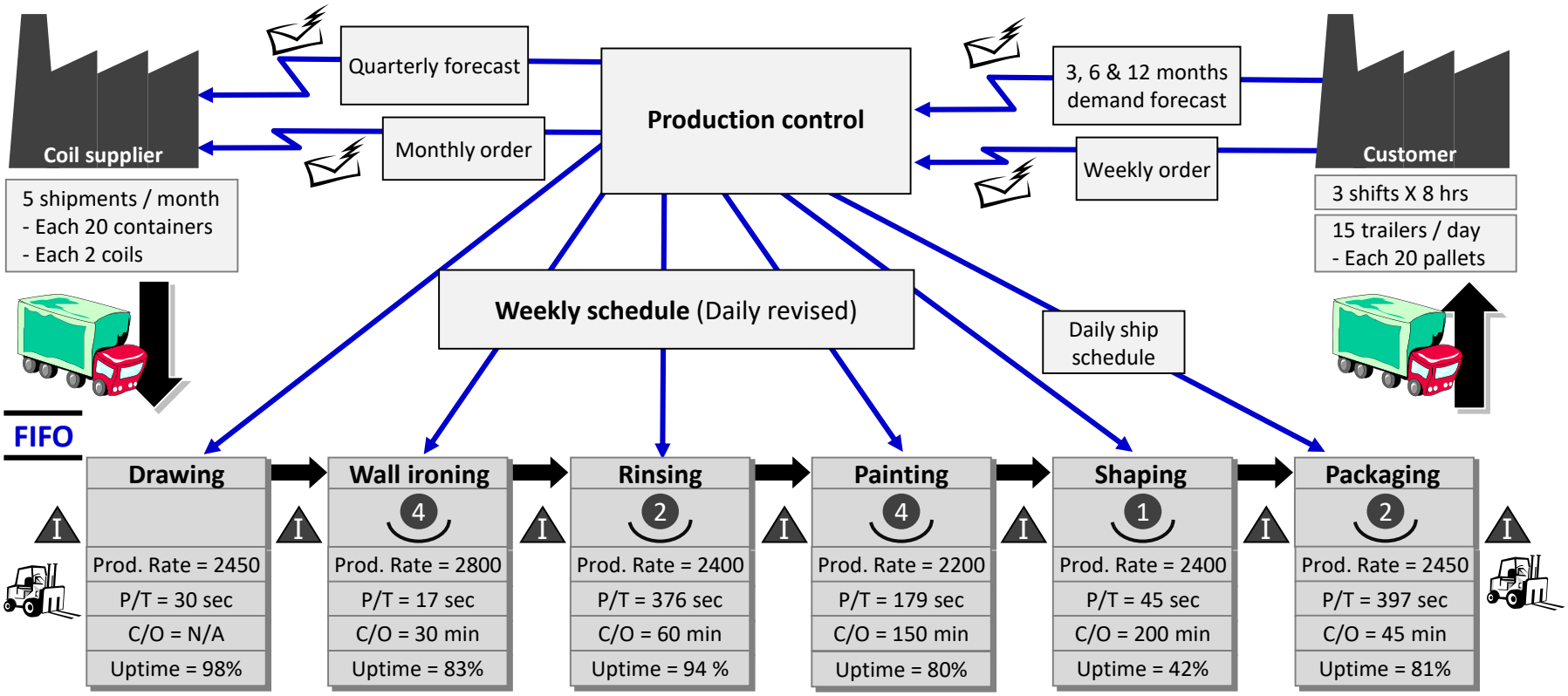
Add suppliers



- Value Stream Mapping

Example:

