

HYBRID AGILE PROJECT MANAGEMENT PRACTICES: NOVEL APPROACH FOR IMPROVING PROJECT MANAGEMENT

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Abstract: Agile Methods have grappled the market due to its response to volatile requirements. Traditional software project management practices are not suitable for managing agile project due to lack of big upfront. A new approach agile project management has been evolved to cope up management requirements of agile projects. It is an iterative approach with certain practices such as daily meeting, version controlling customer involvement etc. These practices are helpful in reviewing and controlling the project through collective decisions of team members. We have analyzed both agile and traditional project management techniques and draw a comparative analysis. We also suggested Hybrid Agile Project Management(Hybrid APM) that can be incorporated with traditional project management to improve the quality of the project. Although, agile methods are not suitable for life critical systems blending of agile management practices with traditional software project management can be used for traditional projects for better result.

Index Terms: *Agile Project Management, Software Project Management, Statement of Work, Agile Methods, Burn down chart, Grant chart, Dash board.*

1. Introduction

A software project has mainly two activities: one is the engineering and other is the project management. Engineering deals with the designing, coding, testing etc. While the project management deals with the proper planning, way to achieve project goals, project cost, schedule and quality etc. In other words, project management is the well defined approach executed in a systematic manner in order to achieve the objectives and tasks defined for the project. It is always an important activity in case of any software development methodology.

In modern era, Agile Methods (AMs) have grappled the market due to its response to volatile requirements. AM believes in short iterations, accommodate last minute changes and deliver working software to the customers. AMs give more importance to individual interaction, working software, customer collaboration and responding to change than old practices of traditional software development. Management of customer incremental requirements, progress of project and managing uncertainties in short iteration generate the need of an efficient way of project management. Traditional Software Project Management (TSPM) involves very disciplined and deliberate planning methods that deal with big upfront. Thus, it is not suitable for AMs due to lack of big upfront and unpredictable customer requirements. Agile Project Management (APM) is an effective project management technique to handle the uncertainties in requirements, environments and staff. Therefore, it is suitable for today's competitive environment. Although, it is developed for agile methodology but some of its practices can be used in traditional software development to improve software quality.

In this paper, we compare the traditional project management methods with agile project management and a proposed blending of both of these methods that will have light way to handle project management activities but with discipline and control manner. Section 2 depicts both software project management approaches (TSPM and APM) with its practices. Comparison of these two methods is drawn in Section 3. Lastly, blending and conclusion with future research scope is derived in Section 4.

2. Software Project Management

Project management has almost become a new paradigm for getting work done in most corporations around the world [1]. The main objective of software project management is to deliver high quality project with in time and budget. Project management incorporates the activities such as project planning and scheduling, estimating resource requirements, staffing, coordinating activities and resources etc. These activities, enables the manager to handle the situation in crisis and keep track of progress of the project. According to PMBOK project management is defined as "Application of knowledge, skills, basic tools and techniques to project activities in order to meet project requirements" [2]. It involves competing demands for scope, time, cost, risk and quality, from a variety of stakeholders with differing needs and expectations, with identified requirements [3]. Effective project management has following benefits

- Ability to define and control project scope.
- Improved communication among project participants.
- Accurate projection of resource requirements.
- Identification and communication of problem areas.
- Improved assessment and mitigation of project risk events.
- Clarification of and alignment with organizational goals [3,4].

The aforesaid goals can be achieved by performing following activities in efficient way

- Project planning
- Project monitoring and control
- Software requirements

- Risk management
- Improving software process

In following subsection describe TSPM and APM in detail

2.1. TSPM

TSPM involves very disciplined and deliberate planning and control methods that has distinct project life cycle phases. Tasks are completed one after another in an orderly sequence, requiring a significant part of the project to be planned up front. Traditional project management assumes that events affecting the project are predictable and that tools and activities are well understood. In addition, with TSPM, once a phase is complete, it is assumed that it will not be revisited. The strengths of this approach are that it lays out the steps for development and stresses the importance of requirements. It also deliver the documents as output of each phase such as Statement of Work (SOW) from scope, grant chart for scheduling, risk assessment sheet etc.

