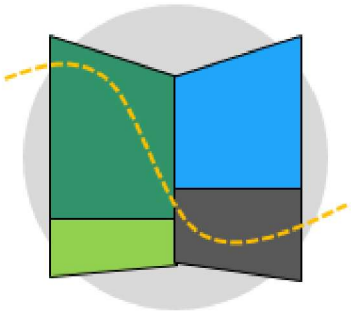
Value Stream Mapping

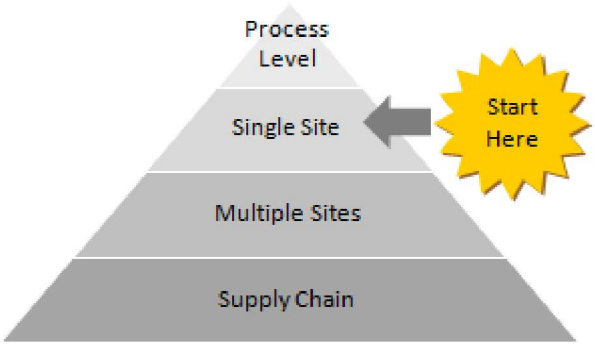


A **Value Stream Map** (VSM) is a visual representation that helps to understand the flow of value in a business process as perceived by the customer. Its primary goal is to identify and eliminate waste (Muda) and make the process as close to lean as possible. It is considered as an improvement tool rather than just a definition of how the process operates or should operate. Although it is often associated with manufacturing, it can also be applied in product development and service related industries such as: healthcare, hospitality and logistics.

A value stream map is looked at as a strategic tool, a change management tool and a communication tool. It is a collection of value and non-value added processes that produce a good,

a service or a combination of both. It helps identify opportunities for reducing waste and improving quality by making the non-value added activities more easy to identify. It can effectively communicate where to focus the continuous improvement efforts to deliver more value.

VSM is preferred over other process mapping techniques:

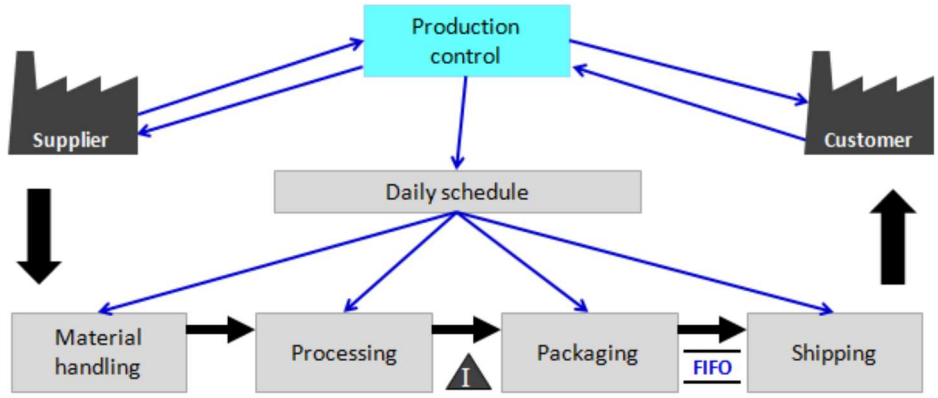


- When you want to find out the Lean opportunities that exist in your core processes.
- When you want improve an end-to-end process in a single site.
- When you want to know the various inventories and delays exist in your processes.
- When you want to know the various business systems used by your processes.
- 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 the process is complex and moves across different geographical regions.
- When you want to present the health of your processes to the top management.

Drawing out the map gives the opportunity to view, understand and communicate what happens today in order to discuss the needed improvements. It enables the team to see the big picture from beginning to end and see where problems lie within their processes. It enables them to identify non-value added activities, delays, rework, bottlenecks, excessive inventories and other forms of waste. This will help

to establish a future state vision and develop a plan for improvement. For example, they may see an opportunity for maximizing the production rate to match the rate of customer demand.

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. The product here may indicate any part, service or the combination of the two. The value stream in a typical manufacturing process spans from the event the materials are received from suppliers until the finished products are delivered to the customer.