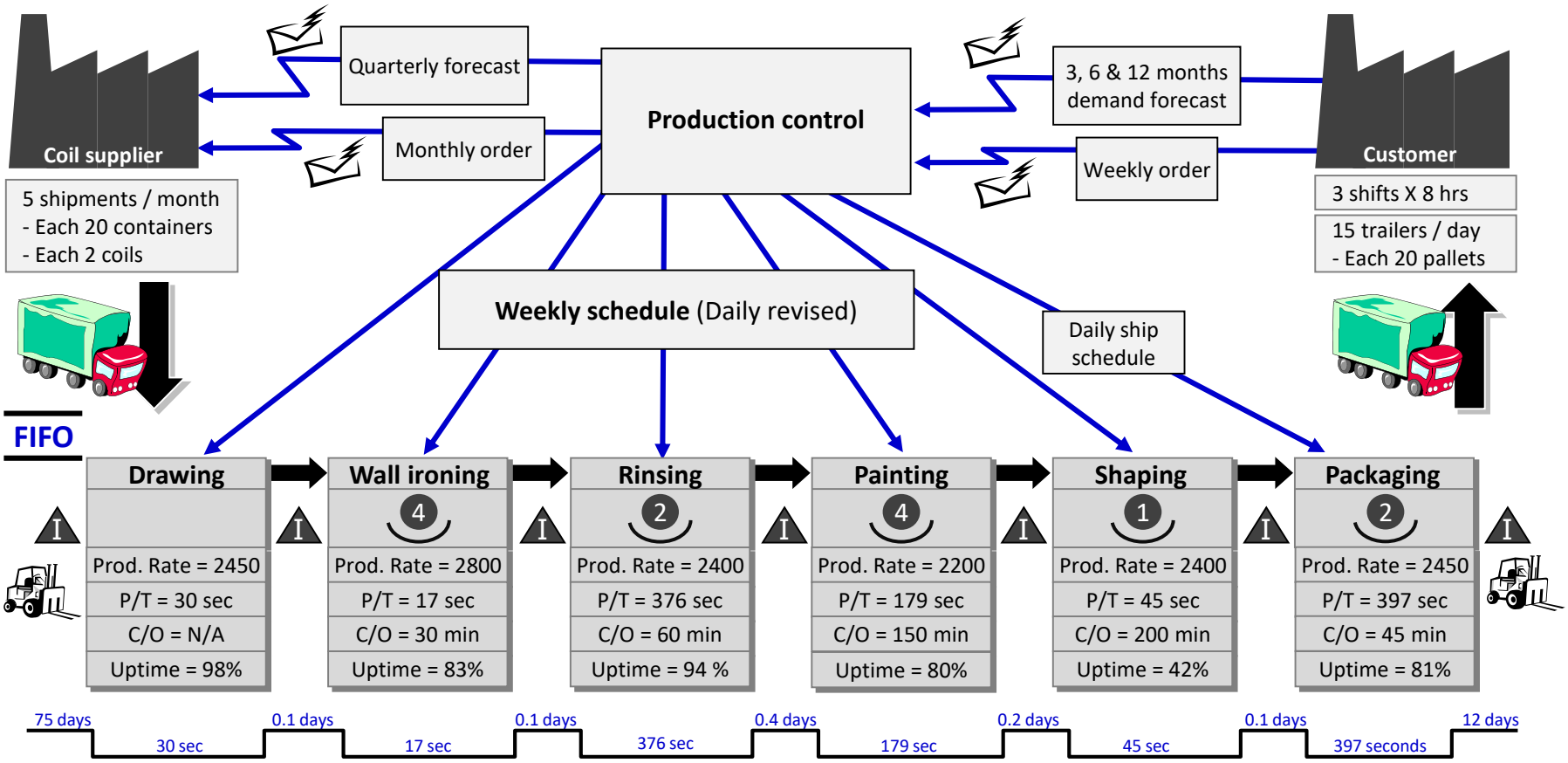
Add information flow



- Value Stream Mapping

Example:

