Module 1 - DevOps Fundamentals and CI/CD Overview

Demo 2

Value Stream Mapping exercise to identify waste in the software delivery pipeline

Value Stream Mapping

Value Stream Mapping (VSM) is a lean manufacturing method of analyzing, designing, and controlling the material and information flows within an organization to create value for customers. It can also be referred to as material and information-flow mapping.

It applies a system of generic symbols to represent different work streams and information flow. In terms of the customer, products within the process are traced as either value-adding or not non-value-adding. The prime objective is to spot and remove non-value-adding activity (waste) to enhance efficiency.

Value stream mapping can enhance any process with repetitive steps, particularly when there are several handoffs. In manufacturing, handoffs are simpler to visualize since they typically involve the handoff of a physical deliverable across stations. If, say, there is an issue when the vehicle is assembled, line employees can observe the physical components stacking up and filling up a given section of the assembly line. They can thereafter halt the line to fix the issue and set the process rolling again.

Value stream mapping, also called "visualizing" or "mapping," is a process that isn't confined to the assembly line. Lean value stream mapping has become popular in knowledge work because it improves team communication and collaboration.

Most of the waste in knowledge work happens during handoffs (or wait time) between members rather than within steps. Ineffective handoffs create low productivity and poor quality. Value stream mapping identifies waste and simplifies the production process. It can be applied to the product and customer delivery flows. Product flow deals with the steps necessary to optimize product delivery and completion. Customer flow is centered on the processes involved in fulfilling end-user expectations and requests.

History of Value Stream Mapping

- Value stream mapping is often linked to Toyota Motor Corporation, though its exact origins are somewhat unclear.
- It's possible that Toyota developed the practice independently or drew inspiration from earlier sources within the lean manufacturing movement.
- In fact, early diagrams illustrating the flow of materials and information date back to 1918, when they were found in Charles E. Knoeppel's book Installing Efficiency Methods.
- At Toyota, it was referred to as "material and information flow mapping" and was first regarded as a secondary activity.
- Nevertheless, Toyota's success with lean production helped to raise value stream mapping to a best practice for improving business efficiency, especially in the 1990s.

Types of Waste in Software Delivery

Software delivery waste is the activity that uses resources but doesn't bring value to the customer. The following types of waste are the usual wastes, as defined by lean principles and redefined for software:

Partially Completed Work - Incomplete work has not yet been handed over to the customer.

Extra Features - Building features that customers don't need or use.

Relearning - Learning over again because documentation is inadequate, or knowledge transfer does not occur.

Handoffs - Work handover from one team to another, which leads to delay and confusion.

Delays - Downtime when work awaits the next process.

Task Switching - Multitasking that reduces focus and efficiency.

Defects - Errors or bugs that need rework.

Additionally, lean concepts like **Muri** (overburden, e.g., overloading developers with tasks) and **Mura** (unevenness, e.g., inconsistent workloads) can also contribute to inefficiencies.

Advantages of Using Value Stream Mapping (VSM) in Software Delivery

Waste Reduction - Eliminates non-value adding tasks, lessening costs and delays.

Improved Flow – Streamlines processes for quicker, more reliable delivery.

Customer Focus - Focuses on activities that provide value to the customer.

Team Collaboration - Improves cross-functional team communication and alignment.

Continuous Improvement - Provides a framework for ongoing process optimization.

Steps to Create a Value Stream Map

Creating a VSM for a software delivery pipeline involves the following steps, synthesized from industry resources:

1. **Identify the Product or Service** - Choose a particular software product or feature to model (e.g., a new user authentication capability). Establish the beginning (e.g., customer request) and end (e.g., feature rollout) of the value stream.
2. **Map the Current State** - Carefully detail each of the steps in the existing process, including all the primary activities like coding, testing, and deployment. Include information on how workflows from one team to another, for instance, when developers hand over work to the QA team, and any wait times involved, such as waiting for code review. Document the tools and resources utilized throughout the workflow, such as platforms like CI/CD pipelines and Jira. Utilize standardized

Value Stream Mapping (VSM) symbols to draw a clear and organized visual flowchart of the process. Also, obtain the important data metrics including lead time, which is the measure of the cumulative time from start to completion; process time, which is the measure of time devoted to work in progress; and percent complete and accurate, which is the measure of percentage of work advancing without needing to be redone.

3. **Identify Waste and Bottlenecks** - Examine the process map closely to uncover inefficiencies, such as excessive wait times, testing delays due to insufficient QA resources, rework caused by defects or miscommunication, and the development of unnecessary features that provide no value. Once these issues are identified, key stakeholders, including developers, testers, and product managers, should be involved to validate the findings and ensure a shared understanding of the challenges.
4. **Design the Future State** - Develop a new process map that removes identified inefficiencies and improves overall flow. This can involve implementing pull systems, such as continuous deployment, to reduce unevenness (Mura), automating repetitive tasks to lessen overburden (Muri), and streamlining handoffs between teams or steps to cut down on unnecessary delays. By addressing these key areas, the optimized map promotes smoother operations and more efficient delivery.
5. **Implement and Monitor** - Implement the future state map's recommended adjustments. Track changes using measures of cycle time, lead time, and defect rates. Improve the procedure constantly depending on comments and statistics.

Practical Example

Consider a software team delivering a new feature. The current state of VSM might reveal:

Delay: Code waits 2 days for QA testing due to limited testers.

Defect Waste: 20% of deployments require hotfixes due to bugs missed in testing.

Handoff Waste: Multiple handoffs between developers, QA, and operations cause miscommunication.

The future state map could propose:

Automation: Implement automated testing to reduce QA wait times.

Improved Testing: Add unit tests to catch bugs earlier, reducing defect rates.

Streamlined Handoffs: Use a shared DevOps platform to improve collaboration.

Tools for VSM in Software Delivery

Several tools can support VSM in software development:

Atlassian Jira (Jira): Integrates VSM into workflows for tracking and visualization.

Harness CI/CD Platform (Harness): Automates software delivery and provides pipeline analytics.

GitLab (GitLab): Offers VSM tools for DevOps and CI/CD pipeline management.

Other Tools: Plutora, CloudBees, and ServiceNow provide value stream visualization and metrics.

Challenges

Time Investment: Mapping is hard work, so match the level of effort to the return on investment.

Team Buy-In: Use experienced, cross-functional teams to ensure correct mapping and minimize resistance.

Tool Selection: Begin with basic tools, such as whiteboards, before investing in commercial VSM software.

Continuous Effort: VSM is an ongoing activity, not a one-time event; monitor and adjust continuously.

Conclusion

Value Stream Mapping (VSM) is a highly useful tool for streamlining software delivery pipelines and eliminating waste through identification and removal. It helps teams realize the flow of work and shorten processes, minimizing delays and achieving more value from customers. This guide's steps and resources create a real starting point for applying VSM to software development processes.