

Agile Project Management Tools: A Brief Comparative View

Deniz Özkan^{1,2}, Alok Mishra²

¹Havelsan, A.Ş., 06510, Mustafa Kemal, Çankaya, Ankara, Turkey

²Department of Software Engineering, Atılım University, Turkey

E-mails: dozkan@havelsan.com.tr alok.mishra@atilim.edu.tr

Abstract: Agile methodologies are becoming popular in software development. Managers are required to understand project's progress and product quality without development documents. During Agile practices of the teams and organizations, Agile project management tools are frequently used. The use of such tools leads to achieving speed and efficiency, affects the quality of the software. The quality of final product is mostly related with to project management. Accordingly, the paper provides brief comparative perspective about the popular project management tools for agile projects. 16 popular Agile project management tools have been presented helping agile developers to plan and manage their tasks in an efficient manner. Taiga, Axosoft, Agielan, Planbox are more appropriate for start-up projects. The most twitted and most appreciated tools are reported as Jira, Trello, and VersionOne. SpiraTeam by Inflectra and Pivotal Tracker are other pricing and popular agile tools, providing flexibility to Agile developers and increase collaboration among team members.

Keywords: Agile Methodologies, Agile Project Management Tool, Tools, Software Project Management.

1. Introduction

Presently, Agile software development method is becoming popular as it helps organizations to develop software projects faster. Most organizations (71%), mention that by using this methodology, projects are 28% more successful than projects managed with traditional methods [1]. It is reported in a previous study that using agile methodology in software development lowers the costs, leads to better quality, productivity and higher business satisfaction [2]. The main reason of acceptance of agile methodology is the ability of changing swiftly and easily for project management.

The main principle of the Agile Manifesto is to speed up the development process and provide high quality software. To ensure that, four values and twelve principles are specified in Agile Manifesto: "Individuals and Interactions Over Processes and Tools", "Working Software Over Comprehensive Documentation", "Customer Collaboration Over Contract Negotiation", "Responding to Change Over

Following a Plan” [3]. There are some popular agile methodologies such as “Extreme Programming”, “Scrum”, “Kanban” and so on. The four values of Agile Manifesto are applied differently in each methodology to develop and deliver high-quality software working properly.

More and more software development organizations are adopting agile methodologies to achieve speed and efficiency, and increase the quality of the software [4]. In recent years, Agile software development methods are also in adoption by large software companies along with small development teams and Scrum with its various variants are the most widely accepted by over 70% of agile teams [5]. The quality of the final software depends on how the project has been managed [6]. During last decade many software professionals admit that Agile helps to complete project faster and Agile project management tools assists the team or an organization to improve their quality and enhance project agility [3]. An increasing percentage of Agile software developers are using Agile project management tools and these provide interfaces for decisions regarding each stage of the agile software development process and facilitate data-driven understanding of task allocation decision-making [7].

In Agile methods, managers are required to understand product quality and development progress without the development documents. Also, the managers should grasp various project states (such as fair, normal, confused state, settled) without documents [8, 9].

According to VersionOne (2014) the amount of projects using Agile was increased up to 52% in 2013. Number of globally distributed software projects have demonstrated growth of 10-20% per year [9]. During the last same time Agile methodologies in software development became popular and to make the most of both approaches software professionals also use agile methods in distributed context [10]. It is further observed that project-management-tools tools (like Jira, Redmine, YouTrack, etc.) are an established way to enable agile practices over distance as these include capabilities to track requirements and other process-relevant data [10].

Studies by Boehm and Turner [11] and Damian et al. [12] have shown that software tools can enable and improve communications in projects. For instance, it has been recommended that the use of groupware systems enhances project communication and produces improved project results [13, 14]. Good communication results in high quality products and good progress and is one of the significant measures of project states so that managers can aware of these without managerial documents [8].

1.1. Background

The first study regarding Agile project management tool is based on 3500 responses (in 2014) reported office productivity tools such as Excel (66%), Microsoft Project (48%), VersionOne (41%), Atlassian/Jira (36%), Microsoft TFS (26%), IBM ClearCase (10%), LeanKit (5%). However, Trello was not part of this survey. The results on satisfaction rates are as follows: VersionOne (93%), Atlassian/Jira (87%), LeanKit (84%), TargetProcess (83%), Microsoft TFS (79%) and ThoughtWorks Mingle (69%).

