The Comparitive study of Agile software engineering with Traditional Waterfall model using GOMS architecture.

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Abstract: The competitive organizations are focusing on quality and speed improvement beyond the cost factors. In this paper the Researchers has compared the traditional approaches along with the recent ones. The paper has concluded agile having the highest priority for customer satisfaction with frequent delivery of working software with backward scalability in managing change request.

I. INTRODUCTION

The ISO/IEC 12207, and ISO/IEC 15504 and IOS/IEC 90003 are software process standards and CMMI are software models developed by international association to help project management and software development. Software organizations uses above tools to meet current demands of improving quality process and software product Ease of Use

II. METHODOLOGY

In paper[1] author has stated Agile focuses on project management and software implementation with different agile software development methodologies with newly introduced ISO/IEC 29110 according to standard. The systematic analysis, design, testing and implementation of project is software implementation. For software implementation project management is used to improve quality, schedule and cost. The small software development companies are focused by newly introduced ISO/IEC 29110 standard of agile. Researchers stated that SCRUM as agile methodology having high compliance, good organization and it satisfy many requirements from ISO/IEC 29110 standard in comparison of other methodologies like UPEDU and XP.

In paper [6] author has stated Agile methodology is definitely better for small projects as well it also perform better for large and distributed projects. Large organizations with multiple teams working on big projects are increasingly accepting agile development. Distributed projects with agile development itself introduces new challenges like scope and size scaling, strong requirement identification, coordination between teams and   many more distributed projects challenges.

In paper[2] author has stated that for mobile cloud computing project development agile methodology is applicable. Mobile cloud computing is a part of recent research and development. It is integration of mobile application with cloud environment. Researchers stated that cloud based agile development reduces the development time. Indirectly it affects to development cost of project.

In paper[3] researcher stated that Building Information Modeling(BIM) technology is a new construction approach plays a key role in agile development methodology with some additional benefits like shortening construction time of project and technological container for information model . Investors are interested in early returns or profits with early and faster start of project operation. The use of schedule compression technique reduces overall project duration. For this optimization Building Information Modeling (BIM) is used. Researchers stated that this schedule compression is executed by simultaneous working of design and construction phases based on agile development methodology. BIM contains essential information during planning phase and afterwards it only contain detailed design information for next iteration. Product and process model integration results in improved product quality and cost.

In Paper [5] Beyond cost factor now a day's companies are focusing on speed, quality and agility. The organizations are satisfying dynamic requirements of customers very quickly. This ever increasing process of satisfying customers demands is agility. Various models are available for agility measurement. Total Agile Design System (TADS) is a model used to determine agility. The tool like agile quantification tool is used to measure agility index. Researchers concluded that agility index of an organization can become better with proper implementation of TADS.

In Paper [9] Author stated that meeting project objective within planned schedule at the time of change in requirement is very challenging task in automotive industry. Use of agile methodology over traditional models in automotive industry is more beneficial for delivering high technology products within minimum time duration and minimum time intervals in market. The traditional models are comfortable for projects with predefined objectives not accepting any change during construction. In automotive projects requirement changes takes place with advance technology. Agile methodology is useful with principle of continuous improvement, testing and change according to feedback.

In Paper [10] Author stated that traditional models work with phases and predefined activities of that phases where as

agile framework work with iterative philosophy demanding iteration based contribution of cross-linked team members. The documentation and organizational structure is important for traditional approach. Additional requirement changes are allowed in agile framework due iterative and incremental nature. Care full planning is required for adopting agile culture for large companies.

Agility Principles

1.   Highest priority is to satisfy the customer the customer through early and continuous delivery of valuable software.

2.   Welcome changing requirements, even late in development.

3.   Deliver working software frequently, with a preference to the shorter timescale.

4.   Business people and developers must work together daily throughout the project.

5.   Build project around motivated environment.

6.   The most efficient and effective method of conveying information to and within a development team is face to face conversation.

7.   Working software is the primary measure of progress.

8.   Agile process promote sustainable development.

9.   Continuous attention to technical excellence and good design enhances agility.

10.   Simplicity is the art of maximizing the amount of work not done is essential.

11.   The best architectures, requirements and designs emerged from self organizing teams.

12.   At regular intervals, the team reflects on how to become more effective, then tunes and adjust its behavior accordingly.

