



ADVANCED KANBAN PRACTICE GUIDE

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Originally conceived by Toyota Motors in the 1950s, the Kanban method is a powerful set of tools that was designed to streamline and optimize work within the automobile manufacturing business. Because of its flexibility, over the past few decades, Kanban has been successfully applied to a wide range of domains such as technology and service design and implementation. Kanban's primary strength is its versatility, which is also a source of its risk – many business organizations struggle to effectively apply its principles and practices because of the wide range of possibilities.

This guide is specifically developed to enhance an organization's ability to design and evolve a Kanban approach that will empower teams to achieve their business objectives. In this advanced practitioner's guide, the relationship between Value Stream Mapping approach within the context of Kanban system design will be discussed. In addition, techniques for constructing a Kanban flow system using elements of operational and development value streams will also be examined.

Furthermore, various design options for Kanban boards will be discussed using various usage scenarios and team attributes. Due to the high level of variability within organizational constructs, teams must assess the benefits and risks associated with each specific type of Kanban system to maximize long-term viability as well as the probability of success.



VALUE STREAM ANALYSIS

To take full advantage of the Kanban method, it is essential to understand the foundational concepts behind this approach as well as how an effective Kanban system can be constructed. Value Stream mapping is a technique that complements the Kanban system design approach extremely well.

While there is no single formal definition of a Value Stream, a typical Value Stream consists of a series of activities that describe a business process which ultimately results in delivery of some type of business value to the end customer or consumer. This series of steps required to bring a product or service to a customer serves as a critical entry criterion for developing a simple yet effective Kanban system which will be used to manage and optimize the end-to-end process flow.

Basic Value Stream



There are two main types of Value Streams that may be used to describe and communicate a business process: Operational Value Stream and Development Value Stream.

Operational Value Stream (OVS) articulates the series of steps that a user-driven request may progress through the process flow in order to arrive at the desired end state, which is the delivery of the requested product, solution or service. While there is not a direct correlation between the OVS and a Kanban system, having a thorough understanding of the OVS is a key step towards defining the Development Value Stream (DVS), which directly influences the design of the Kanban system.

Example Operational Value Stream – Order Request Fulfillment Process



At the surface level, the **Development Value Stream (DVS)** may appear to be nearly identical to the Operational Value Stream. However, a closer inspection will reveal that the DVS is derived from the OVS because the activities associated with the Development flow exist to support the business activities and goals within the Operational process flow. In addition, it is possible (and very likely) that a single OVS will require multiple Development Value Streams in order to successfully produce and deliver the desired end product/service.

Example Development Value Stream – Order Fulfillment System



A Development Value Stream is comprised of a sequence of steps that is necessary to define, develop, and deliver a tool or service that allows the Operational Value Stream to be executed in an effective manner. Hence, the DVS will usually serve as the starting point for designing a basic Kanban system that a product development team can use to manage all the relevant tasks and deliverables associated with this tool/service.

DESIGN APPROACH FOR KANBAN SYSTEM

The approach for designing a lean and effective Kanban system will typically model after the PDCA (Plan-Do-Check-Act) method that was developed by the founding father of quality control, W. Edwards Deming. Deming's PDCA concept follows an iterative and incremental approach which enables inspection and adaptation over time. High-performing Agile teams are much more likely to successfully apply this concept due to higher level of experience and maturity as compared to new teams that have yet to adopt the mindset of continuous reflection and process improvement.

By following this approach, teams will avoid analysis-paralysis and empirically learn and adapt their way of working through real-life experience. It is important to iterate through this process and measure the effectiveness of the approach, then make refinements in an incremental way.

One manifestation of this approach is described below in Figure X. Most teams can apply this technique which consists of the following steps. By following this cycle, teams can make small yet impactful adjustments to optimize the overall system.

Analyze

Gain understanding of business and operational context prior to designing a Kanban flow. Develop a Value Stream Map (either Operational or Development) to identify key steps and activities, as well as identify potential inefficiencies in the flow.

Design

Develop a Kanban flow that captures key workflow states that are meaningful and impactful to the overall delivery flow.

Implement

Deploy the Kanban system and allow the team to utilize the system to manage work.

Observe

Monitor the effectiveness of the system and identify inefficiencies.

Reflect

Assess the root cause of inefficiencies and/or impediments to the overall process flow.