Another survey conducted in 2011 [15] was based on 121 responses from 35 countries. Survey reported most commonly used tool was physical wall (26%), and then Microsoft Project (8%), Rally (5%), Mingle (3%), VersionOne (2%), Jira (2%) and Team Foundation Server (2%). Beck et al. [3] and Ebert [16] in assessment of existing project management tools argued that these have not been built with the intent of enabling remote extension of the onsite customer. Matta and Marchesi [4] found most mentioned Agile project management tools in Google trends in descending order of search are Jira, Trello, Mingle, Microsoft Project and Team Foundation Server. They also argued that Microsoft Project popularity has been decreased from 2004 till 2015 in favour of Jira and Trello project management tools.

A project management tool using agile methodology will help software developers to plan their work and assist project managers to get the desired results in terms of team communication and resource allocation when required. Agile management tools may be considered as unnecessary in small projects. However, especially in medium- and large-scale project, it is mandatory to cope with schedules, budgets, competitive environments, and requirements change or daily new challenges [17]. A survey by Azizyan, Magarian and Kajko-Matsson [15] with 121 respondents from 120 organizations from 35 countries was conducted. According to result of survey, agile project management tools are adopted more in distributed teams than collocated teams. This indicates that agile tools assist communication among distributed teams. Project management Tool always requires careful study of each organization and its development environment. Complex tools cover all requirements of all companies, however, decreases usability [15]. Therefore, it is critical to select convenient tools for the type of agile projects. The aim of the research is to briefly summarize popular agile project management tools and comparatively analyze their features. Next sections are organized as follows: First, agile project management tools are described. Secondly, a comparison chart is presented. Finally, discussion and conclusion are presented.

2. Agile Project Management Tools

In this research, sixteen popular agile project management tools used by agile professionals are investigated. In addition, their features are compared and a comparison chart is presented in Appendix. The agile tools to be considered in this study are selected from open source and proprietary software. Brief explanations about the selected tools are given below.

2.1. JIRA

JIRA is popular project management tool [18] for software professionals, institutional designers using shared environments. One important feature of JIRA is having customizable Scrum boards and flexible Kanban boards. It offers full integration with popular environments such as Eclipse [19]. In addition, it is possible to apply custom filters using JIRA Query Language (JQL). Other important features of JIRA can be listed as customizable developer tool integrations, cumulative flow diagrams,

reporting, issue and bug tracking. Being a mature and proven tool preferred by large enterprises globally, this tool has an active community of users.

2.2. ActiveCollab

ActiveCollab is a commercial agile project management tool and ensures a Web-based platform for supporting activities like planning and progress tracking, task management, filtering, and email integration through a workflow [19]. This tool provides strong team collaboration and has many advantages including easy to use, reliable and exquisite interface. Including powerful features with a moderate price, this tool is mostly suitable for small businesses.

2.3. Agilo for Scrum

Agilo for Scrum is mostly suitable for distributed teams where an immense communication is required. A real-time workflow is offered with this tool, including real-time scrum board, high-level themes, customization and email integration. Additionally, it is possible to overview on product ongoing process, supports sprint planning first and second, estimation of your sprint.

2.4. SpiraTeam by Inflectra

SpiraTeam is a comprehensive tool that attends to project's requirements, versions, iterations, tasks and problems related to bugs. This tool is developed to assist the software development methods such as Scrum, Agile UP, and Extreme programming. The tools' interface provides an individual homepage for each project, which makes it easy to monitor the overall situation at a glance.

2.5. Pivotal Tracker

Pivotal Tracker is a convenient tool for the web and mobile software developers, assisting in development and tracks all stories until implementation. The main characteristics of this tool are estimation and prioritization, multi-project workspaces, burn-up, cycle time report, released reports. Further, this tool has other important attributes such as search, file sharing, task management, keeping project history, story association, bulletin etc. It also guides to dividing project into manageable parts. It also provides translucent view of team preferences towards cohesive co-ordination.

