

Software Process Models for Mobile Application Development: A Review

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Abstract: Mobile Industry is rapidly growing and has dynamic environment. Here in mobile industry, the User Requirements are changing with time and change is frequent. So developers are hunting for flexible software process models that can adjust to frequently changing system requirements and produce valuable software in short duration with low budget. Literature survey shows that among various software process models, Agile model is best suitable for mobile applications because it follows a combination of iterative and incremental approach which helps the project to adapt to changes rapidly. There are various Agile process models like Scrum, XP, Lean, Kanban, Crystal, FDD, ASD and DSDM. Literature survey shows that instead of using any one Agile process model solely, combining the main strength of Scrum, XP and Lean will prove to be an ideal software process model for mobile application development.

Keywords: Agile, Scrum, XP, Lean.

I. INTRODUCTION

Software process model describes a sequence of activities carried out for developing software. A generic framework for software engineering defines five framework activities i.e. Communication, Planning, Modelling, Construction and Deployment. All software process model can put up the generic framework activities, but each applies a different emphasis to these activities and leads to a process flow that appeals each framework activity in a different manner. There exists various process models like waterfall, spiral, RAD, Agile etc.

Process model selection for developing a software depends on the software project characteristics. For mobile application development, we need to understand the characteristics of mobile application. Main characteristics of mobile application are:

- User Requirements are changing with time. Change is frequent
- Development time is short.
- Emphasize is more on User Interface.

Keeping these requirements in mind, a flexible software process models that can adjust to frequently changing system requirements in short duration with low budget is what is needed for mobile application development. The uncertainty in mobile application development thus requires an iterative and incremental model. Agile is identified as most suitable process model.

A. Paper Outline

Section II describes why Agile is most appropriate software process model for mobile application development among various software process models. Section III shows various software process models which were proposed but does not have a case study which shows its use in practice. Section IV describes the characteristics of Agile process models- Scrum, XP and Lean. Section V shows that combining the features of Scrum, XP and Lean together can be an ideal software process model for mobile application development.

II. Agile Overview

Agile: A suitable software process model for Mobile Application development.

Agile software development uses iterative development as a base but it differs from other traditional software process models as it has more customer-centric viewpoint. Agile process model uses continuous customer feedback to successively refine and deliver a software system.



Why Agile is best suitable for mobile applications?

- It follows a combination of iterative and incremental approach where the entire SDLC is broken into small iterations which helps the project to adapt to changes rapidly.
- It minimizes overall risk.
- It gives importance to Customers and their feedback.
- It believes in self-organizing teams and customer collaboration for developing an amply satisfied product.
- Numerous cycles of testing and quality assurance increases reliability.

III. Proposed methods for mobile software development

Mobile-Dbased on Crystal methodologies and Rational Unified Process RUP and eXtreme Programming XP was proposed by Abrahamson in 2005 which comprises of following phases: Explore, Initialize, Product-ionize, Stabilize, System Test and Fix. Mobile-D is proposed to be used by a small team involved in a short development cycle[4].But there is no case study

which shows that this paradigm is used in practice.

HME(Hybrid Method engineering) proposed by Rahimian in 2008 is based on a combination between agile methodologies, Adaptive Software Development (ASD) and New Product Development(NPD)[5]. It has four iterations.

- Method is thoroughly taking market considerations into account in first iteration.
- New product Development is involved during second iteration.
- Adaptive Software Development ideas are incorporated during third iteration.
- During fourth iteration prototyping is added.

The published material on HME does not show any case study which says this methodology has been tested on actual mobile software.