Typical Value Stream Map for Manufacturing

Material and Information Flows:

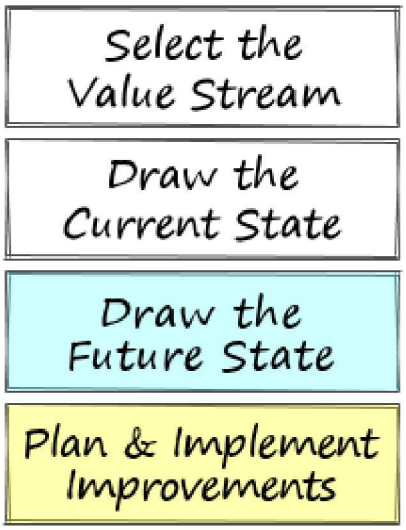
A value stream map analyzes both material and information flows. The **material flow** is where products flow through the stream, and includes: processing, handling, transport and storage. It can be separated into different branches that rejoin again later. For simplicity, you don't need to map the flow of every part or product but the production of a single product or product family. Focus on long lead time and high volume products. 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.

What makes the value stream map unique is the representation of **information flow** along with the material flow. This is critical to the effective and timely execution of any process. Information flow may include orders, instructions, schedules, approvals, reports, replenishment cards, verbal discussions, and whatever necessary to support the process. 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.

Current and Future States:



A **current state map** develops an understanding of how the value stream operates today and helps identify the waste elements of the existing system. Once it is mapped, and after studying the flow of materials and information and identifying the waste, it is time to create a future state map of how the process should operate.

A **future state map** is the blueprint that you want to achieve toward a more lean business system. Thus, it should be based on Lean principles such as flow, pull and perfection to create a more streamlined production flow.

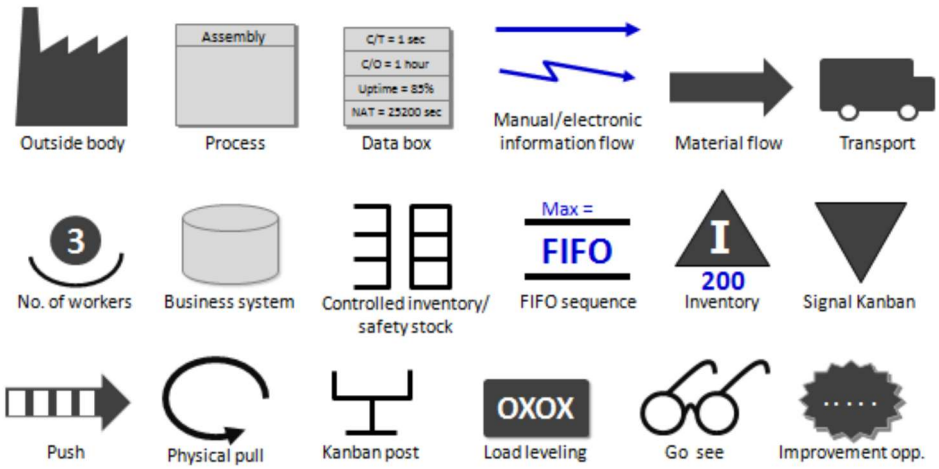
Here are some guidelines and ideas to consider while developing of the future state map:

- 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.
- 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.
- Develop continuous flow wherever possible (from batch production to a single piece flow).
- Use pull and kanban systems and where continuous flow is not possible (to make flow possible).
- Produce to Takt time.
- Send customer schedule to only one production process (the pacemaker process).
- Distribute the production of different products evenly (level the production mix).

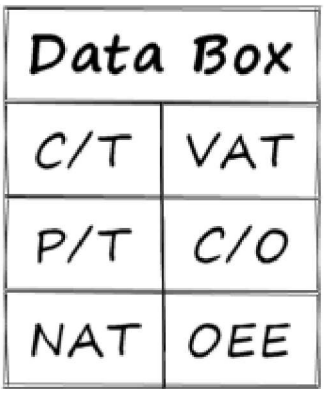
An **implementation plan** should then be developed to get to the future state taking into consideration the gaps between where are and where we want to be. A timetable should be put together with milestones, review periods and responsibilities. Remember that this is a project that needs to be owned,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

VSM Symbols:

A value steam map uses a standard set of symbols to denote the various details. It can also be full of friendly symbols and icons which makes it simpler to develop and understand.



A **process box** is used to indicate the process name and covers one area of continuous flow where products flow without being stored, queued or delayed (or without significant waiting time between steps).



Data boxes are used to carry all data related to a specific process box. Data boxes can also be used to display data and performance information related to inventory, transportation and important suppliers and customers (see below).