2.6. Microsoft Visual Studio Team Services (VSTS)

One of the powerful agile project management tools, VSTS has almost all the functionalities that are required to support scrum team: flexible Kanban boards, exceptional traceability through inventory, customizable dashboards, and inherent scrum boards, extended integration, and Git client support. This tool makes it possible to handle the code versions, test documents and work items such as scenarios, test tasks, bugs and risks automatically [20]. Other important features can be mentioned as the backlog management, capacity management, and easy to use and attractive interface.

2.7. Icescrum

Icescrum is an open source agile project management tool. Icescrum provides many useful features such as plan, collaborate and deliver better with Scrum pillars, keep product backlogs and information on roles, keep track of reports and metrics, enables agile item tracking such as releases, sprints, defect stories, and acceptance tests. This tool can be integrated into well known tools like JIRA, Jenkins, Redmine, Mantis, Trac to support version controlling, bug tracking, continuous integration, and IntelliJ IDEA. Other important features can be reported as enabling collaboration through virtual task board, instant messaging property, and extensibility, providing API for web services, embedded HTML widget, and slack integration. More features such as cloud storage and feedback options will be available within the professional version.

2.8. SprintGround

SprintGround is excellent choice for agile software developers, providing an effective task management: organize, classify, plan, refine and explore tasks. Issue and bug tracking, track time, automatic estimates, and development progress are some of the features that the tool provides. Additionally, this tool enables collaboration with the members and task management in real time, organizing suggestions, queries and feedbacks, and the visual analysis of the stuff phenomenon in the project, along with supports to Scrum and Kanban approaches.

2.9. VersionOne

VersionOne is useful for Agile software development professionals especially working in distributed environments, assisting agile framework, Kanban, and Hybrid approach. This tool is connected with software development environment easily. Most important features of this tool can be listed as: end to end visibility, team integrity, customizations, user story management, release and planning of sprints, storyboard, task board, test board and test tracking.

2.10. Taiga

Taiga is ideal tool for developers, providing open source, issue tracking, multiplatform importers, and simple customization. Taiga supports Scrum and Kanban approaches. It also provides video calls facility to team members.

2.11. Agilean

This tool is used in project planning and workflow automation, mostly suitable for small and medium enterprises. Main features include execution, monitor, bottlenecks and feedback plan, stand up meeting automation, release management, reflective analysis, and envision documents.

2.12. Wrike

Similar to the previous tools, Wrike also enables customization and collaboration among team members by providing flexibility to administer multiple projects and teams. During the agile process, developers will receive the recent and accurate information. The tool also provides email integration through project management.

2.13. Trello

Trello, a tool based on Kanban approach, is one of the popular project management tools. It is supported by the mobile platforms. Projects are defined by boards including lists, where every list has progressive cards, used as drag-and-drop. Additional good features can be listed, such as integration with other applications and using checklists, ability to write comments, notes and add attachments.

2.14. Axosoft

This tool is used along with Scrum to enable centralized project management with feedback support and communication with the client. It also provides planning for development, identifying the steps of the process, effective collaboration for the developers, detecting and resolving issues on time before delivery stage.

2.15. Planbox

Planbox is cloud-based agile project management tool and supports Scrum approach. This tool can be used in both suitable for small, medium and large organizations. It allows team members to coordinate and move software development into agile life cycle. Main features of the tool include version management, monitoring iterations, stories, tracking backlog, preferences, roles, sprints, and estimation. Additionally, providing features such as to-do lists, time trail, file sharing, reporting, messaging, evaluation, etc.

2.16. Asana

Asana is one of the best task management tools, allowing teams to contribute, coordinate, and trail the development of the assignments. Each assignment can include note, remarks, notes and marker. This tool is easy to use, suitable for both small and large processes.

3. Discussion

As described in the previous sections, many kinds of agile project management tools are present. Some of them are specific, used for type of agile methodologies such as Scrum, Kanban, XP, whereas others are more generic, used for all type of agile methodologies or any sector.

