Lean Thinking

1. Identify Value - Specify value from the standpoint of the end customer.

2. Map the Value Stream - Identify steps in the value stream, removing all unnecessary steps.

3. Create Flow - Make value-creating steps occur in tight sequence so product flows smoothly to customers.

4. Establish Pull - As flow is introduced, let customers pull value from the next upstream activity.

5. Seek Perfection - As value is specified, value streams are identified, wasted steps are removed, and flow & pull are introduced, begin the process again and continue until a state of perfection is reached in which perfect value is created with no waste.

--Adapted from Lean.org

What Is Value?

"Value is what customers actually want"
- Womack & Jones, Lean Thinking

"Value is what people are willing to pay (or do) to have their requirements met." --Gerald M. Weinberg

What Is Waste?

Waste, or muda, is everything that is not value. We sometimes refer to two types of muda:

- *Type 2 Muda* - This is "pure waste" or things that could be eliminated immediately without damaging our ability to deliver value.
- *Type 1 Muda* - This is "Supposedly Necessary Waste" and refers to things which do not directly create value, but eliminating them all at once would damage our ability to deliver value. An example of this might be a validation process which doesn't actually create value, but omitting it could be catastrophic while at our current level of producing defects.

Kanban Boards
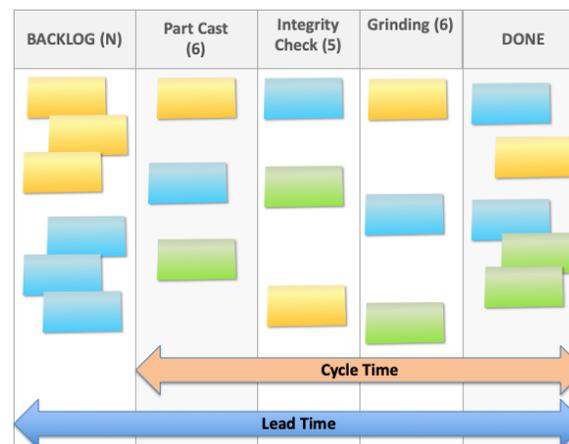
Creating a basic kanban board:

1. Identify the "states" the work moves through. This may or may not be a change of hands (people) handling the work.

2. Other than the first column (Backlog) and the final column (Done), each state becomes a column on the board.

Metrics and Definitions around Flow

- *Cycle Time* - time elapsed from starting work on a request to fulfillment.
- *Lead Time* - time elapsed from a customer request to fulfilment.
- *Throughput* - the number of items completed in a fixed amount of time.
- *WIP or Work-in-Progress*, the amount of work that has started but not yet completed.

How to Sabotage Flow

"The hard part about developing eyes for waste is that most waste is caused by doing things right within the conventional system."
--Allen Ward

Easy ways to sabotage flow include:

- *Allow High WIP*. WIP is a leading indicator of cycle time and the primary lever to establish (or destroy) flow.
- *Minimize Slack*. As slack approaches zero flow abruptly halts.
- *Maximize Utilization* Maximizing utilization is an intuitive and seductive, but horribly destructive practice.
- *Multitasking*. Multitasking, despite best intentions to maximize utilization of resources and skilled people, reliably reduces flow.

Value in Product Development

In repeatable processes like manufacturing, it's reasonable to define value as what the customer is willing to pay for.

In new product development, who the customer is and what the customer might find valuable are often unknown. In this environment, we need a new definition of value, one that supports discovery of customers and their needs.

We recognize this essential role of learning and *we define value as validated learning*.
*--adapted from Eric Ries.*

Shifting from Push to Pull Thinking

Pull is doing work in response to immediate downstream demand. This is sometimes difficult for people to grasp and apply in their context. A few suggestions for doing so…

- Rather than thinking about task lists, or *things we want to do*, focus on *required outcomes*. What are the minimum essential completion criteria and how we deliver this sooner. (Relate to Evolutionary Design.)
- *Stop starting and start finishing*. Always prefer working the task closest to done over working a younger item, or a new item.
- Use a kanban board. *Review the board from right to left rather than left to right*. Example: what's in the rightmost working column, and how could we move it to completion ASAP? As we clean out that column, move one to the left and repeat.
- Some find it useful to reverse the board, with "Done" at left and pending work at the far right. As many of us are accustomed to reading left-to-right, this reversal makes the previously suggested item more intuitive.
- *Set WIP caps*, limits for each working column of your kanban. This forces effective behavior

even when thinking hasn't yet changed enough to make it automatic. When can you reduce those WIP caps?

Flow - an Example
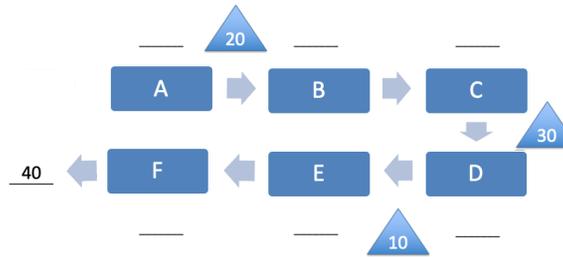
Assuming the above system has been running at full speed for an hour:

- Where is the bottleneck?
- What is the capacity at each station?
- Starting with an empty system, what is the cycle time, from A through F?
- Starting with the current WIP, what is the cycle time for a new item starting now? Why?

Questions to Ponder

- How does failure to meet the preconditions for agility reduce flow?
- Does lack of psychological safety reduce flow?
- Does Evolutionary Design accelerate flow?
- Which of these impacts do you see most in your current work?
- What could you experiment with, to accelerate flow?
- What metrics may cause local optimization at the expense of flow? What metrics make flow visible?

Experiment & Learn Rapidly

Experimentation and learning rapidly is a Modern Agile principle and the heart of continuous improvement.

"The trick to learning rapidly is creating small cheap experiments that will inform a decision you're trying to make" -- *Joshua Kerievsky & III*

Things to consider:

- Before trying something, ask how will we know if it's better. Decide what better is, and how you might measure it? What is your hypothesis? How will you know if it's valid or invalid? How could you learn that faster?
- How much measurement do you need? When you have no data, even very little information can improve your decision.
- Look at the kanban board. Properly constructed, it's a view of current reality.
- What would happen if we reordered columns and tried working in a different order, or even concurrently?
- What could be done to eliminate a column?

References and Recommended Sources

Lean Thinking, by Womack & Jones.
2 Second Lean, by Paul Akers. (Choose audio.)
Lean Startup, by Eric Ries.
Making Work Visible, by Degrandis & DeMaria
The NUMMI Story,
https://www.thisamericanlife.org/561/nummi-2015.

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