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Understanding the Kanban Development Process and Review of Kanban's Rules and Principles

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Abstract: - Kanban is the framework which is used to implement agile and DevOps which are used for the implementation of software development process. It is the representation of the work being executed during the process of software development using Kanban board. Everybody working on the project have clear vision of what is going on in the project, the progress of the project, who is performing which task etc. This provides effective mode of communication between all the team members working on the same project. It helps the team to organise the work and tasks and also contribute to improve the efficiency. Kanban elements consists of cards, columns, etc and has continuous improvement plans which helps the team to plan the tasks appropriately and helps to achieve the goals within the decided time frame. The paper will discuss the elements of Kanban, rules and how it works. It will also discuss the advantages of having Kanban framework in the software development.

Keywords: - Introduction to Kanban, Elements of Kanban, Benefits of Kanban, Challenges of Kanban, Rules and principles of Kanban.

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Introduction: - [1]

Kanban is derived from Japanese word which means cards used for visualisation. It was discovered by Taiichi Ohno who worked in Toyota. It was used in Toyota to limit the production on a manufacturing floor which indicates work in progress status. This has helped to reduce the amount of time for the manufacturing and also reduced the waste generated. This has contributed to use the free resources and time for next business opportunities or for executing other tasks. This concept was thought to be used in software development process to implement the agile and devops methodology so that efficient and proper communication is provided among the team which will save extra time and effort to communicate with each other about the progress of the project. It uses cards, billboards, boards etc to visualise the progress of the project as it represents the work flow about the tasks being performed in order to complete the project. It helps the organisations to organise the tasks and gives better view to understand which task is assigned to whom and also reflects the amount of work completed and the pending amount of work also. Kanban has following three main concepts:

1. To limit the Work in progress: -
   The Kanban tool limits the amount of work in progress in each work component which means assigning limits which represents that how many items will be in progress in each workflow segment.
2. To estimate the Lead time: -
   It is the average amount of time taken to complete one item. It is also known as cycle time.

Lead time or cycle time is estimated and the process is optimised so that the lead time can be kept as minimal as possible.

3. Visualize Workflow: -
   The work is divided into small components which will be represented as named columns on the board so that everybody can visualise it. Each item will be represented by a card which indicates the position of that particular item in the workflow.

Elements of Kanban: - [2]

There are following five main components of Kanban: -

Figure 1 Components of Kanban.

1. Visual Signals: -
   - This is the main component of the Kanban board as it is used for visualisation of the work being done during the project of software development.
   - These visual cards may contain stickies, tickets etc on the board for the representation.
   - Each card is used to display the work items which are executed during the software development.
   - In agile teams, each card of the Kanban board will represent the user story.

- Once these are displayed on the board it is easy for the team members to understand what is going on in the team.

2. Columns: -
   - Each column will represent the activity which follows the work flow.
   - These cards will follow the work flow until it is completed.
   - Work flow can be in the status of To do, Work in progress, etc. Each company can use their own nomenclature for the representation of the work in progress items.

3. Work in progress limits: -
   - WIP is the limit which is set to show the maximum number of cards which can be present in each column.
   - If the limit of a particular column is set to four then that particular column cannot have more than that number of cards in it.
   - When the limit of the columns is fulfilled then that card is put in the next column.
   - WIP are used to identify the bottlenecks and use to improve the workflow and maximise the working capacity.
   - It warns the team if the committed work is too much to be completed.

4. Commitment point: -
   - Kanban board also have backlog for the team. It is used to present ideas by the clients and team members which can be utilised by the team when they are ready.
   - It is the point where the idea is used by the team and the work will start for the project.

5. Delivery point: -
   - Delivery points means that the end point of the workflow of the Kanban team. Delivery point means when the project is completed and the product is ready to be delivered to the clients.
   - The team member work as per the planned tasks in order to move the cards from the commitment point to the delivery point.
   - The elapsed time between the commitment point and delivery time is called lead time. The focus of the Kanban team is to reduce the lead time as much as possible for them to do it.

