



Introduction to value stream mapping

Value stream mapping (VSM) is a visualization tool among lean techniques, which are based on the Toyota Production system, used to document, analyze, and improve the flow of information and materials required to produce a product or service for a customer. It is a process for measuring, understanding, and improving the flow and interactions of all the associated tasks to keep the cost, service, and quality of a company's products or services as competitive as possible. VSM is an end-to-end system taking into account all processes involved in producing a product or service as well as the management and information systems that support those processes. By analyzing the value stream map, we can identify continued opportunities to enhance value, eliminate waste, and improve flow.

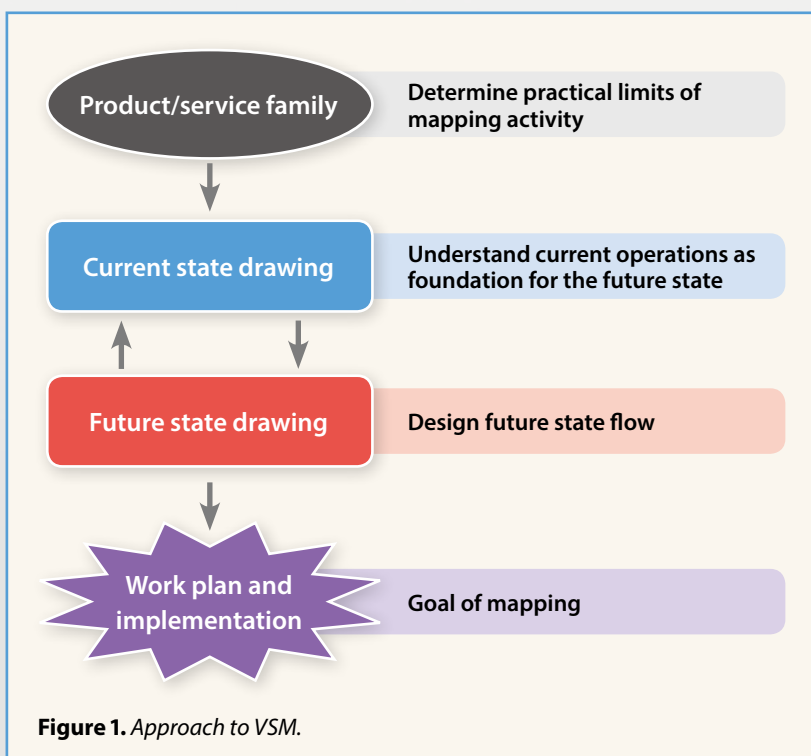


Figure 1. Approach to VSM.

Approach to VSM

To construct a value stream map, the boundary must first be determined by selecting a product or service family (Figure 1), i.e., a group of products/services sharing similar process steps that are not necessarily identical (Table 1). This isolates different families to distinguish the needs of the customer and the purposes of the transactions for each family and is vital to show current steps, delays, and information flows required to deliver the product or service. The current-state map forms the foundation to identify the nonvalue-added activities and then to improve the flow and shorten the end-to-end lead time.

Through analysis of the current-state map, we can identify opportunities for improvement by applying lean techniques like the kanban/pull system, single-minute exchange of die, continuous flow, heijunka (production leveling), pokayoke (mistake proofing), etc. to remove waste and improve



the process flow to derive the future-state map. Some future-state questions to be asked include:

- What does the customer really need?
- How often will performance be checked?
- Which steps create value and which generate waste?
- How can the work flow with fewer interruptions?
- How will work be controlled between interruptions?
- How will the workload and/or activities be balanced?
- What process improvements will be necessary to achieve the future state?

From the future-state map, the work plan is broken into loops prioritized for kaizen improvement, minimizing the use of resources. The following common-sense approach is recommended:

- Eliminate nonvalue-added tasks that do not require new IT efforts.
- Simplify the remaining steps requiring minimal IT support (e.g., minimize transactions entering the value stream).
- Change the flow of transactions or paperwork

Table 1. Identifying a product/service family.

"A group of products and/or services that share similar processing steps: they do not have to be identical to each other."				
Product	Processing Steps			
	Estimate/quote	Design/configure	Enter order	Generate job packet
Model A			●	●
Model B			●	●
Model C	●	●	●	●
Model D	●	●	●	●

to "process one, move one" (e.g., improve layout, cross-training, cell implementation).

- Implement solutions requiring significant IT support.

Constructing a value stream map

A cross-functional team is required to construct a value stream map and ensure that every detail of the flow and management of activities in creating the product or service family is covered. Various software packages can help in constructing a value stream map. However, when drawing up a