Advantages of Agile over waterfall

1. For small and medium size projects lightweight methods are useful.

2. Focuses on best team cohesion.

3. Final product attention is important .

4. Iterative in nature.

5. requirement changes are acceptable to produce good quality product.
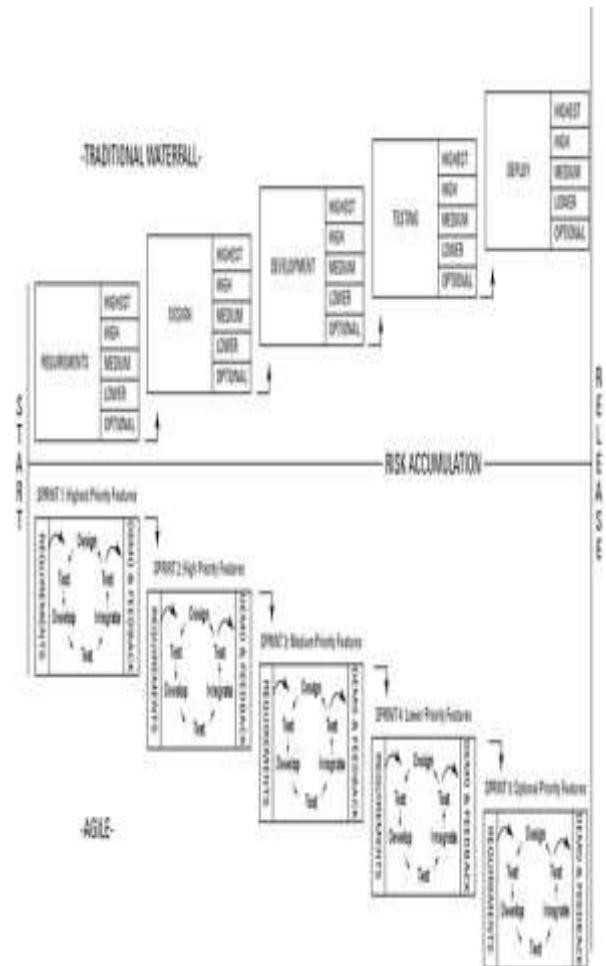
Difference between Agile and Waterfall Model

1. The main advantage is the backward scalability in Agile. Under waterfall approach we cannot change the decisions and implementations that we had made under the previous stages.
If we want to make changes under waterfall we will have to build the entire project from the scratch once again.

2. The flexibility to error check under any part of the development stage makes Agile more bug free and less erroneous as compared to Waterfall which can only test bugs at the end of the development

Figure 1. The Agile Model Driven Development (AMDD) lifecycle for software projects.
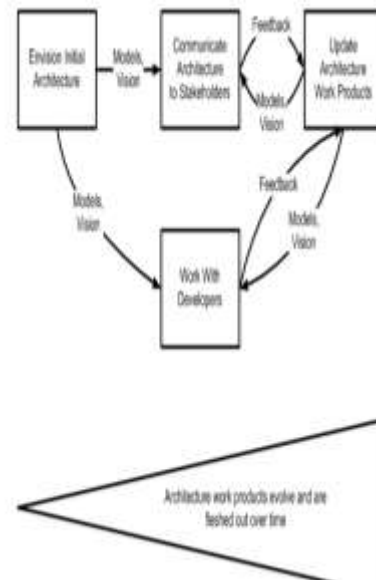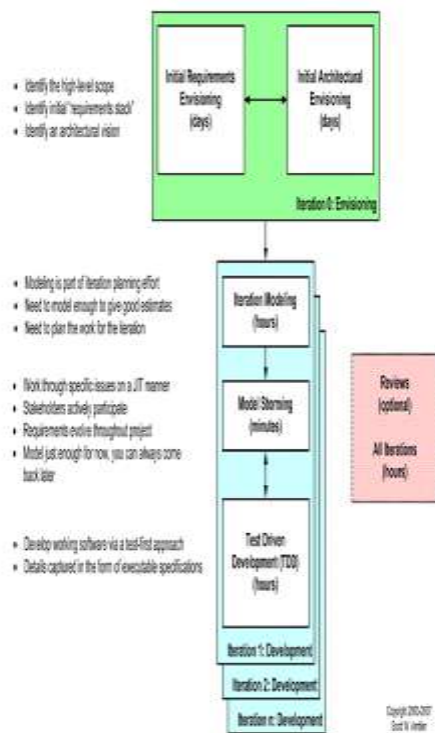
Above diagram shows schematic representation of agile. The researcher has taken few points from agile structure as 1) In Iteration 0 called as inception phase should go in right direction and in proper format. Developer should able to answer the critical questions of users and party to which he is going to deliver the software. 2) identify the potential technical direction- risk analysis is done in second phase. The model is well suited for developers as analysis and risk measurement is done in initial stage. Still some disadvantages are mentioned by researcher as People are not agreeing with this model. Agile framework needs a large team for the project; it generates need of scaling. The team architecture consists following modules:-

a. Architecture-driven approach: - Team is organized around system and subsystem.
b. Feature-driven approach:- Concentrated around the features and application.
c. Open source approach: - This is useful when system is built in open source manner.
d. Combinations there of :- Combination of above three.

