

Report on Kanban Framework in Agile Development

Introduction

Agile development has change the software engineering practices by highlighting adaptability, customer collaboration, and iterative progress. Among the various Agile methodologies, Kanban is identified as a flexible framework that focuses on visualizing workflow, limiting work in progress, and maximizing efficiency. It is 1st appear in Toyota's manufacturing processes in the late 1940s. Kanban is same meaning for Japanese word visual signal and cards. That technique was adapted for software development in the early 2000s by David J. Anderson [1]. The framework provides a visual help to managing work, Support teams to respond to changing priorities while maintaining a flow of deliverables.

Requirement / Task / Incident Progress					
Backlog	Planned	In Progress	Developed	Tested	Completed
User Story	User Story TK TK TK	User Story	TK TK	User Story TK	User Story TK TK
User Story	IN	User Story TK	TK TK IN	TK	IN IN
User Story		IN			
User Story					
User Story					

Sample Kanban Cards with Task Allocated

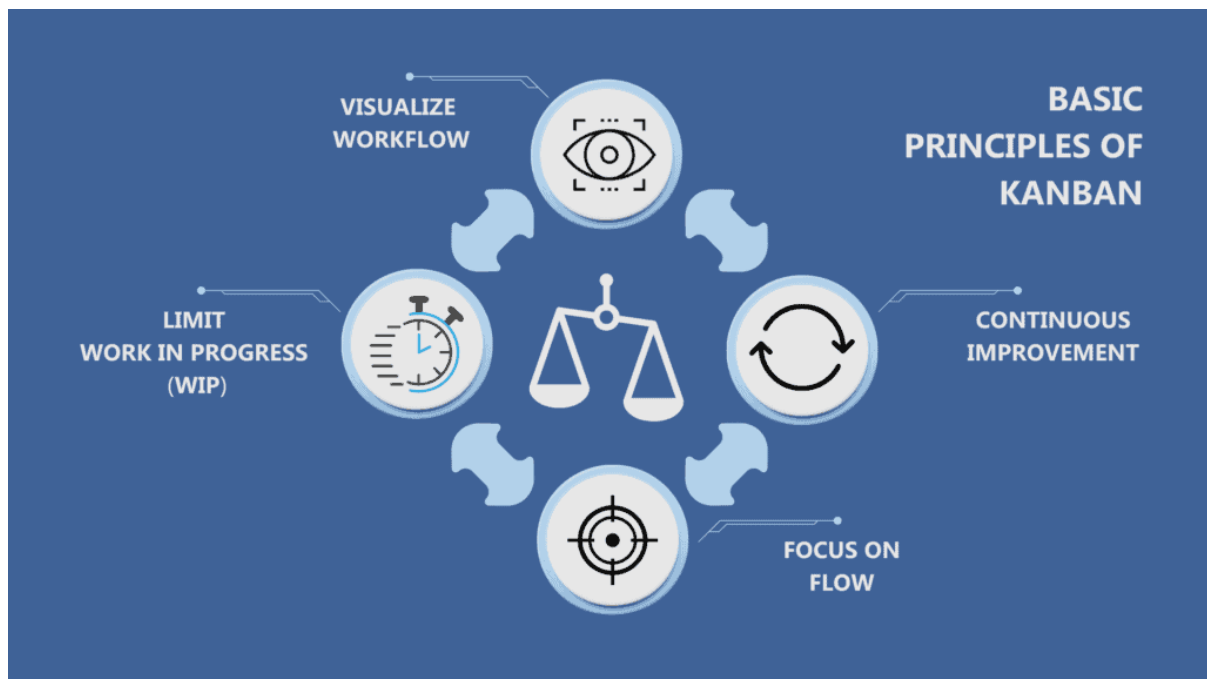
<https://www.inflectra.com/GraphicsViewer.aspx?url=Solutions/Methodologies/Kanban.xml&name=wordml//03000001.png>

Core Principles of Kanban

Kanban is built on four fundamental principles that guide its implementation and practice

1. **Visualize the Workflow:** Making work visible is main point to Kanban. By representing work items as cards on a board, team members gain immediate insight into the status of tasks, bottlenecks, and overall project progress.
2. **Limit Work in Progress (WIP):** Restrict the number of parallel tasks that prevents overloading and which often leads to decreased productivity. Work in progress limits ensure that teams complete existing work before taking on new tasks.
3. **Manage Flow:** The focus is on creating a smooth workflow through the system. By using teams monitor metrics like lead time and cycle time, we can optimize processes and remove inefficiencies.
4. **Continuous Improvement:** Kanban is very helpful for changing the processes and improve the team to regularly review their teams and process through the visual aids.

In addition to these principles, Kanban emphasizes making policies explicit and implementing feedback loops, creating a framework that promotes transparency and continuous learning [2].



Basic Kanban Principles

<https://www.simonsezit.com/wp-content/uploads/2022/10/SSI-Images-3-1536x864.png>

Kanban Board and Workflow

The Kanban board is the core of the framework and it is the main point in that, providing a visual representation of the workflow., a Kanban board consists of three columns in its simplest form, in industrial level there are many columns add for their customizing in kanban board such as "Planning," "Testing," "Review," or "Deployment."

- **To Do:** Tasks that have been identified but not yet started
- **In Progress:** Tasks currently being worked on
- **Done:** Completed tasks

Each work item is represented by a card that contains essential information like task description, assignee, priority, and deadline.



Basic Kanbam Chart

The workflow process in Kanban is

1. Tasks enter the board in the leftmost column.
2. Team members pull tasks through the workflow from left to right as capacity becomes available.
3. WIP limits are applied to columns to prevent bottlenecks.
4. Metrics such as cycle time that known as how long it takes for a task to move from start to finish are collected to measure efficiency.