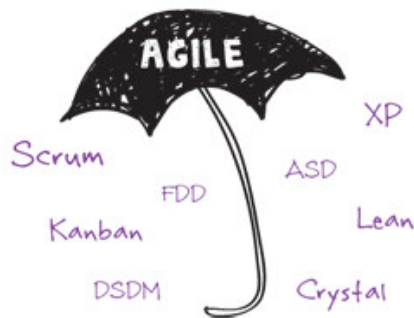
MASAM(Mobile Application Software Agile Methodology) is based on eXtreme Programming (XP) and the Software and Systems Process Engineering Meta model(SPEM)[6]. Its strategy is same as Mobile-D method with enhancement such as project management and followup tool integrated with Eclipse Process Framework. It has four phases: The Preparation Phase which assigns roles and responsibilities. The Embodiment Phase which focuses on understanding user expectations i.e. user requirements. The Product Developing Phase provides an iterative Extreme Programming (XP) development sequence through Pair Programming, Refactoring, Test-Driven Development and Continuous Integration, with a close relationship with iterative testing deeds. Commercialization Phase focuses on product launching and product selling activities.

This methodology can be used for small companies but no case study show that this methodology is implemented in a real world environment.

SleSSproposed by Cunha in 2011 assimilates Scrum and Lean Six Sigma (LSS) focuses on process improvement and project management respectively[7]. This method easily adapts to requirement changes even in the last stage. It helps in meeting deadlines. It delivers product rapidly. It helps in achieving performance and quality targets. It reduces cost. It improves project outcome with less defects and failures. The approach was tested with average size of 529 LOC (Line of Code).

IV. Scrum, XP and Lean

Agile software process model concentrates on people and not technologies. Soone should make use of those technologies that arewell known by the team and that is significant for our organization. Agile is an umbrella that has various agile methodologies which include Scrum, XP, Lean, Crystal, FDD,Kanban, ASD and DSDM. They all share Agile characteristics.



Now,which methodology should be adopted depends on the team.It is concerned with:

- Which methodology the team members are well acquainted with?
- How is your team organized?
- How big your team is?

Based on the literature survey Scrum, XP, and Lean are most widely preferred Agile methods.

Scrum:Scrum is the most effective agile method with following features:-

- Project management frame work.
- Self-organized and Diverse skilled team.

- Clear visibility of project development by daily meetings.
- Iterative in nature so follows changes quickly.
- Sprints are shorter so it provides quick feedback and thus changes can be incorporated quickly.
- Finds bugs at early stage and thus can be resolved faster.

Extreme Programming(XP): XP is the next most preferredmodel. XP has following features:

- Pair Programming: XP Programmers work together at one machine and write production in pairs. One behaves as a driver who writes the code and other as an observer who focus on the strategicaspects and checks forprocess convulsions into other parts of the project.
- Test Driven Development: Here developers first write trial version of software to check its correctness and then the final software is developed fulfilling all the requirements pointed in trail version. Acceptance tests are provided by customer which ensures than all the required features are incorporated in the software.

- Continuous Integration: Codes developed by individual developers are integrated with each other on continuous basis requiring continuous integration at least once a day. Focus is to integrate new features and changes immediately into the system.

Lean:Lean is the third preferred approach. Lean focuses on reducing waste, continual learning and improvement.

- Eliminate waste: It eliminates unnecessary code and functionality, requirements which are not clear, incomplete testing and slow internal communication.The aim is to eliminate

everything that does not benefit the customer.

- Continual learning & improvement: Customer's feedback is taken continuously to develop the software. Team is continuously learning and thus improving the product as per customer requirement.
- V. Combination of Scrum, XP and Lean- Ideal for mobile application development.

Literature survey shows that mixture of agile approaches, specially, Scrum, XP, Lean can best fit for mobile application development than applied exclusively[1].

Main strengths of XP are: -High satisfaction of customer, Simplicity and adoption to changing requirements.

Main Strength of Scrum is project management ability. But as Scrum lacks in software development life cycle (SDLC) phases, XP is essential to support Scrum principles.

Lean focuses on eliminating waste and improving quality of product by continuous learning throughout the software development process. It can be well integrated with other agile methodologies as it does not specify any technical practices.

Thus, combining the above strength of Scrum, XP and Lean together can prove to be ideal for mobile application development.

Conclusion

Literature survey shows that agile approaches are best apt for mobile application development. Also instead of applying any one agile methods solely a combination of appropriate agile methods should be used which will help us to meet mobile industry requirements.

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