What is Value Stream Mapping?

A value stream is all actions (both value added and non-value added) currently required to bring a product through the main flows essential to every product:

1. The production flow from raw material to the customer
2. The design flow from concept to launch

What follows focuses on the production flow from customer demand back through to raw material which is the flow usually related to lean manufacturing.
Value stream mapping is a pencil and paper tool that helps visualise and understand the flow of material and information as a product makes its way through the value stream. A map is created by following a product's production path from customer to supplier and carefully drawing a visual representation of every process in the material and information flow. Then by asking a set of key questions draw a “future state” map of how value should flow.

Why Value Stream Mapping is an Essential Tool

- It helps visualise more than just a single-process level.
- It helps you see more than waste. It helps you see the sources of waste in the value stream.
- It provides a common language for talking about the manufacturing process.
Why Value Stream Mapping is an Essential Tool

• It makes decisions about the flow apparent.
• It ties together lean concepts and techniques, which helps avoid cherry picking.
• It forms the basis of an implementation plan - by designing the whole door-to-door flow it becomes a blueprint for lean implementation.

Why Value Stream Mapping is an Essential Tool

• It shows the linkage between the information flow and material flow.
• Value stream mapping is a qualitative tool by which you describe in detail how the facility should operate in order to create flow. Numbers are good for creating a sense of urgency or as before or after measures. Value stream mapping is good for describing that you are actually doing to affect those numbers.

Material and Information Flow

• The movement of material through a factory usually comes to mind but there is another flow - of information - that tells each process what to make or what to do next.
• The essential question is: How can we make information flow so that one process will make only what the next process needs when it needs it?
Selecting a Product Family

- The first step in value stream mapping is to focus on one product family. Value stream mapping means walking and drawing process steps (material and information) for one product family from door to door.
- A family is a group of products that pass through similar processing steps and over common equipment.
Selecting a Product Family

The Value Stream Manager

- To avoid isolated islands of functionality one person should lead responsibility for understanding a product's value stream and improving it.
- Mapping and future state implementation needs to be led by someone who can see across the boundaries over which a product's value stream flows and make change happen there.
- The value stream manager should report directly to senior management.
Two Kinds of Kaizen

• Both flow kaizen (value stream improvement) and process-level kaizen (elimination of waste at the shop floor team level) are necessary - improvement in one improves the other.
• Flow kaizen focuses on material and information flow (which requires a high vantage point to see) and process kaizen focuses on people and process flow.

Using the Mapping Tool
Initial Value Stream Mapping Steps

Using The Mapping Tool

- The first step is drawing the current state map which is done by gathering information from the shop floor.
- Future state ideas will come from mapping the current state. Likewise drawing the future state will often point out important current-state information which has been overlooked.

Using The Mapping Tool

- The final step is to prepare and begin actively using an implementation plan that describes on one page how to plan to achieve the future state.
- Then as the future state becomes reality, a new future state map should be drawn.
- That’s continuous improvement at the value stream.
THE CURRENT STATE MAP

Drawing the Current State Map

Initial Value Stream Mapping Steps

- Developing the future state begins with an analysis of the current production situation. Mapping begins at the level of door-to-door-flow where you draw process categories like assembly or welding instead of recording each process step.
- Once you see the overall flow through the plant, you can change the level of magnification: zooming in to a map every individual step within a process category, or zooming out to encompass the value stream external to the plant.
Levels of Mapping the Value Stream for a Product Family

- **Process Level**
- **Single Plant** (door to door)
- **Multiple Plants**
- Across Companies

**Drawing the Current-State Map**

- As noted in Lean Thinking, the critical place to begin any improvement effort is a clear specification of the value of the product as perceived by the customer.
- Otherwise you can run the risk of improving a value stream which efficiently provides the end customer with something other than what's really wanted. Thus mapping begins with customer requirements.

**Drawing the Current-State Map**

- Material Flow is drawn from left to right on the bottom half of the map in order of processing steps; not according to the physical layout of the plant.
- Value stream mapping uses seconds for cycle times, takt times and available working times.
A Few Mapping Tips

• Always collect current-state information walking along the actual pathways of material and information flows.
• Begin with a quick walk along the entire door-to-door value stream
• Begin at the shipping end and work upstream

A Few Mapping Tips

• Begin your stopwatch and do not rely on standard times or information that you do not obtain personally
• Map the whole value stream yourself
• Always draw by hand in pencil

Typical Process Data

• C/T (cycle time)
• C/O (changeover time)
• uptime (on demand machine uptime)
• EPE (every product every production batch sizes)
• number of operators
Typical Process Data

- Number of product variations
- Pack size
- Working time (minus breaks)
- Scrap rate

Some Lean Measurements

Cycle Time (C/T)

How often a part or product is actually completed by a process as timed by observation. Also, the time it takes an operator to go through all of their work elements before repeating them.

Some Lean Measurements

Value Added Time (VA)

Time of those work elements that actually transform the product in a way the customer is willing to pay for.
Some Lean Measurements

Lead Time (L/T)
The time it takes one piece to move all the way through the process or a value stream from start to finish. Envision timing a marked part as it moves from beginning to end.

usually

$VA < C/T < L/T$

VALUE STREAM MAPPING

ICONS
**Material Icons**

**Manufacturing Process**

Assembly

One process box equals an area of flow. All processes should be labelled. Also used for departments such as production control.

**Outside Sources**

XYZ Corporation

Used to show customers, suppliers and outside manufacturing processes.
Data Box

- C/T = 45 sec
- C/O = 30 min
- Uptime = 80%
- 3 shifts
- 2% scrap

Used to record information concerning a manufacturing process, department, customer etc

Inventory

- I
- 300 pieces
- 1 day

Count and time should be noted

Truck Shipment

- Mon + Wed

Note frequency of shipments
Movement of Production Material by PUSH

Material that is produced and moved forward before the next process needs it; usually based on schedule

Movement of Finished Goods to Customer

Supermarket

A controlled inventory of parts that is used to schedule production at an upstream process
Withdrawal

Pull of materials, usually from a supermarket

Transfer of controlled quantities of material between processes in “First-In-First-Out” Sequence

Indicates a device to limit quantity and ensure FIFO flow of material between processes. Maximum quantity should be noted

Max 20 pieces

Information Icons
Manual Information Flow

For example: production schedule or shipping schedule

Electronic Information Flow

For example via electronic data interchange

Information

Weekly Schedule

Describes an information flow
Withdrawal Kanban

Card or device that instructs the material handler to get transfer parts (i.e., from a supermarket to the consuming process).

Signal Kanban

The "one per batch" kanban. Signals when a reorder point is reached and another batch needs to be produced. Used where supplying process must produce in batches because changeovers required.

Sequenced Pull Ball

Gives instruction to immediately produce a predetermined type and quantity, typically one unit. A pull system for subassembly processes without using a supermarket.
Kanban Post

Place where kanban are collected and held for convenience

Kanban Arriving in Batches

Load Levelling

Tool to intercept batches of kanban and level the volume and mix of them over a period of time
"Go See" Production Scheduling

Adjusting schedules based on checking inventory levels.

General Icons

Kaizen Lightening Burst

Highlights improvement needs at specific processes that are critical to achieving the value stream. Can be used to plan kaizen workshops.
Buffer or Safety Stock

"Buffer" or "Safety Stock" must be noted

Operator

Represents a person viewed from above

THE CURRENT STATE MAP

EXAMPLE
ACME Stamping
First View of the Current State Map Showing the Customer

Second View of the Current State Map with all the Processes, Data Boxes and Inventory Triangles

Third View of the Current State Map showing the Material Flow