Rules and Principles of Kanban: - [3]
Following are the basic rules and principles of Kanban: -

1. Visualize workflow: -
   - The purpose of Kanban is to visualize the workflow. Any organisation who is using the Kanban concept must represent their workflow using the Kanban board or software.
   - Each step will be presented in detail on the Kanban board which will show the process of production of the service or the product. The complexity of the visual representation of the work flow on Kanban board depends upon the complexity of the project.
   - Once the work flow is represented on the board, all the team members can see what is happening in the team in order to complete the task.

2. Limit the work in progress: -
   - This is the important principle of the Kanban framework which helps to prevent the system from overload and contributes in improving the work flow.
   - Work in progress represents the tasks that are completed in a time limit.
   - It is beneficial as until the item on the card mentioned is completed, once cannot move onto the next task. This makes sure that the team members for sure will complete the task in the given time period before moving onto the next card.
   - What this does is make limit in the framework. New work can now be pulled by the group. It could require some investment before you can sort out what as far as possible is, and it's typical to get going without having a cut off to your work underway.

3. Work flow: -
   - The main objective of the Kanban board is to understand the workflow of the project. If the above two rules are applied properly then the workflow can be visualized efficiently and anybody can understand what is going on in the project.
   - It also helps to identify the bottlenecks and helps to look for solutions which improves the workflow of the project.
   - The focus is on to move the cards from one column to another making sure that item assigned on each card is completed.
   - If one finds out that the system is being overloaded then they should focus on improving the work flow by again setting the WIF limits.
   - The aim is also to understand how the work starts from the initialising project and when it is completed which is also known as value stream.
   - This transparent component of the Kanban board allows team members to look for ways to improve their work flow.

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4.   Continuous improvement: -
- Since Kanban board is the visual understanding of the work flow so it gives opportunities to continuously look for improving the process. The changes and improvements can be done in small incremental steps which is easy to be handled by the team.
- The aim of product manager will be to evaluate the process and identify scope for modifications and improvement. Whenever a modification is made it is always evaluated to make sure that it is actually contributing in improving the process and not doing the opposite.

Benefits of Kanban framework: - [4]
Following are few advantages of using Kanban framework: -

1. Improved visibility: - The purpose of Kanban is to have better visualisation of the progress of the project for which it uses Kanban board. It gives clear picture explaining the work flow of the project being developed.
2. Productivity: - It is another advantage that the Kanban board helps to increase the productivity of the employees as they need to complete the task mentioned on the card before they move to other task.
3. Better efficiency: - Kanban board helps to identify the bottlenecks and helps the product manager to find out solutions for the issues which improves the performance efficiency of the team members.
4. Prevents overload: - WIP limit defined in Kanban helps to prevent the team members from overpressure of tasks thus preventing overloading of the system.
5. Reduction in wastage: - The main objective of Kanban is to minimise the wastage and used the freed resources for performing other important activities.

Challenges of Kanban: - [5]
There are following limitations of the Kanban framework: -

1. Poor performance in shared resource systems: - Rare orders might deliver the kanban interaction incapable. For example, in the event that your vertical creation line made many parts, your solicitations to make more parts expected by the downstream line will require a cushion to guarantee that the downstream line doesn't run out. This is on the grounds that every creation line requires a different flagging vehicle.
2. Production issues: - Kanban is not useful for production of products which have variable demands, poor quality products, short runs etc. It is not useful where there is demand of multiple product production, etc.
3. Poor understanding of framework fails Kanban: - It is new technolo.gy and one needs hands on experience to be expert in using the Kanban framework. If the

training and learning is not done properly then it will not prove to be successful for the organisation.
4. Diverse nature of user stories: - Kanban works best where the user stories has same nature and size as it will be easy t represent the workflow but if the size of user story varies then Kanban framework will fail to achieve what it is supposed to do.

Conclusion: - Kanban is the structure which is utilized to carry out lithe and DevOps which are utilized for the execution of programming advancement process. It is the portrayal of the work being executed during the course of programming improvement utilizing Kanban board. Everyone chipping away at the undertaking have clear vision of what is happening in the venture, the advancement of the venture, who is performing which task and so on. This gives powerful method of correspondence between all the colleagues chipping away at a similar undertaking. It assists the group with sorting out the work and assignments and furthermore add to work on the proficiency. Kanban components comprises of cards, sections, and so on and has persistent improvement plans which assists the group with arranging the errands suitably and assists with accomplishing the objectives inside the concluded time period.

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