Key Practices of Agile Methodologies for Software Project Development

Kartiki Bhamre
Research Student, VIIT Baramati
Savitribai Phule Pune University, Pune India

Dr. Amol Goje
Research Guide, VIIT Baramati
Savitribai Phule Pune University, Pune India

Abstract:- The implementation process of an IT Industry focuses on Software Development activities and efficient practices of software Project Management. Software Project Management is a well-organized task, which is an assemblage of numerous proceedings done in order to attain an objective. An agile methodology is an effective tool to accomplish successful implementation of software projects. Agile development is contemporarymethod which deals with speedydistribution of quality software. Agile helps to involve customers completely in development of software, so the business requirements of customer can be accomplished, ultimately it reaches to the development organizations and customersbusiness objective. Research paper highlights the agile development cycle, details of agile methodology, and three different approaches of agile methodologies, Significance of SCRUM methodology, Extreme Programming and Feature Driven Development methodology.Advantages and limitations of agile methodologyare elaborates to help IT professionals and academician.The thought of paper accomplishes on the range of agile models and their performance with respect to effective software project management practices.

Keywords:- *Agile Development Cycle, Agile Methodology, Project Management, Software Development, SCRUM, Extreme Programming, Feature Driven Development.*

I. INTRODUCTION

Agile contributes the IT Industry to be equipped for the volatility. It primarilyponders on points as ways of achieving the objective by working together,to plan, to build and to deliver software. As software is providing services and solutions in many domains, those are getting more multifaceted. Constant changes in customer requirements tend it more challenging. Hence new methodologies for software development are evolved, as agile methodologies, significantly to solve problems occurred while developing software project. The recentpractices include amendments to development processes of software projects. This results into delivery of industrious and flexible software projects and products.

Agile describes as the skill to proceed furtherswiftly, efficiently and simply. Even it respondseasily to change requirements, these significance is the essence of agile software development methodology.Agile methodology is an umbrella for anenormous variety of practices and techniques for developing software. Practicing valued principles and rules help team to work together on their own areas for developing unique features.

Scrum is a splinter of agile methodology. Scrum is a framework of lightweight process for implementing agile development for software project management. Usage of the methodology is wide spread across the world.Extreme Programming is an agile methodology which has been practiced for providing software solutions for unsteadysituations. It serves elasticity and tractability in entire modeling process.Reducing the cost of software requirement changes is the vitalobjective of extreme programming methodology.

Feature driven developmentcontributes in proceeding larger size projects in forward direction and obtain repeatable success. Five sequel stages assist to make sure that work is done in less time and easily.

Feature driven developmentbased on established principles and standards for practicing software development. Ultimately it serves efficient, easy and recognized practices in IT Industry.

II. PROJECT MANAGEMENT IN IT INDUSTRY

The Indian IT industry is rising steadily despite the global meltdown at some point of times in last three decades. Information Technology is growing significantly because expansion into varied verticals and domains well differentiated service offerings, forming development teams across globe and importantly by adopting new development methodologies for developing software projects.

The main reason of the rapid development of IT industry is its enormous reservoir of technically skilled manpower and their abilities to adopt new methodologies for implementing software projects.

Software Project Management comprises a group of taskswhichhas to be utilized while implementing various phases of software project development. The prime factors of Project Management are Project, People, Process used to produce the project and significantly the methodology used for developing entire project which has to be delivered to the customer.

The implementation process of an IT Industry focuses on software development activities, processes of software project management. Hence, the practices of software project management are well-organized tasks, which is

anassemblage of numerous proceedings done in order to attain an objective.

III. SOFTWARE DEVELOPMENT METHODOLOGIES

For developing efficient software, numerous software development methodologies plays key role. In IT industry various development methodologies are utilized to serve synchronized software development as per business requirements.

Software engineering explains the significance of the software development methodology as a foundation which is utilized to design, developing blueprint, and monitor the procedure of developing software.

The framework for software development methodology was not introduced up to the 1960s.The traditional systems development life cycle methodology was considered to be the hoariestdignified methodology for designing and developing a software systems.

Software engineering gives the direction for dividing the software development work into numerous unique phases to enhance planning, designing, entire project management. This consists approaches for defining outcomes as software deliverables and its associated artifacts which has to be formed and accomplished by an entire project squad for implementing development of project and maintenances of an application.

