

For Further Reading:

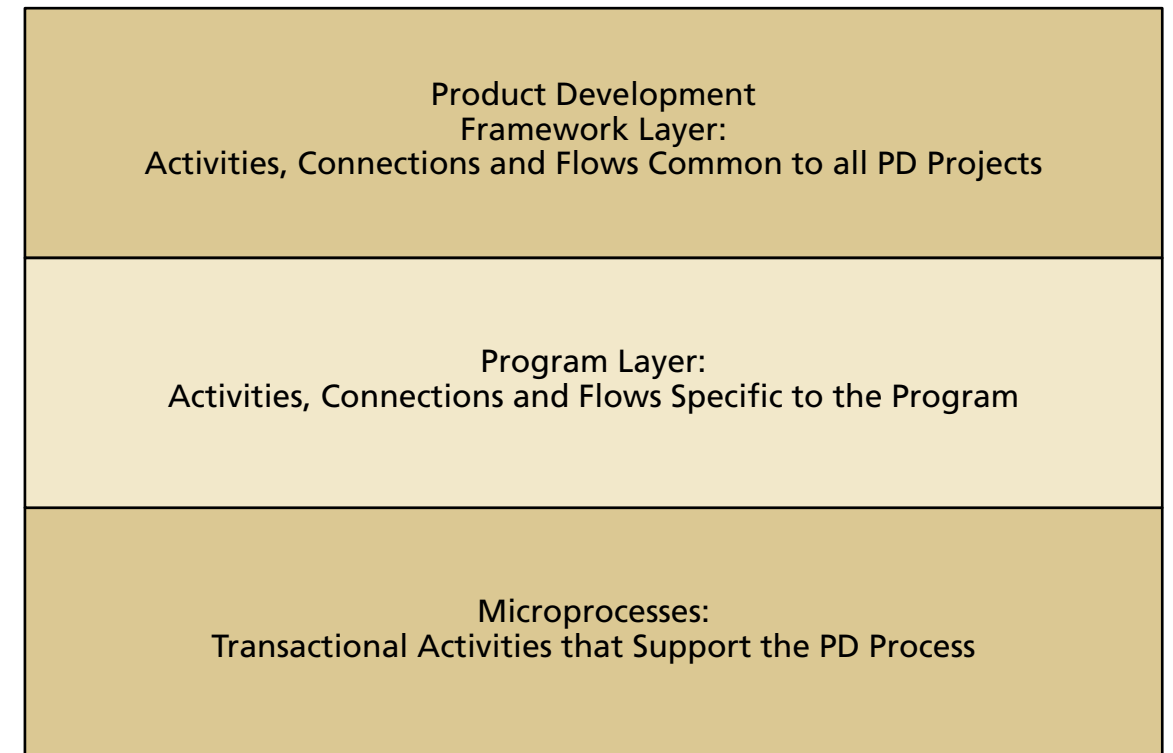
Flinchbaugh, Jamie and Andy Carlino. *The Hitchiker's Guide to Lean: Lessons from the Road*. New York: Society of Manufacturing Engineers, 2006.

Ward, Allen C. *Lean Product and Process Development*. Cambridge, MA: Lean Enterprise Institute, 2007.

Effective Value Stream Mapping in PD

When and Where Value Stream Maps Can Rapidly Improve PD Performance


By Katherine Radeka



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Key Takeaways



- Value Stream Mapping (VSM) is a tool for understanding your current process so that you can find ways to improve it.
- VSM works well at the Product Development Framework level, and at the Microprocess level, but not at the product development program level.
- VSM is best used after other methods of improving PD have eliminated the obvious wastes with much less effort.

What is Value Stream Mapping?

Value Stream Mapping (VSM) is a tool developed in lean manufacturing for documenting a manufacturing process or an operational value stream. It is basically a process mapping methodology to identify activities, connections and flows with a special set of symbols to highlight the flow of value from raw materials through the manufacturing process to a finished product. VSM has been adapted for use in a wide variety of situations: health care to construction to accounting. In product development, it is a tool that has often been misused. However, there are some circumstances, like engineering support functions or current product engineering, where the tool can be exceptionally valuable.

Where to Use VSM in Product Development

We have enough history with lean product development now to identify the places where VSM can identify dramatic improvement opportunities, and the areas where other tools are more appropriate.

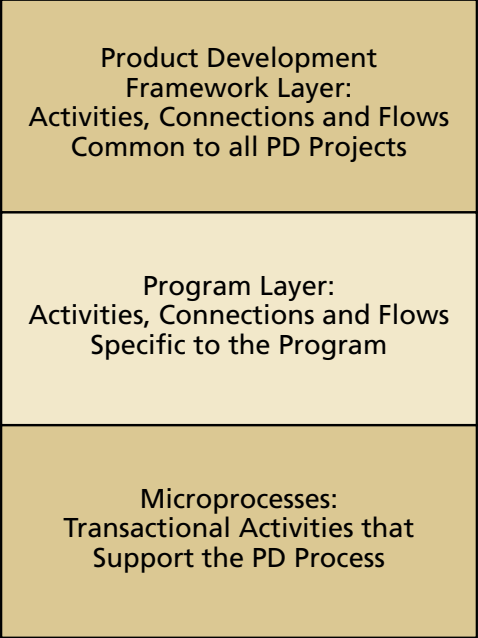
The one thing people want to VSM the most is the one place where they should not do it. One common recommendation is to follow a part design through the system. If every part were the same, this would be a terrific technique. But this idea leads to a VSM that is too detailed and specific to identify improvements that will generate enough value to justify the effort it takes to create one. Every improvement idea is vulnerable to the criticism that "your map doesn't apply to me."