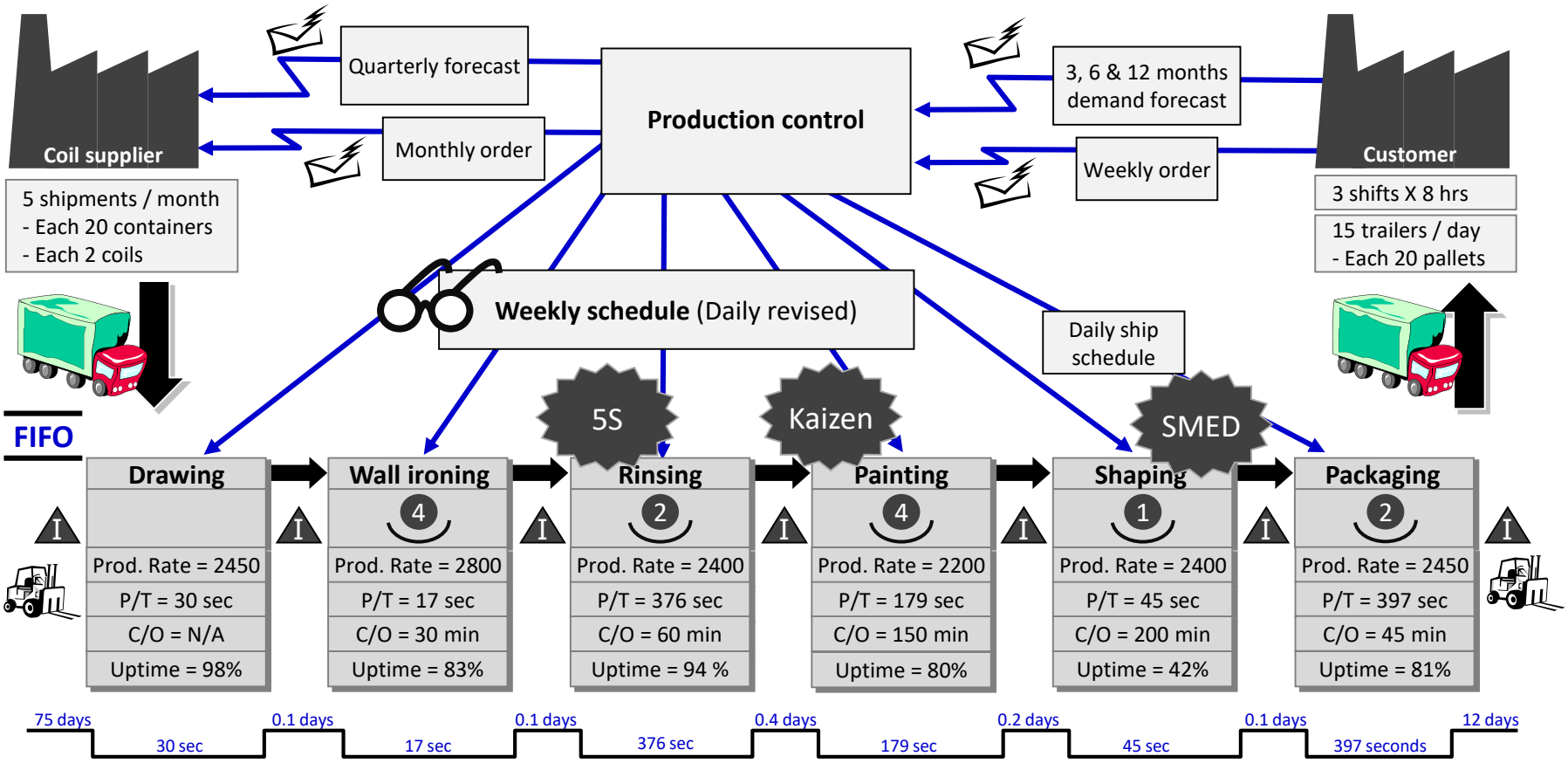
Add timeline and VSM calculations



- Value Stream Mapping

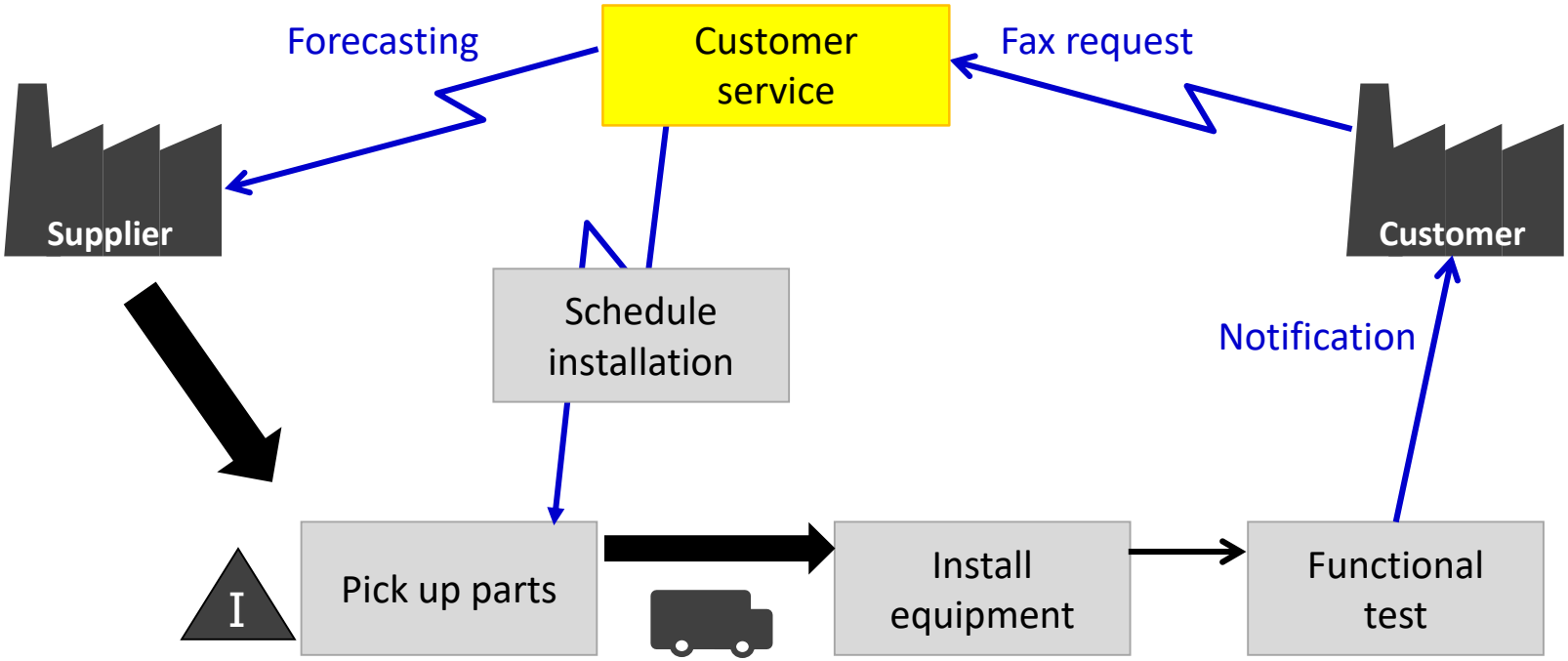
Example:

Identify issues and opportunities



- Value Stream Mapping

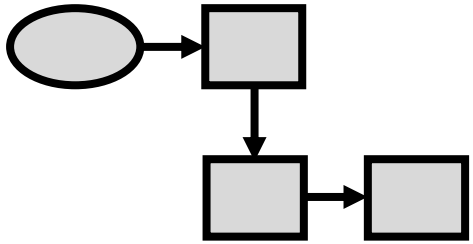
Non-Manufacturing Example – Equipment Installation:



- Value Stream Mapping

Further Information:

- It is important to define what is meant by the future before beginning to develop the future state.
- VSM tends to display more information than a typical process map.
  - A process map just shows the process as it is.
  - A value stream map highlights the flow of value and suggests improvements.
- Make sure that customer's data is directly taken from the customer or from the person who receives customer orders.



- Value Stream Mapping

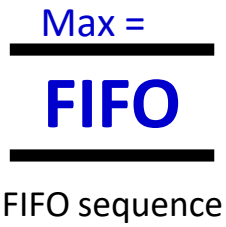
Further Information:

- It is sometime known as **material & information flow mapping**.
- A current state map without a future-state vision is waste.
- A future state map without an action plan to achieve it is waste.
- When the future state becomes a reality, it becomes the new current state.
- It is often useful to draw a series of future state maps starting with a blue sky vision and working backwards towards what is achievable in the shorter term.

- Value Stream Mapping

Further Information:

- This icon is used to show where parts are transferred to the next process in sequence on a FIFO basis.



FIFO sequence

- Further useful VSM icons:

Report

Work cell

Material withdrawal Kanban

Production Kanban