Numerous software development ways are practicedfrom the time wheninformation technology has been shaped. In general styleof development methodology was finalized by development organizations management or elseby development team itself. Waterfall model consists, requirements specifications, design, Implementation, Verification, and maintenance phase.Waterfallmodel focuses on two important things as project planning and development of quantified business requirements.

Primaryrule of this way of development is to follow the array of the project phases mandatorily. Upcoming project development stepscannot instigatetill the earlierphase has beencompleted.

This model helps for clearly specified projects as a solitaryproduct to release which has confirmed deadline. Subsequently, model needexhaustive planning, detailed documentation of project plans, implementation processes and requirements. It requires complete control on the development cycle and its associated processes.This must help to move further on decided time, as per budget decided in agreements, withminimum risks, for achieving specified and estimateddeliveries of project functionalities.

Hence, waterfall method becomes lengthy, time consuming, pricyas well as rigidbecause of the various constraints in processes. In-efficiency of model to regulate the product or deliverablein market which has constantly growing requirements of customer's. Thisfalloutsas excess time, over use of resources and ultimately a great financial loss. Hence, lastly the project gets failed.

Traditional methodologies as waterfall model have discretesegments. Software development life cycle (SDLC) methodology, waterfall methodology have altogether opposite line of process than agile approaches. It describes the practice of iterations, where designing of project, development of modules, testing of release and activities of project launch can happenconcurrently.

Other traditional methodologies are used in prototyping model, incremental development model, spiral development model and rapid application development models.

IV. AGILE METHODOLOGY AND PRACTICES

The name was invented 2001 when theAgile Manifesto was originated. Iterative as well as incremental development methods can be traced back to early 1957,[9] with evolutionary practices of project management. Afterwards, in 1970 the adaptive software developmenthas been emerged.

After a long time, in1990s, several lightweight software development methods are introduces and developed in response to the widespreadtraditional methods, which are characterized as excessivelycontrolled, prearranged, scheduled and well organized. These methods are named as RAD (rapid application development), (DSDM) dynamic systems development method and (UP) unified process.

Scrum methodologyhas been originated in 1995; sequentially, extreme programming (XP) and crystal clear are introduced in1996; lastly, the most useful feature-driven development was presented in 1997 before publication of Agile Manifesto.

In 2001, Jeff Sutherland,Jim Highsmith, Ken Schwaber, Bob Martin and Alistair Cockburn discussed lightweight development methods, among others and published the Manifesto for Agile Software Development [7],[10].

Software development with agile method which is utilized to design a well-organized software project management practices. This allows some normalmodifications in the software while developing a project. Agile software development methodologies arethoughtful structure for commissioninga variety of software engineering projects. This process are practiced to reduce the risk of designing and developing software inlesser time. This short period of development lasts for seven days to thirty days and this is named as iterations.

Agile methods always attempt to reduce the risk by identifying bugs regularly, it helps to control cost overruns, and frequent demands of change requests in development phase of software. This is possible because of entire development happens in iterations.

The advantage of multiple iterations helps to improve efficiency by finding and fixing defects and gauging the gaps between customer expectation and developed productat early stage of project development.

Agile methods always believes on instantaneous communication concept, which supportupcoming users to be in workflow and catch the speed with help of documentation. But it need complete and detailed documentation. The advantages of the software development are understoodtimelybecause of the incremental addition of the iterations. Agile methods are analogous to Rapid Application Development, and these can be less productive in largesize

organizations. In IT industry developers, designers, process implementers and management are happy to use waterfall method. Hence professionals may feel challenge while adapting agile processes, and so fusion of waterfall and agile approach are used in industry.

Agile based software development isgrounded on iterative development. In this project requirements as well as software solutions propagate inassociation of self-organizing cross-functional teams.

Iterative development of agile method serve lighter and human resource oriented viewpoint which is absent in traditional development practices.Agile processes profoundlyintegrate iteration and thinks on constantresponse of customer which offersimprovements in releases and finally launches a successful software project.

Product owner, Scrum master, cross functional team members are roles played while implementing software development project using Agile Methodologies.

Agile method has voluminous forms of efficient development methods as scrum, crystal, extreme programming (XP), and feature-driven development (FDD).

A. Agile Development Cycle

Agile methodologies uses iterative line of implementation of performing various activities insoftware development.

Agile projects consists small cycles called as sprints. Number of these cycle are based on business requirements. Actually every cycle is small project itself.Prime entity of sprint is backlog which containstasks related to design, sprint implementation, respective testing of features developed and decided deployment of phase.