This pull-based system specify that work flows smoothly and teams can familiarize to changing priorities without disturbing ongoing work.

Advantages and Disadvantages of Kanban

Advantages

1. **Flexibility** - Kanban allows for continuous flow, making it easier to adapt to changing priorities.
2. **Visibility** - The visual nature of Kanban boards provides clear idea into workflow status and limitation.
3. **Reduced Waste** - WIP limits minimize multitasking and context switching, increasing efficiency.
4. **Continuous Delivery**
5. **Shorter cycle time**
6. **Start without disturbing new processes**
7. **Improve team communication**
8. **Increased Transparency**

Disadvantages

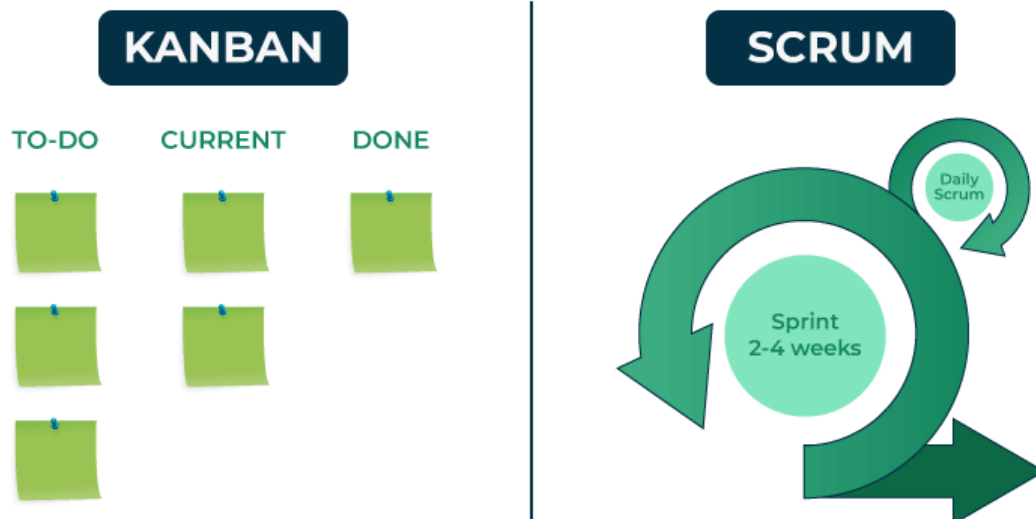
1. **Lack of Time Frames** - Without fixed time, some teams may struggle with planning and forecasting.
2. **Some tasks can get more time-** Without explicit deadlines, tasks may remain in progress longer than necessary.
3. **Possible delays with every phase**
4. **Misinterrupt about task information**
5. **Less Structured Meetings** - Kanban doesn't recommend specific formalities, which may lead to communication gaps.
6. **Requires Discipline** - Maintaining WIP limits requires team discipline and may be challenging in high-pressure environments.
7. **Not Ideal for Complex Projects** - For highly complex projects with various features and activities, Kanban only alone may not provide sufficient structure. [4]

Comparison with Other Agile Frameworks

When compared to other Agile frameworks like Scrum, Kanban offers different characteristics

Feature	Kanban	Scrum
Work Cadence	Continuous flow	Fixed-length sprints
Roles	No suggested roles	Specific roles (Scrum Master, Product Owner, Development Team)
Delivery Schedule	Continuous delivery	At the end of each sprint
Changes	Can be made at any time	Discouraged during a sprint
Metrics	Lead time, cycle time, throughput	Velocity, burndown charts
Board Usage	Persistent	Reset after each sprint

Scrum provides a more structured approach with defined roles and ceremonies. Kanban offers greater flexibility. Extreme Programming (XP), focuses on engineering practices whereas Kanban concentrates on visualization. Some organizations use a hybrid technique called "Scrumban," that combines Scrum's structured planning with Kanban's flow-based delivery to gain the strengths of both frameworks. [4]



Kanban vs Scrum

<https://media.geeksforgeeks.org/wp-content/uploads/20231107173425/Kanban-board-2.png>

Real-World Applications

Kanban has been successfully implemented across various industries and contexts [3]

1. **Software Development:** Companies like Spotify use Kanban to manage feature development and bug fixes, allowing them to respond quickly to user feedback.
2. **IT Operations:** Use to manage incidents and service requests, visualizing work to ensure nothing falls through the cracks.
3. **Marketing:** Marketing departments utilize Kanban to manage campaigns and content creation, maintaining a steady flow of deliverables while adapting to changing market conditions.
4. **Healthcare:** Hospitals have implemented Kanban to streamline patient flow, reducing wait times and improving resource allocation.
5. **Product Development:** Companies like Microsoft have used Kanban to manage product development lifecycles, enabling continuous delivery of features and improvements.

Kanban offers a flexible, visualization-focused approach to Agile development that emphasizes continuous flow and incremental improvement. By making work visible, limiting WIP, and focusing on flow, teams can increase efficiency and adaptability. While not without challenges, Kanban's principles have proven effective across diverse industries and contexts. As organizations continue ways to deliver value in rapidly changing environments, Kanban is a valuable tool in the Agile toolkit.

References

- [1] D. J. Anderson, *Kanban: Successful Evolutionary Change for Your Technology Business*. Sequim, WA: Blue Hole Press, 2010.
- [2] J. Hammarberg and J. Sunden, *Kanban in Action*. Shelter Island, NY: Manning Publications, 2014.
- [3] <https://www.unleashedsoftware.com/blog/8-examples-of-kanban-in-lean-manufacturing/>

[4] <https://www.atlassian.com/agile/kanban>