Supplier data box
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

Process data box

Cycle time (CT)
Changeover time (C/O)
Value-added time (VAT)
Net available working time (NAT)
Production rate (i.e. units/day)
Scrap rate / % defects
Machine uptime %
Processing time
Maximum capacity
Product flow (push or pull)
Overall equipment effectiveness
Number of operators
Number of product variations
Setup time
Batch size
Rework rate

Customer data box

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

Transportation data box

Lot size
Transportation time
Number of product types
Distance traveled
Transportation frequency

Inventory data box

Amount of inventory
Queue or delay time
Number of product types
Inventory type

How to Conduct a Value Stream Mapping Exercise:

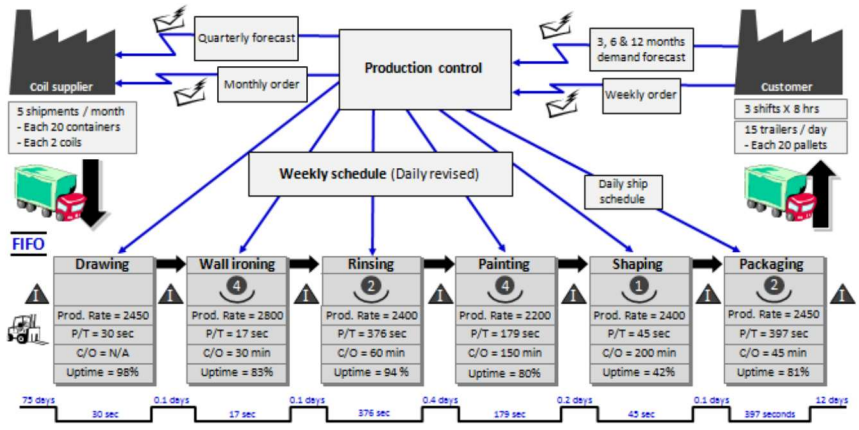
Value stream maps are conducted through the following steps:

- Establish the team and include people working in the process, process owners and planners.
- With your team, identify the product and the value stream that needs to be mapped.
- Physically walk the flow starting from the customer then work upstream through the process.
- Capture all relevant data and performance information as you walk (e.g. cycle times, schedule requirements, delays and inventory between processes, etc.). Always record what you see not what you are told is normally there.
- Walk the information flow as well and collect examples of relevant documentation and records.
- Talk to the people there and listen to their ideas and issues.
- Draw the map on a large piece of paper using the standard set of symbols. Map what actually happens as opposed to what should happen.
- Start with the material flow including processes, inventory, delays and transportation. Group process steps where they are linked together.
- Map the information flow and the secondary processes (e.g. rework loops).
- Complete the data boxes then add the VSM timeline and any other information you feel is relevant to the map.
- Identify the non-value added activities, delays, rework, bottlenecks, excessive inventories and other form of waste.

- Brainstorm how to eliminate waste and improve the process. 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 through immediate improvements without significant investments?
- Visualize the ideal state and develop a future state map for where you want to be.
- Plan and implement actions to achieve the future state.

Example:

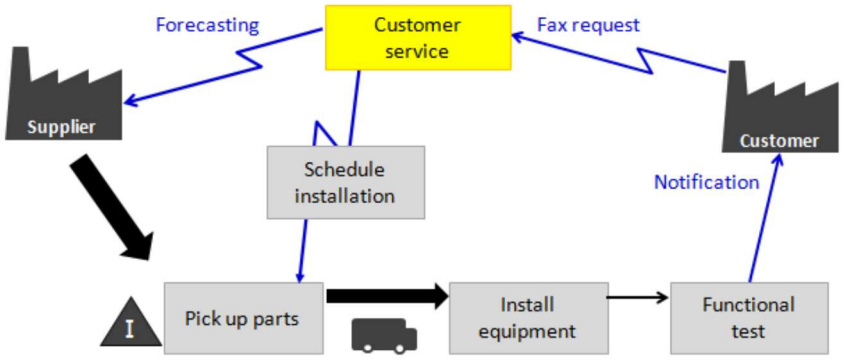
The following is an example of a value stream map that was created for a specific product in a product line. Note the timeline that is placed at the bottom of the map which reflects the value added and the non-value added activities of the core process.



Click to enlarge

Example:

This is an example of a value stream map for a non-manufacturing process (equipment installation).



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.
- Transportation should be considered both in terms of how the raw materials are brought in and how the finished goods are sent out. Transportation can be of three types: external (e.g. trucking), internal (e.g. forklifts), and conveying techniques between processes.