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WATERFALL AND AGILE METHODS

A STUDY ON USING THESE IN SOFTWARE PROJECT MANAGEMENT

Introduction

There are many project management methodologies which one can choose from when starting a new project. The purpose of this article is to analyze the most known methodologies,

- Scrum Agile Method
- Kanban Agile Method
- Waterfall Method

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Kanban Agile Method

Kanban is composed of five key stages:

- visualizing the workflow,
- limiting work-inprogress,
- managing the workflow,
- making each and every step unambiguous
- ultimately evolving as one single and precise mechanism

1. Ideas – these are tasks that are still in a state of ambiguity
2. To do - these tasks have passed the first stage and it is clear that they should be implemented
3. In progress – the task has been assigned and is being developed
4. Done – The task has been completed

Scrum Agile Method

This method is stricter then Kanban,In which each process follows these 7 steps:

- Requirement Elaboration
- Design
- Development
- Comprehensive Testing
- Integration
- Documentation
- Approval

1

Scrum Roles:

- Product Owner
- Development Team
- scrum master

2

Scrum Artifacts:

- Product Backlog
- Sprint Backlog
- Increment

Waterfall Method

The Waterfall model assumes that once the initial requirements are set and every goal has been cleared of any ambiguities, there is an unobstructed road which the development team will follow towards finishing the project

1. Requirements
2. Design
3. Coding
4. Testing
5. Implementation

Literature Review

Year	Aurthor	METHODOLOGY	CONCLUSION
2016	EDWARD SCOTCHER, ROB COLE	Agile Project Management	focussing on real-life use of Agile in business environments, it provides practical advice and techniques on how to implement and work with Agile
2017	VAN CASTEREN	THE WATERFALL MODEL AND THE AGILE Method	two SDMs were introduced, a plan-driven Water-fall Model and the Agile Methodologies. Both models have theiruses, advantages and disadvantages
2009	PETERSEN K	Waterfall Model in Large-Scale Development	Petersen K., Wohlin C., Baca D. The Waterfall Model in Large-Scale Development. In: Bomarius F., Oivo M., Jaring P., Abrahamsson P. (eds) Product-Focused Software Process Improvement. PROFES 2009. Lecture Notes in Business Information Processing, vol 32. Springer, Berlin, Heidelberg, 2009.
2010	MATKOVIC	A Comparative Overview of the Evolution of Software Development Models	The paper provides an evolutional overview of development models, with their comparisons, and considers the expected avenues of future development.

Methodology

We propose a practical study by analyzing the results of a survey designed to capture the experience of developers with the aforementioned methodologies. We will focus on the Scrum and Kanban Agile methods and Waterfall to analyze the findings of the study.

Next Steps

In order to study the preferences of students and junior developer, a form was created and distributed. The form answers will reflect what methodology fits for each candidate, based on their previous experiences

1 Years of Experience	2 Questions to Evaluate
• Less than 2 Years • 2 to 5 years • Greater than 5 years	• The number of people involved in the project • Duration of the project • Project completion • Project success • Personal satisfaction

Analysis

The form was sent to 32 candidates in order to examine their experience with the presented methodologies. A set of questions was chosen in order to evaluate in what circumstances the candidates used Scrum, Kanban, and Waterfall.

The majority of the participants had less than 2 years of working experience, consisting mainly of students and junior developers, representing 84.4% of the candidates. The results regarding the working experience of the participants can be visualized in

Figure 1. Years of experience

By asking the candidates the size of their teams for the chosen project, it was discovered that the numbers were between 2 and 15. While most Scrum teams had 4, 5 or 7 members, the Kanban teams usually had 5. Waterfall projects had even smaller teams, of 3 or 4 people.

Figure 3. Number of team members for Scrum teams

Figure 4. Number of team members for Kanban teams

Figure 5. Number of team members for Waterfall teams.

- **Waterfall** presented the shortest duration, with 88.9% of candidates stating that the duration of their project was less than 6 months
- **Kanban** was used for projects with variable length, from less than 6 months to more than 1 year
- The majority of the **Scrum** projects were short term projects as well, with 70% of the respondents affirming their project lasted less than 6 months

Figure 6. Kanban projects duration

Figure 7. Scrum projects duration

- All of the projects that used **Waterfall** were finished
- 95% of the ones that used **Scrum** has been finished
- high percentage of projects that used **Kanban** were abandoned

Figure 8. Finished Kanban projects

- While the big majority of Scrum and Kanban users gave a score of 4 and 5 (90% and 87.5%, respectively),
- Waterfall has with an average of 77% votes for 4 or 5. However, most of the votes were scores of 4.

Overall, all candidates enjoyed using each methodology

- Respondents that used Scrum reported that they were highly motivated during the development and liked the fact that they were in good synchronization with the rest of the team. However, some of them did not enjoy the high number of meetings and the fact that they induced a routine.
- Kanban users enjoyed the simplicity and flexibility of the methodology while reporting issues with task prioritization and the amount of time they spent updating the cards.
- Waterfall users enjoyed the Plan-Driven Development that this methodology encourages and the strict requirements imposed from the beginning but had

Conclusion

In **conclusion**, the methodology chosen depends on each team and has to be picked specifically for that project, as no approach can satisfy all needs. The tendency is that Waterfall is used mostly by small teams for a small project that have well-defined requirements, while Agile is more flexible and preferred when continuous feedback is important.

THANK YOU