There should be four evaluation approaches for above strategies :-

a. Envision the initial architecture: - Focus and bring feedback on initial architecture.
b. Working with the development teams: - Members are taking active roles in development.
c. Communicating the architecture to architectural stakeholders:- Feedback in interval
d. Updating architectural work products:- Validation of feedback and updation.

Architecture work products evolve and are fleshed out over time

GOMS Architecture

GOMS is human computer interaction architecture which is used for the evaluation on the basis of – Goals, Operators, Methods and Selection Rule. Goals are standing for the objective. Operators are treated as actors. Methods and Selection rules are fused to get output. The GOMS user operating modeling has strength and weakness. It is not accurate method but provides procedural outline to the required concept. GOMS is used to easily estimate a particular interaction and calculate it with little effort in a short amount of time and at little cost. The disadvantage of GOMS is it is designed for skilled users only. It is not full fledge for beginners or intermediate user; still it can be used to get general outline for the desired output.

The Working with BIM model

Though agile is advance software engineering technique there are some problems in comparison between the project's phases and reactions to changes during the project development. The use of overlapping techniques like concurrent engineering, phased construction, parallel engineering, flash-tracking, fast-tracking, and agile project management reduces the time required for project completion. The software engineering technique must absorb changes and instability in market conditions and reduction of project involvement term. Both of above are treated as risk factors. Second factor will also reduce in resources and time required for completion.BIM is collaborative purpose model which involves investment on software and employee. Scheduling must make sure that this building can be built in the time allotted and estimating needs to make sure that they constantly track the cost of the project. How can BIM help with this? The BIM models need to be set up correctly from the start. For scheduling, the model has to be built with building in mind. The schedules need be filtered correctly so estimating can utilize

the model to help in their estimates. Also, the elements in the project need to have enough information so that estimating knows what type, size, etc… of element they are estimating. This is especially important in projects that are heavy on the process side. It is very laborious for estimating to try and count all of the elements of a process project from a 2D plan. BIM has enabled the design and construction process to be a totally collaborative effort. The Waterfall model is a linear activity. Almost no overlapping is done. There are eight stages in waterfall model namely conception, initiation, analysis, design, construction, testing, implementation, and maintenance. The biggest disadvantage of this technology is once developed, developed cannot go back in previous step to modify. The only good thing is client knows parameters of software so it becomes helpful to interact. Documentation is more ever important part which is helpful for version improvement. Waterfall technology relies heavily on initial stage i.e. requirement. The testing is done at the end which will affect different modules. So one can use waterfall technology only when client is not going to change the needs and all requirements are finalized at initial stage. In contrast agile follows incremental approach. Developers start off with a simplistic project design, and then begin to work on small modules. The work on these modules is done in weekly or monthly sprints, and at the end of each sprint, project priorities are evaluated and tests are run. These sprints allow for bugs to be discovered, and customer feedback to be incorporated into the design before the next sprint is run. The Biggest advantage of Agile is it allows to make change once we have completed design. It results in adding features once initial design is finalized. The project is evaluated at the end of each module which provides a weightage to client's feedback. Evaluation at each module also allows to fix error during development cycle. But more ever agile requires skilled developers and as initial planning is not clear so final product may be different than initial requirement or initial feedback. So agile is used when rapid production is needed and not having a clearer idea about final project.

CONCLUSION

Researcher has noted different points regarding to waterfall technology and agile technology. The integrated product and process model will facilitate improvements in the construction process, particularly in the case of collaborative design, project coordination, and reduction in project duration, reduction in costs, reduction in claims and disputes and improvements in product quality. Waterfall model does not allow such flexibility in design due to its disadvantage. Currently BIM is method which is in practice. The software companies who have customers who are changing their requirements frequently supports agile framework to meet customer requirements. The need of customers is always heard in all points at any module so agile is best technology suitable for the development.

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