The chart in Appendix compares 16 agile project management tools, which are outlined in preceding sections are described side by side on a characteristic basis. These characteristic are chosen according to the results of survey which were described by respondents as their needs [15]. Jira is one of most popular agile project management tools with pricing. The reason behind popularity of Jira is that it supports 15 out of 19 characteristics. Every team has a unique process for shipping software. Jira allows workflow adaption. Project manager can choose an out-of-the-box workflow or create one to match the way his team works. The remarkable thing which increases productivity is that Jira offers integration with the tools already in use. For instance, Jira automatically updates issues and transitions' work when code is committed in Bitbucket. This feature is time saving and increases collaboration [18].

This is also supported by Matta and Marchesi [4] reporting based on their survey results that the most tweeted and most appreciated Agile project management tools are Jira, Trello, and VersionOne. Matta and Marchesi [4] also observed that the popularity of Jira and Trello is increasing based on the information provided by Google Trends, during September 2014 and March 2015 their survey duration.

SpiraTeam by Inflectra and Pivotal Tracker are other pricing and popular agile project management tools. Although these tools require pay price to use, project managers prefer using them for which especially have workspace characteristic. Workspace gives flexibility to users and increase collaboration among team members [21]. In terms of cloud based, eight tools are compared. Recently, cloud computing which is based on Internet technology which has gained an important interest in IT environment. In the literature, several studies have been conducted and revealed that agile methodologies and cloud computing have based their features on the necessities for small and large organizations as well as on an understanding of the project group [11].

Some of tools give opportunity free and price usage according to number of users. It can be important for small companies, which have three to five employees. As number of employees increase, price versions are used. Icescrum, Trello and Asana are quite appropriate for senior projects, which will automate some of your most cumbersome communication and collaboration tasks. Satisfied companies praise it for accuracy and time-effectiveness, and are particularly satisfied by tracking tasks, and debate them in real time [22]. Taiga, Axosoft, Agielan, Planbox are more appropriate for start-up projects. Since, as number of features increases, the usage of tools becomes more complex and this feature decreases productivity.

4. Conclusion

This paper provides a brief perspective about the best Agile project management tools popular among software professionals. Applying agile methods provides the opportunity for both the developer and client to have a more open and flexible model on the project and product that has to be developed than using the conventional way of developing software. Agile methodology is represented by many changes during the product development, along with flexibility and teamwork. In order to get best results in terms of team communication and resource allocation while using agile approach, sixteen popular Agile project management tools have been presented to assist agile developers to plan and manage their tasks in an efficient manner. Taiga, Axosoft, Agilean, Planbox are more appropriate for start-up projects. Jira, Trello, and Version One are the most tweeted and most appreciated agile project management tools. SpiraTeam by Inflectra and Pivotal Tracker are other pricing and popular agile tool but still popular due to workspace characteristic which provides flexibility to Agile developers and increase collaboration among team members. More attributes and Agile project management tools can be included for comparison as future research direction. Also, survey-based questionnaire and interview from Agile professionals and managers may provide additional insight in this regard.