VSM assumes that the activities, connections and flows for the process being mapped are repeated in essentially the same way every time. However, each product development program will need to create its own flow in order to overcome the challenges specific to the product under development. Innovation is too unpredictable. Every part is simply not the same.

Although each product is unique, there are patterns: handoffs that need to occur every time, business decisions that must be made at specific points in the development process. It is valuable to capture these activities, connections and flows in a common PD Framework, sometimes called the Product Development Lifecycle.

A VSM conducted at this level, with representatives from a representative set of program teams and their partners, can identify the areas where unnecessary waste has accumulated, necessary waste (such as status reporting) can be reduced and problems with handoffs occur over and over. This type of VSM has the potential to dramatically improve time-to-market by improving cross-functional communication and lowering program management overhead. Since the map only shows the level of detail that is shared by all programs, all products will benefit from the improvements.

There are also activities in product development that are transactional in nature. These "microprocesses" have relatively short cycle times (a few weeks or less) and they follow standard procedures that are not highly dependent upon the design content. Some examples include checking product information into or out of repositories, procuring prototype parts, vetting suppliers, getting



regulatory approval and conducting acceptance tests. These are ripe areas for VSM because they are often on the critical path for product release and they are executed many times in one program, so that any improvements to cycle time will directly impact time-to-market. Since the microprocesses are leveraged across all products, the benefit accrues rapidly.

When to Use VSM in Product Development

Even if VSM is confined to the areas of PD where it will work well, VSM may not be the best tool to get immediate dramatic improvements in product development performance. It is resource-intensive, it is not part of the standard development flow, and the results are often incomprehensible to anyone who was not part of the original mapping team. It is best used after a team has already identified and resolved a lot of the "low hanging fruit" that is visible to everyone without drawing a map. *Lean Product and Process Development* by Allen C. Ward describes lean product development-based countermeasures for the pervasive sources of waste in product development, including some sources that a VSM does not capture.

For example, if the number of ECOs is unacceptably high, the root cause is often a lack of early manufacturing involvement. A VSM may make that visible. But the time spent to create the VSM would be better spent doing root cause analysis on a sample of ECOs. That will create a more convincing case to justify the cost of putting a manufacturing engineer into product development as early as the feasibility phase, and the investment of time to create a means to capture manufacturability information as engineering checklists. One also doesn't need a VSM to see that specifications changes in late development create delays and unnecessary rework cycles or that inadequate systems to capture product knowledge leads to reinvention.

The second reason to delay implementing VSM is that a lean product development framework often looks very different than the current state framework. Teams will spend more time creating and sharing knowledge in early development to save time during late development. A lot of the mechanisms that frameworks put in place to prevent problems may simply become unnecessary once the team has sufficient time to fully understand the technology before committing to a design.

When do I use VSM as a tool with my own clients? I use it frequently to lower the cost of current product engineering so that the resources can be reallocated to new product development. I also use it to reduce the impact of "necessary wastes" such as data transfers and supplier qualification so that the team can spend more time on innovation.

If the team lacks a standard product development lifecycle for decision-making and management oversight, a framework-level VSM can help create one that flows smoothly and supports the team through the transition towards knowledge-based decision-making. Similarly, if the standard product development process has become overburdened with redundant reports and bureaucratic decision-making, a framework-level VSM can help refocus the organization's effort on value creation.

Is My Organization Ready For Value Stream Mapping?

Even in Manufacturing, teams will often apply other tools, such as 5S to a manufacturing process before they attempt to create a value stream map. In product development, it is even more important to ensure that the team is ready. Here are some questions to ask yourself to decide whether or not VSM is appropriate for this phase of your organization's lean journey:

- Have we already identified and addressed the sources of waste in product development that are common across organizations, such as scatter, late manufacturing involvement, late customer feedback, insufficient knowledge transfer across programs and unproductive meetings, if they apply to us?
- Is the lean product development transformation likely to dramatically change the product development framework as teams spend more time on knowledge creation and knowledge capture and less time on detailed design? Will doing a framework-level VSM at this time support or inhibit this change?
- What is the current state of our product development framework? What does it contain (common milestones, document templates, checklists, etc.)? How effectively do the product development teams use it today? Is it seen as a mandate, a set of guidelines or something in between? What are you prepared to do to ensure that the improvements identified by the framework-level VSM propagate to all of the product teams?
- Have we identified a specific purpose for this VSM session: streamline decision-making, improve handoffs, eliminate procurement-related delays, etc.?
- Is the microprocess to be mapped on the critical path for product development? If not, then what are the benefits of streamlining it?