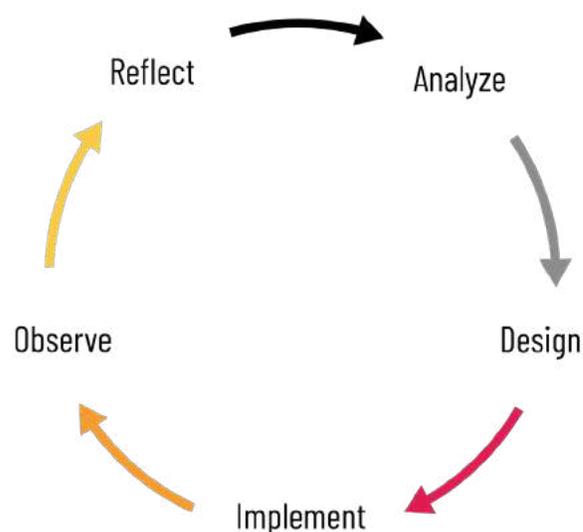


Figure X

KANBAN BOARD DESIGNS

Once a team has a solid understanding of the key steps within the Development Value Stream that are essential to track and manage, a Kanban system can be derived and a Kanban board can be assembled using these steps. It is important to note that a Kanban system does not need to contain every single step identified in the Development Value Stream; it is possible that the DVS is too complex to be modeled within a Kanban board effectively. For a team that is experimenting with the Kanban method for the first time, the Kanban board should contain no more than five steps as a starting point.

As the team matures and gains a better understanding of the approach, refinements can be made at that time. Building a large, complex Kanban system is a high-risk strategy that may impede adoption and impair the team's ability to follow the cyclical inspection and adaptation model. It is important to note that all Kanban boards must contain Work-In-Progress (WIP) limits on at least one workflow step; this is a critical mechanism for managing the flow of work through the system, and without this throttle, it is extremely difficult to understand the sources of inefficiency which can hinder optimization.



Team Kanban

The most common Kanban board is a simple flow that encapsulates basic steps within the Development Value Stream. Within this board, two workflow states contain WIP limits (“Ready for Work”, “In-Progress”) which will allow the team to shift focus as needed if work items have reached the maximum allowable capacity within either of the states.

For example, if the WIP limit is 5 for “In-Progress”, and the maximum limit has been reached, no additional work should be done to introduce more work into that state; all work to the left of this state (“Ready for Work”) should be stopped immediately so that the team can focus on moving items within the “In-Progress” state to “Done” to avoid the bottleneck being formed. This approach encourages the team to focus on finishing work (i.e. delivering the product/solution) rather than starting new work or doing work that contributes less value.



Individual WIP Limit

Another board design consists of utilization of individual WIP limits in order to manage the amount of work any individual team member should do at any given time. While this approach will generally improve productivity at the individual level by reducing context-switching, this design is more difficult to manage and track, and does not focus on optimizing overall team performance.



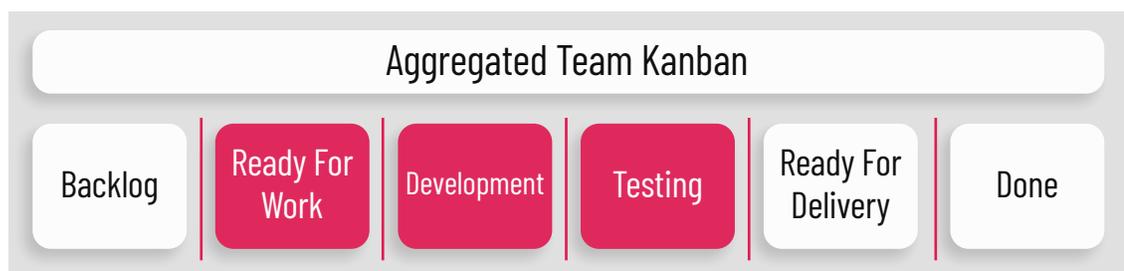
Constant WIP

Another board design, known as the Constant WIP, imposes a single WIP limit across two workflow states (i.e. “Committed” and “In-Progress”). This is a simple approach that is easy to implement, and this design ensures that the team will not commit to too many work items or requests at any given time. However, due to the lack of granularity, it is often challenging to understand where the bottlenecks in the process may reside.



Aggregated Team Kanban

In situations where multiple teams are collaborating to deliver a product or solution, the Aggregated Team Kanban may be a viable option to consider. This board design provides a higher level of visibility into various workflow states such as “Development” and “Testing”, which allows the team to identify bottlenecks more easily.



Each of the Kanban board designs have its own unique characteristics, benefits, and risks. Table 1, on the following page, describes the specific traits and limitations of each board type.