The limitations are that projects rarely follow the sequential flow, and clients usually find it difficult to completely state all requirements early in the project. This model is often viewed as a waterfall. TSPM assume all the requirements are known in advance before the beginning of the project and minor changes in the software requirements are acceptable but major changes are avoided. Therefore, all the activities in TSPM are predictable and initial planning and scheduling is done for complete project. Big upfront is useful in identifying accurate prediction of duration, resources and worst consequences. TSPM is heavy weight project management techniques that generate heavy documentation and require more time for project tracking. The failure of the project was due to lack of skills rather than inappropriate feasibility, suitability, or acceptability of the solution i.e. inappropriate project management techniques. Today, in mobile technology, lack of big upfront, market forces, stress of changing staff are prevailing to use shorter plan and light weight techniques to manage software development.

2.2. APM

The decisive aim of any organization is to increase the performance to meet the requirements of the project [5,6]. As the traditional project management is ineffective in producing the better results then it is very necessary to find new methods of designing and delivering projects. APM is highly iterative and incremental activity in which project manager, team members and stake holders, user are primary actors[7]. They work together in collocated environment to identify the domain, objectives and prioritizing the functionality of the system. It is mainly suitable for frequent requirement change, staff change and technology change due to its adaptive characteristics [8]. APM works on the principle of review and improve which emphasizes on review the process, project and operation consciously to improve the performance in next iteration. It does not require big upfront to derive complete duration and estimation as it derive the estimation and cost for only features that are to be implemented in current iteration [9]. There are various key components in AM which provides the basis of APM. These key components are vision control, test driven development, collocated high performing team, adaptive control etc.

Vision control is a way to control and monitor the progress of the project. This is a “cards-on-the-wall” method of planning to assist a team in organizing the work of the project. For example, one successful agile project team placed different color groups of cards that represented the features of the solution on the wall. The features that were designed, developed, tested and in production were one color, the features that were designed, built, tested but not yet put in production (but ready to go) were another color. The team was able to see at a glance where they were with each feature set. Visual control is a valuable technique for all projects, since it ensures that every member of the team views the project the same way[10].

Daily Meeting is of 15 minutes daily meeting to explore what we did yesterday, what we are doing today and do you have any impediments? By answering these three questions, the entire team is aware of current status of the project and issue are brought to in front of entire team to get quick remedy [9].

Running tested feature metric(RTF) is useful to evaluate the progress of the project. RTF is count of features that are ready to deploy. RTF enables the team to know their efforts in developing the projects. Low RTF values are alerts to team about their productivity. Team performs root cause analysis to find out the reasons of low productivity in case of low RTF[11,12].

Feedback from customer and team member helps to improve software quality and usability. It also improve user interface. APM evaluates the productivity of the team on the basis of velocity and feedback. Velocity is number of stories completed in one iteration. Depending on the velocity of current iteration, schedule of the project re-estimated. Velocity chart per iteration provides better information on code quality also. For example, if the team velocity is decreasing in successive iterations is reflect poor code quality i.e. most of the team members are busy in removing defects in previous code not working on new features [12].

Burn down chart indicates the actual work completed against the planned work. It is efficient way of tracking the project progress[13].

2.3 TSPM vs. APM

APM and TSPM have same objectives to deliver the project on time and in budget with higher quality of customer satisfaction. However, both follow different approaches to achieve it.

One way to distinguish the differences between traditional and agile project management is to look at a process as a control system [14]. TSPM is typical to adopt the defined (theoretical) modeling approach when the underlying mechanisms by which a process operates are reasonably well understood whereas APM is an empirical approach adaptive to change when process is very complicated and unable to defined complete set of requirement in the beginning. Empirical process control i.e. APM relies on frequent inspection and continuous adaptation to minimize risk and produce quality product. APM implements *empirical* process control through iterations, frequent increments of working, and tested functionality. Requirements emerge through the efforts of self-organizing small teams, and direct collaboration with the stakeholders

TSPM require special team for managing the activities in which they are not directly involved whereas APM prefers the same team for development and management. Therefore, estimations of project are more practical. Again, AM uses easy estimation methods based on analogy, expert opinions that requires less time and more accurate than algorithmic methods such as COCOMO II and function point analysis. AM emphasizes on individual interaction over process and tools therefore APM also strongly recommend oral communication instead of heavy documents. APM also have documentation but based on lean practices that recommend eliminate waste[14,15]. TSPM interacts with customer only at the time of information gathering. Thus, customers are not aware of accurate status of the project. On other side, APM involves the customer throughout the project thereby wining trust of customer by providing realistic figures of project status[16]. Table 1 summarizes the differences in both the approaches.