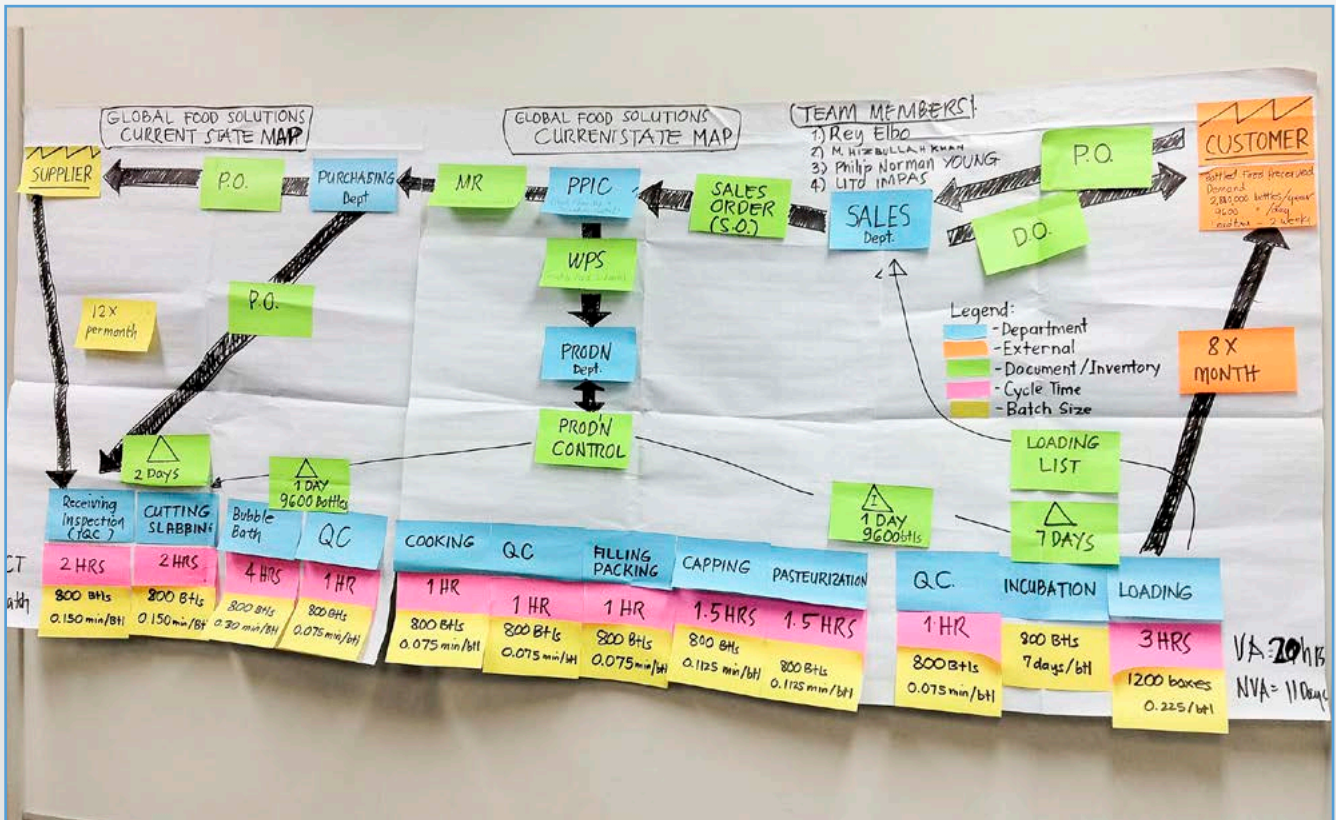


Figure 2. Value stream mapping in progress.



value stream map by a cross-functional team, flipcharts and sticky notes work equally well (Figure 2). For documentation purposes, the map can then be reconstructed using VSM software.

Six steps are involved in creating a current-state value stream map:

- Document customer information and need, i.e., identify the key group of customer demands for the selected product or service family. The lead time to deliver the product or service must also be determined.
- Identify main processes in order, not by the department or functions in the company. This should be detailed in a forward-flow manner.
- Select process metrics. This reflects the cost, service, and quality within the value stream. Some examples of process metrics include process times, changeover times, batch size, inventory, number of people, etc.
- Perform a value stream walk-through and fill in data boxes, including inventory and resident technology to show how work is created, progresses, and is organized. This is done with the cross-functional team observing each of the main process steps identified in step 2 and collecting the agreed-upon data in each step.
- Establish how each process prioritizes work, including instructions, scheduling logic, or prioritization, for example, by due date, order size, customer, etc.
- Calculate system summary metrics, such as lead time versus process time, first-pass yield, cost, and/or other value stream summary measures. This requires assessing the value stream performance from a systems perspective.

Below are some tips for constructing a value stream map:

- Identify the basic process boxes before performing the actual walk-through.
- Identify the metrics that the team will collect for each process box.
- Add other information (via visual icons or metrics) as the process is observed in motion.
- Guard against making the map too unwieldy; start simply and add boxes as necessary.
- Estimate the performance of the current state first to get a quick picture of the existing value stream.
- Walk the value stream to gather performance data associated with creating value.
- Ask questions regarding activities and issues to understand potential barriers in designing future states.
- Map the whole value stream as a team.

- Assign team members specific tasks to perform in the mapping process.
- Always draw by hand and in pencil.

In addition, specific sets of process, material, information, and general symbols are used to construct a value stream map (an example of these symbols can be found at: <http://www.lean.org/Bookstore/ProductDetails.cfm?SelectedProductId=9>).

Application of VSM

VSM is typically used in conjunction with the plan-do-check-act (PDCA) cycle for continuous improvement. Constructing current- and future-state maps helps define the work plans and target metrics in the planning stage. Value stream maps also help communicate plans to all stakeholders when lean champions are selected to implement the changes identified. With the target performance metrics determined in the future-state map, we can then reflect upon the actions undertaken, and the cycle is repeated.

A key point in the application of VSM is that it is simply a visualization tool to help communicate plans of action and create consensus and prioritization of lean implementation in operations. It should not be done as a one-off exercise for planning without action on the lean improvement opportunities identified. Every improvement step taken is a move to improve productivity. By repeating the PDCA cycle, enterprises will be well on the way to staying competitive through lean applications. 🌀



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