References

1. PMI. Pulse of Profession. 2017, 26 July 2019.
<https://www.pmi.org/>
2. Mishra, D., A. Mishra. Complex Software Project Development: Agile Methods Adoption. – Journal of Software Maintenance and Evolution: Research and Practice, Vol. **23**, 2011, No 8, pp. 549-564.
3. Beck, K., et al. Manifesto for Agile Software Development. 2001.
<https://agilemanifesto.org/>
4. Matta, M., M. Marchesi. Understanding Approval Rating of Agile Project Management Tools Using Twitter. – In: Proc. of 10th International Joint Conference on Software Technologies (ICSOFT'15), IEEE, 2015.
5. Versionone. 8th Annual State of Agile Survey, 2013.
<http://www.versionone.com/pdf/2013-state-of-agile-survey.pdf>
6. Mishra, A., D. Mishra. Software Project Management Tools: A Brief Comparative View. – ACM SIGSOFT Software Engineering Notes, Vol. **38**, 2013, No 3, pp. 1-4.
7. Lin, J., et al. Studying Task Allocation Decisions of Novice Agile Teams with Data from Agile Project Management Tools. – In: Proc. of 29th ACM/IEEE International Conference on Automated Software Engineering, ACM, 2014.
8. Hanakawa, N., K. Okura. A Project Management Support Tool Using Communication for Agile Software Development. – In: 11th Asia-Pacific Software Engineering Conference, IEEE, 2004.
9. Versionone I. 8th Annual State of Agile Survey. VersionOne. 2014, Inc.
10. Raith, F., I. Richter, R. Lindermeier. How Project-Management-Tools are Used in Agile Practice: Benefits, Drawbacks and Potentials. – In: Proc. of 21st International Database Engineering & Applications Symposium, ACM, 2017.
11. Boehm, B., R. Turner. Management Challenges to Implementing Agile Processes in Traditional Development Organizations. – IEEE Software, Vol. **22**, 2005, No 5, pp. 30-39.
12. Damian, D. E. H., et al. Using Different Communication Media in Requirements Negotiation. – IEEE Software, Vol. **17**, 2000, No 3, pp. 28-36.
13. Babar, M. A., B. Kitchenham, R. Jeffery. Comparing Distributed and Face-to-Face Meetings for Software Architecture Evaluation: A Controlled Experiment. – Empirical Software Engineering, Vol. **13**, 2008, No 1, pp. 39-62.
14. Babar, M. A., et al. An Empirical Study of Groupware Support for Distributed Software Architecture Evaluation Process. – Journal of Systems and Software, Vol. **79**, 2006, No 7, pp. 912-925.
15. Azizyan, G., M. K. Magarian, M. Kajko-Matsson. Survey of Agile Tool Usage and Needs. – In: 2011 Agile Conference, IEEE, 2011.
16. Ebert, C. Managing Global Software Projects Software Project Management in a Changing World. G. Ruhe, C. Wohlin, Eds. Springer, 2014.
17. Highsmith, J. R. Agile Project Management: Creating Innovative Products. Pearson Education, 2009.
18. Jira Software. July 26 2019.
<https://www.atlassian.com/software/jira>.
19. Rodríguez, J. P., C. Ebert, A. Vizcaino. Technologies and Tools for Distributed Teams. – IEEE Software, Vol. **27**, 2010, No 5, pp. 10-14.
20. Perez, J. J., S. Guckenheimer. Software Engineering with Microsoft Visual Studio Team System. Pearson Education, 2006.
21. Dubakov, M., P. Stevens. Agile Tools: The Good, the Bad and the Ugly. Report, Target Process, Inc, 2008.
22. Taheri, M., S. M. Sadjadi. A Feature-Based Tool-Selection Classification for Agile Software Development. – In: SEKE, 2015.

Appendix. Comparison of Agile Project Management Tools

Name	Platform Based	Web Based	Online	Cloud Based	Burn Down Chart	Agile Boards	Milestones	Resource Management	Time Tracking	Bug Tracking	Tasks	Integration	Reports	Documents	Version Control	Workspaces	User role	Pricing	Free Version
Jira		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	
Active Collab			✓	✓					✓		✓		✓	✓			✓	✓	
Agilo for Scrum	✓					✓					✓		✓	✓			✓	✓	
SpiraTeam by Inflectra	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	
Pivotal Tracker			✓			✓			✓				✓	✓		✓	✓	✓	✓
VSTS			✓		✓	✓	✓		✓		✓		✓	✓	✓		✓	✓	✓
Icescrum	✓		✓	✓	✓	✓				✓		✓	✓		✓		✓	✓	
SprintGrounds			✓		✓		✓			✓	✓	✓	✓		✓		✓	✓	✓
VersionOne			✓			✓	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓
Taiga	✓	✓				✓	✓				✓	✓	✓	✓	✓		✓		✓
Agielan			✓	✓		✓				✓			✓	✓					✓
Wrike	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓	✓
Trello			✓	✓		✓	✓		✓		✓		✓	✓					✓
Axosoft			✓	✓	✓	✓	✓	✓				✓							✓
Planbox			✓	✓			✓	✓	✓		✓								✓
Asana	✓		✓			✓	✓	✓			✓		✓						✓

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