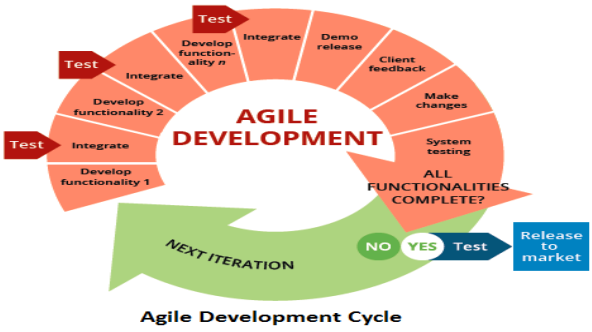

Fig 1:- Agile development cycle

By theend of every sprint, prospectivedeliverable as part of product is delivered incrementally.Accordingly,ineachround of release (iteration) new functionalities are delivered to customer. This results in steady progression of project to achieve desired goal. Functionalities are verified and tested in early stages of project development. It helps to lower the possibilities of releasing aninefficient module orproduct. Main benefit of agile process is it helps to prioritizetasks, gives flexibility in entire project development cycle as mentioned below,

- Increases team members productivity through daily task allocation and discussions of status of ongoing work
- Ability to administer the altering priorities
- Enhanced project visibility due to the easy planning method.

B. SCRUM

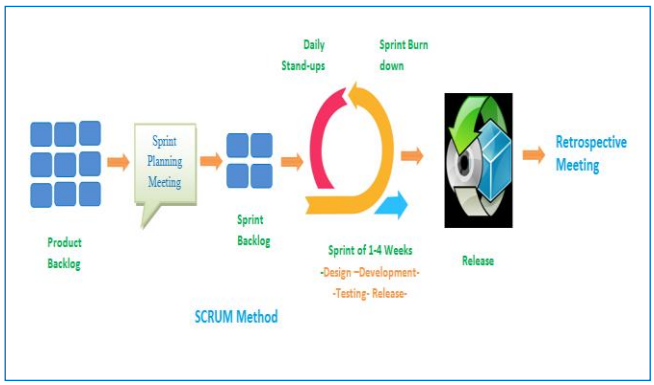

Fig 2:- Scrum

Scrum methodology can be functional to every project. It is suitable for development projects which changes swiftlyand constantly developingnew chucks of requirements according to customers need.

Scrum method starts with a short sprint planning, it has logical meeting and sprint concludes with a lessons learned andretrospective meeting. Such methodology is practiced for rapidsoftware development. It also containschain of iterations for developing desired software. SCRUM has capability to bring slow progressing projects on right and timely track.

Scrum method is agile framework toorganizeproceedingsby keeping torch specifically on functionality development of software. This method is intended for development team of three to twelve developers. They are supposed to divide their work in actions items. This action items should be completed in stipulated timeframe of iterations.Entire structure of implementation is called as sprints. This consists approximately 2 weeks times' span. This method tracks the movement and if necessary then re-plans in stand-up meetings which are of 10 to 15 minutesand called as daily scrums.[11]

This is anoverriding agile methodology. It has been practicedentirely by 42% of IT companies and rest of the 54% IT companies customize the process by combing scrum with other developmenttechniques [13].

A Scrum process distinguish itself from other agile techniques because in scrum specific concepts, value and practices are separated in three various groupsas roles of stake holders, artifacts in sprints, and stipulatedtime frames.

Scrum is generally utilized to manage projects for complex software development. It uses iterative as well as

incremental practices. With respect to the waterfall model scrum methodology riseseefficiency, productivity and decreases time.

Scrumfacilitate to fine-tuneconstantly changing requirements, and delivers a product whichaccomplishall business requirements. Agile Scrum process is useful for organization because it,

- Improves the quality of the product
- Offer good estimates while spending less time to develop them
- Controlled project schedule and state

Due tospeedy iterations, Scrum is useful development organizations and their teams whose clients and all stakeholders wish to get involved and approve every task according to their role. As frequentlymonitoring working products at showcase meetings this association allows the development team to rectify issue or make changes in forthcomingrelease. Generally key team members are product owner, scrum master, developers, tester, technical writers, automation engineers, process manager and customer representative.

C. Extreme Programming

Extreme Programming is an agile development methodology. It is also named as XP methodology. This is primly practiced for designing and developing software for highlyunsteadywork cultures. This model offers greater flexibility inentire development process. The aim of XP model is to reduce the cost of software with respect to requirements. It is fairly commonwith XP model that the cost product goes high in later stages because of constant change in requirements[1].