Table 1 – Kanban Board Type and Corresponding Benefits

Board Type	Characteristics / Benefits	Limitations	Application
Team Kanban	<ul style="list-style-type: none">• Focus on getting things done as a team• Encourage common understanding of work• Optimizes workflow at team level	<ul style="list-style-type: none">• Pair-work may be challenging due to knowledge gap• Difficult to understand bottlenecks within specific workflow steps	<ul style="list-style-type: none">• Works well with small tasks or simple workflows with few steps• May be a good starting point for new teams
Individual WIP Limit	<ul style="list-style-type: none">• Different pairing options• Controls WIP for specialists	<ul style="list-style-type: none">• Not optimizing overall flow• High WIP limit possible	<ul style="list-style-type: none">• May be applied to specialists and/or part-time resources
Constant WIP	<ul style="list-style-type: none">• Simple and easy to implement• Progress lumped together	<ul style="list-style-type: none">• No visibility into specific progress for work items	<ul style="list-style-type: none">• May be a starting point for new teams that are unable or unwilling to analyze workflow
Aggregated Team Kanban	<ul style="list-style-type: none">• Potentially have multiple teams working on a single board• Bottleneck will become visible	<ul style="list-style-type: none">• No overall optimization• Unable to track lead time (if using unbounded or infinite WIP limit in the middle of the workflow)• Risky as teams may become comfortable and unwilling to evolve to Team Kanban	<ul style="list-style-type: none">• Organization still working in silos, following Waterfall approach

FLOW OPTIMIZATION STRATEGIES

As described previously, a Kanban system should evolve incrementally over time given that experimentation and adaption are key tenets of the Kanban method. However, it may be difficult for teams to determine how to evolve their system and the board in pursuit of the desired outcomes. In addition to making adjustments to the WIP limits for various workflow states, teams may choose to modify the basic design of the Kanban board to further enhance the flow of work. There are a few strategies that may be applied when attempting to refine the design of a Kanban board.



Strategy 1 - Individual WIP to Team Kanban

In many situations, teams that are new to the Kanban method are either reluctant to make major changes or unsure of how to deploy the Kanban approach. Hence, implementing WIP limits at the individual team member level will likely be the least intrusive and easiest to apply without disrupting existing organizational processes. However, over time, the limitations of this approach may begin to surface, such as the lack of visibility to performance at the team level, as well as limited ability to optimize team output.

In this case, it is often useful to transition to the Team Kanban board in order to improve transparency and gain the ability to identify specific impediments associated with the workflow. This is a very common scenario that new Kanban teams experience.



Strategy 2 - Constant WIP to Team Kanban

Another option for evolving a Kanban board is the migrate from Constant WIP to a Team Kanban. The biggest benefit gained from this transition is improved visibility to workflow steps, and a more granular definition of specific work item states that the team must manage. This change will improve the team's ability to deploy more granular WIP limits at multiple states within the flow, which will lead to improved throughput.



Strategy 3 - Aggregated Team Kanban to Team Kanban

While having multiple teams working from a single Kanban board is not an ideal scenario, many organizations find this to be an effective entry point into the Kanban approach because it provides an opportunity for a larger population of the teams to learn this method. Over time, teams using this approach will likely find that throughput is not significantly improved by using this board design since there is limited optimization.

Furthermore, this board design allows multiple teams to still operate in silos via a Waterfall/sequential process. Ideally, the team will be encouraged to explore how to improve the overall performance by making adjustments and evolve to a single-team Kanban.

LEVERAGING METRICS FOR REFINEMENT

Teams that have made a commitment to the Kanban method will most likely benefit from this approach by leveraging key metrics for decision-making and continuous improvement. Given that the Kanban method is designed to evolve perpetually, it is essential for teams to gain an understanding of how to inspect the effectiveness of the current system in order to refine it in a methodical manner.

While there is a large selection of metrics that may be used to monitor a Kanban flow, three key measures are utilized by most experienced Kanban teams.

Lead Time - The amount of time required to complete a unit of work from the initial request (usually by the customer) is a key indicator that measures the effectiveness of the overall workflow. As expected, it is generally desirable to shorten Lead Time as much as possible in order to minimize waiting time by the customer, which will directly translate into customer satisfaction.

Cycle Time - The amount of time required to execute work from the beginning of actual implementation of the product (or solution) to completion and delivery to the customer is another critical metric.

Throughput - The total amount of work (or value) produced and delivered to the customer on a regular cadence will heavily influence the success of the overall Kanban system and customer loyalty.

