Increasing Team Throughput by Five Folds using Kanban and Lean Principles

By Ruby Tomar

Abstract

Traditionally one Program Manager managed one Platform so that s/he could provide the required focus to the program. Program Management is challenging as the contributing asset teams are spread geographically and there are dependencies on cross functional teams within the organization. This also involves challenges like overwhelming engineering priorities, wasted engineering BW due to a large number of false defects logged, wasted $ in manufacturing etc. This paper explains how Lean principles of eliminating waste and Kanban principles were used to aid me to take up the Program Management of five Platforms, with the same team which used to deliver one Platform earlier.

Challenge / Opportunity

The Platform Program Manager is accountable for a stable delivery of all the Platform features. This involves, for each Platform, generating/eliciting requirements from various sources, prototyping the solution, seeking management approval to investment of resources and money to move the program to the next phase; obtaining resources from various global asset teams; interfacing with various global cross functional teams; ensuring that the product manufacturing goes smooth; I have applied Lean Principles to work on some challenges to optimize team performance while improving quality of deliverables. This has enabled the team to own five Platforms instead of one.

1. The Platform firmware Integration team needs to ensure that the firmware is always healthy. This involves resolving issues reported from multiple sources - the FW development community, the HW development community, the Quality Organization and the factory manufacturing the units. Engineers are caught between conflicting priorities, multitasking and a large amount of WIP (Work In Progress) in the system. There was always:
    a. Lots of unanticipated work
    b. Large WIP
    c. Variable quantum of work
    d. High work load
    e. High level of stress in the team

2. All defects even remotely related to the scope of the firmware integration team are logged on the integration team. Each defect has needs to be reproduced, analyzed, fixed or transferred in a timely manner. Sometimes after analysis it is found that the defect was due to incorrect test procedures or tester error. According to Lean principles, this is wasted effort ***(Muda)***, it robs resources, "chokes" flow and must be minimized or eliminated. For the last cycle the false defect % was 48%.

3. The main focus of platform testing was on core functionality of the platform to ensure that it is stable. Most of the customer facing scenarios and system level tests were not covered which lead to defects found during the final stages of the product life cycle. Defects at a later stage only serve to increase costs.

4. Loss of trained factory operators causes assembly issues, leading to a manufacturing line stalls and a lower than planned yield rate from the factory.

5. Shipments from the factory getting stuck in customs leading to delays in firmware development.

Solution and Results

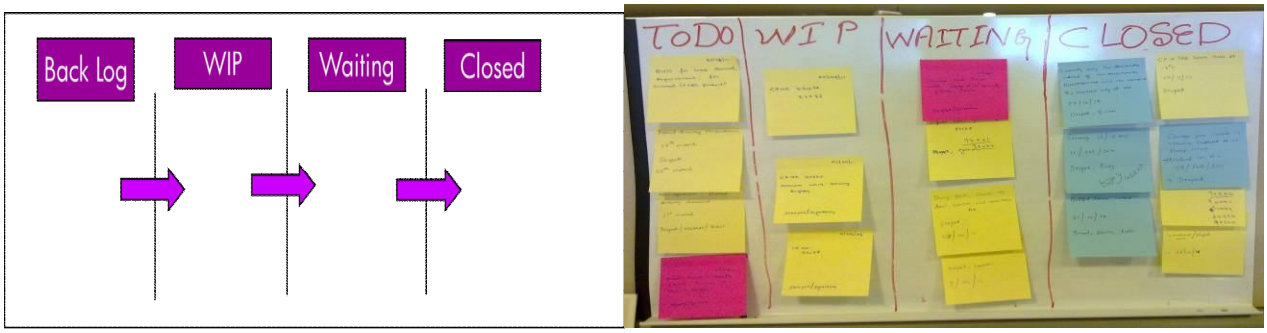
This section describes the way in which the challenges outlined above were overcome to remove waste from the system thereby creating bandwidth for the team to handle four more platforms:

1. The situation required a transformation in the process in which work items are taken up by the team. There was a need for a process which allows for:
    a. Visualizing work flow
    b. Limiting work in progress (WIP)
    c. Measuring and Managing Flow

    Kanban for SW development [1] is a pull system which achieves a sustainable pace of work in a systematic way by limiting the WIP to an agreed upon quantity, thereby reducing the load on the engineers. It introduces process change with minimal resistance. It also enables incremental process improvement through repeated discovery of issues affecting process performance.

    The value stream (workflow) was mapped: the start and end point of control were defined – starting from the point when the team gets requests to the point when they are delivered. Work item types- requests, defects etc were defined; the card wall

was drawn to show the work flow. Work item cards were designed such that they represent the work items completely. An electronic tracking mechanism was also deployed.



Results: Following Kanban in the project, the average delivery rate has gone up and with the same head count the team was able to handle two more Platforms with different inkjet technologies, while increasing the throughput by 10%. Due to controlling the WIP and clear prioritization, there has been reduction in cycle time, increased quality of deliverables, reduction in the stress levels of the team and higher motivation levels.

Influenced by the success of this program, two managers in the section have successfully adopted Kanban and have considerably improved their team's throughput.

2. Every False Defect was analyzed, root caused and categorized. PDSA cycles were executed for each category, engaging with stakeholders, making them aware of the situation, getting their buy-in to improve the situation.

   Result: 39.5% ***reduction*** in False Defects leading to 29% Engineering Bandwidth savings as compared to the previous cycle. This created additional bandwidth in the team to take up more Platform ownership.

3. According to Lean Principles, ***Poka Yoke*** (mistake proofing) was implemented by strengthening the process around code reviews and unit testing. The test process was enhanced to uncover defects at early development stages. Extensive test cases were developed using tools like XMind which helped in increasing test coverage.

   Result: 30% more (as compared to the previous cycle) test scenarios were added to the existing test suite leading to 25% (7% critical) more defects logged in the early stages of this cycle. Thus critical issues were addressed before the firmware was released to QA, resulting in more stable and better quality firmware.

4. Came up with a process for better engagement with the Operations team which handles the manufacturing. This involves review of test scripts used in manufacturing, executing test scripts one/two weeks before the build, training the

factory operators to overcome issues so that the yield is not impacted, training the operators so that they can provide meaningful data and logs to R&D for remote debugging.

Result: All issues were captured and addressed early (before manufacturing) by the development team, resulting in zero manufacturing line stalls and reduced stress in the system.

5. The shipments were received from the factory without proper documentation. Therefore, the local team was unable to clear the shipments from customs in a timely manner. The India shipment process was created (along with the local ops team) and explained to all the manufacturing and shipment partners. The freight carrier local office and the ops team is alerted whenever a priority shipment is expected, thereby ensuring that shipments are not delayed/held up.

   Result: There has been one incident of delayed shipment out of an average of 15 shipments received per month, thus development schedule was not affected.

Comparison with other practices / literature

Kanban and TOCPM (Theory of Constraints Project Management) are both implementation of pull systems. Kanban was easier to implement at no extra cost, therefore it was chosen.

References

1. http://www.amazon.com/Kanban-Successful-Evolutionary-Technology-Business/dp/0984521402

ABOUT THE AUTHOR

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Ruby Tomar is an action oriented, decisive and results focused Project and Program Manager with 15 years of experience in the field of embedded systems. With two patents filed and four disclosures to her credit, Ruby is process and technology savvy with a strong inclination towards innovation and process optimization. She has worked in automotive, consumer, networking, and telecommunications industries and is an avid reader of technical and management research. She has an MS degree in Software Systems from BITS, India and is currently working as a Project and Program Manager at HP. She can be reached at rubytomar.sps@gmail.com.