Fig 3:- Extreme Programming

The core practices of Extreme Programming, are, fine scale feedback from test driven development from domain users and customers, planning game, whole team, pair programming. Further process includescontinuous integration of modules, design improvement as per response and requirements, timely implementation of small releases[4].

Mutual understanding serves with the help of simple module design, delivering system metaphor, by taking collective code ownership, following coding standards and decided coding conventions. All these activates are performed as per priority to develop and deliver software product.

D. Feature Driven Development

Feature driven development is also an iterative software development methodology. It isenvisionedtopractice by large teams who areemployed on a singlesoftware development project. The projects surely usesobject-oriented technology [16]. Feature driven development type of model performs efficiently for organizations which are upgrading themselves from a phase-based to an iterative approach. This is also named as FDD methodology.

This methodology helps to progress large size projects. Even contribute to achieve success repeatedly. Eventually, the easy five stagescontribute to bring work done. This takes place in lesser time and with simplest manner.FDD is built on established standards which is used by entire software development industry. EvenFDDserves as easy development and industry recognized practices. [18]

FDDhasadequate process to certify scalability of task and repeatability of work while boosting creativity and innovation.

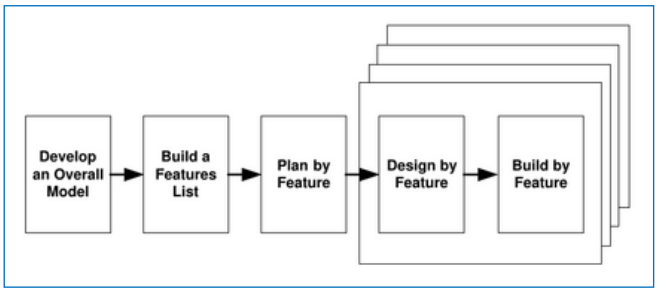

Fig 4:- Feature driven development

Feature driven development emphasizes on scaling the larger projects to develop systems of software systems. A well-described process will be helpful and efficient to implement software project.Process steps should be logical and those must be very clear to each team member. For developing overall models, system prepares a feature list, and then creates plans as per features and then features get designed and developed accordingly. Design and building of features performed in iteration mode.

Good processes must move ahead so team members can completely focus on results. Processes which are small, iterative and feature-driven thendevelopment cycles are best to accomplish successful software development.

V. ADVANTAGES OF AGILE METHODOLOGY

Advantages of agile methodologies are as below,

- While utilizing agile development,testing stage is unitedin the cycle with development of code, it tells that feature is consistently getting validated to confirm that the product is properly working. Ithelps the feature/ product owner to rework on code if required and entire team become aware of issue at that time only.
- Releasing the product to customer veryquickly. Many times with every release client gets access of system and he can confirm and approve his requirement during

development cycle only. This implies engagement as well as customer satisfaction.[2]

- Agile methodology gives liberty when changes are bound to implement. These changes can be applied at low cost.
- Agile methodology permitsthe client to decide priority of features to be developed. So,development team realizesessential and key requirements of customer's business.

VI. LIMITATIONS OF AGILE METHODOLOGY

- In agile methodology does not emphasize on essential design and documentation of features.
- While practicing agile methodology, if customer is not clear about his ideas and requirements then project can be easily get taken off the track and organization has to face schedule, scope and cost overrun.
- Customers who work according to fixed schedule and budget find agile process complicated. This tends to delay in project deadlines and sales team cannot negotiate with customers on time and cost issues.
- Major limitation is short cycles of agile methodology which don't give required time for design thinking process. Hence designers are supposed to redevelop the feature according to response of customer.

VII. CONCLUSION

This paper focuses on the software development methodologies, project management practices in IT Industry. Paper has explains about agile methodologies and practices.

Agile development cycle describes an iterative approach for performing software development activities. It helps to enhance project visibility due to easy planning method.

Paper has elaborated three key practices of agile methodologies as scrum, extreme programming and feature driven development. Scrum method is suitable for developing projects which are swiftly movingand developing new necessities for customers. Extreme programming is chiefly used for developing software within a very unsteadyworkflows. Feature driven development method is used by large teams who are working on project using object-oriented technology. Paper highlights the advantages and limitations of the agile methodology which will be helpful to the IT professionals and academician.

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