The relationship between the three key metrics, as well as how an organization manages this intricate system will most likely determine the performance characteristics of a given Kanban process flow. As described in Table 2, Kanban teams can further customize the continuous flow system by making incremental changes based on observed trends within the data collected.

Table 2 - Customization Options for Kanban System Using Key Metrics

Scenario	Possible Causes	Potential Solutions
Cycle Time Significantly Lower than Lead Time	Excessive wait time caused by excess WIP in "Ready" state	Reduce WIP in "Ready" state
Cycle Time and Lead Time are Nearly Identical, but Throughput is Stagnant	Too much WIP in one or more state	Reduce WIP in the right-most state, then assess impact
Throughput Steadily Declining	Multiple states within flow are reaching WIP threshold limit, causing a cascading bottleneck	Reduce WIP in the right-most state, then assess impact

CONCLUSION

The Kanban method is a highly flexible and iterative approach that requires an open mind and persistence to apply successfully. The freedom that the Kanban approach provides is both its greatest strength as well as its greatest risk because teams need proper level of support in order to attain its benefits. When applied properly, even the most seasoned and accomplished Agile teams will be able to find value in the Kanban system design approach to further enhance their performance.

To maximize the potential benefits, Agile teams are encouraged to take an iterative approach to the design and implementation of a Kanban system; by applying an empirical approach and adapting the system incrementally, the team will develop a mindset of continuous improvement which will empower the team to effectively support any business climate that may arise.



ABOUT THE AUTHOR

Mr. Eugene Lai is a seasoned innovator in Information Technology and process engineering with over 20 years of proven track record delivering high-impact solutions within PMOs and Agile teams. In previous roles as Lead Software Engineer, Chief Scrum Master, Principal Program Manager, VP of Project Management, PMO Director, Technical Consultant and Agile Advisor, Mr. Lai has successfully applied process lifecycle frameworks and delivered complex solutions to various Fortune 500 financial services companies and U.S. Department of Defense customers across the globe.

Mr. Lai has provided consulting services to organizations such as Project Management Institute (PMI), Scrum Alliance, and Cprime Learning. Over the past 12 years, Mr. Lai has orchestrated Program Management and Agile Engineering initiatives by applying a variety of methodologies and frameworks such as Traditional Waterfall/SDLC, Large Scale Scrum (LeSS), Scaled Agile Framework (SAFe), Scrum and Kanban. Mr. Lai has architected 5 corporate PMOs and successfully executed Agile transformation efforts for 6 different organizations.

Mr. Lai currently holds several professional certifications including: Certified Scrum Master (CSM/PSM), Microsoft Certified Technology Specialist, Professional Scrum Product Owner (PSPO), Scaled Agile Program Consultant (SPC), Agile Certified Practitioner (PMI-ACP), Project Management Professional (PMP), and Program Management Professional (PgMP).

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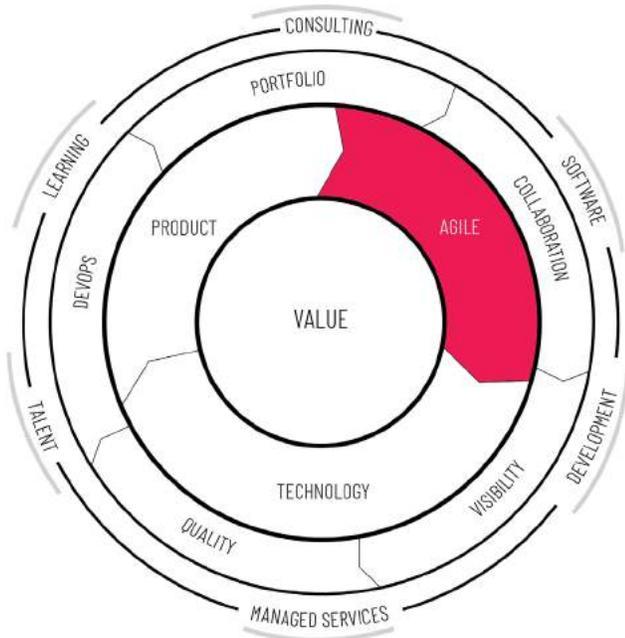
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Kanban methods have increased in popularity. Going beyond the manufacturing origins, more and more teams in information technology are adopting the practices. Kanban methods go beyond the visual aspects of the Kanban board. In addition to visualizing the work in progress, Kanban provides techniques to manage the flow of work and continuously improve on that flow.

YOU WILL LEARN HOW TO:

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