APM is a need of today but TSPM is also generated successful projects in past. Some of the techniques such as proactive risk management techniques are proven to be good practices. APM practices such as daily meetings, version controlling may be utilized in TSPM to get better result. In this section we compared both the methods based on their attributes [17] as shown in Table 1.

Table 1: TSPM vs APM

Attribute	TSPM	APM
Key Focus Area	Process	People
Customer involvement	At initial stage and in last stages	Customer feedback and involvement is very important at every stage of software development life cycle
Management	Controlled	Self managed team and facilitator
Technology	Depends on Software Requirements	Mostly object oriented and reusable code for fast delivery
Testing	A separate testing phase in SDLC	Follow test driven development
Task priority and collection	At beginning all requirements are collected and prioritize	Requirements are prioritized in each iteration and backlog is also included along with customer feedback
Documentation	Huge	As per requirements and believe in lean development

Thus, it is clear from Table 1 that APM is the demand of today due to rapid software development [18,19]. Although, due to flexibility and lack of documentation, APM has been treated as cowboy management techniques. Therefore, there is scope of improvement in APM for building trust amongst the developer.

Table 2: TSPM and APM Development Approaches

Sr. no	TSPM	APM
1	Required BUF initially to plan the things	Big up front not required
2	Predictable method	Suitable for volatile requirements
3	Sequential Approach	Iterative and incremental Approach
4	Importance to document	Less documentation
5	Considerable amount of time required	Less time
6	Big bang	Just in time
7	Team is different from development team	Same team used for development and management
8	Customer involvement at initial stage only	Full participation of customer
9	Risk management plan is to assess the risk	Reduces the risk from continuous integration
10	Communication with development team and among the team is periodically	Continuous communication preferably face-to-face
11	Feedback is not in project management	Feedback is important activity to improve successive cycles
12	SOW, WBS, RAS, Cost estimation details	Dash board, version control, automated test build, burndown charts etc

3. Hybrid APM

In this section, we propose a hybrid project management techniques for software development to deliver the software on time with higher customer satisfaction along with a case study.

Proposed method suggest blending of traditional project management and agile practices to get better project management in formalized way. This blending of both practices advocates following practices must be carried out to keep bird eye view on project development. These practices are

1. The involvement of customers in project management tasks is only at beginning for task prioritization and in between to address the issues related to requirements and feedback only.
2. Initial documentation of project activities and its responsibilities must prepared
3. Sprint and standup meeting must be carried out for project review.
4. Continuous integration and test driven development helps to mitigate risk must me followed.
5. Early estimation and iterative estimation process specified in generalized estimation process need to followed for optimization of time and size of project[17].
6. Team must be self organized and one supervisor must be included in team to monitor efficiency of team or measuring team velocity.
7. Dashboard , burn down chart must be included in project management activities.

Thus, inclusion of documentation in each iteration not only builds the trust amongst team but also useful to identify the gaps in project development activities. Moreover, customer involvement at beginning of each iteration is useful in getting the feedback on working software and inline the project management activities.

4. Conclusion

Hybrid APM addresses the project management of agile practices in formal manner. Agile practices are suitable in the volatile environment where requirements are uncertain. Hybrid APM emphasizes on highest customer satisfaction that is achieved through delivering highest priority features first and taking continuous feedback on release feature to remove the defect of current release in next release. Controlling all these activities with involvement of customer at initial level of each iteration gives customers insight on the project and develops the product with higher customer satisfaction. However, AMs are not suitable for life critical system but hybrid APM can be applied to any software development process. Incorporating agile management techniques into projects fosters a focus on the benefits of each feature. In traditional project management, the teams strive to finish the project on time and under budget and often lose sight of the overall benefits the entire effort is intended to bring the organization. It's important to remember the strategy the project is expected to advance as well as the total cost of ownership and not just the project costs.

APM is used mainly in low accuracy and higher customer satisfaction projects such as in chatting, MIS application where as the application requiring scientific inference with higher accuracy are using traditional software management. In our opinion, blending of traditional software project management and agile software project management yields better result as compared to individual.

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