



IMPORTANCE OF SOFTWARE ENGINEERING IN SOFTWARE DEVELOPMENT

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Abstract— Software engineering is an engineering branch related to the evolution of software products using well defined techniques and procedures. It was basically introduced to address the issues of low quality software products[1]. The problem arises when a particular software exceeds time duration, expected budget and also poor quality of software. So, with the help of concept of software engineering, it ensures that the application is built consistently, correctly within time and on budget and also satisfy the end user needs. It plays a vital role in the development and maintenance of any software products. The concepts of software engineering helps industrialist to determine the cost, technical feasibility and operational feasibility which helps them to define the existence of software products. The concepts of software engineering is being practiced in every software industry in order to satisfy the requirement of end users.

Keywords—Technical feasibility, operational feasibility, industrialist.

these fields developers and industrialist are able to make their products in the required budget and most importantly under the required time. Software engineering helps us to maintain the dynamic nature of the product means it helps that if the software is continually changes then new upgrades need to be done in the existing one. When we talk about the importance of software engineering then one thing which automatically comes in our mind is the role of software engineers in this field and I think that the good software engineers means if they are having good programming abilities, good technical knowledge of the project, good interpersonal skills, familiarity with software engineering principles etc. Sometimes it happens that we are unable to find the result or sometimes we are not able to meet the user requirements, in that case we should try to do something new and we should follow software engineering methods to avoid these. These repetitive failure basically happens when we use same workforce, same methods, same tools and sometimes it also happens due to complexity and increasing demands.[8]

I. INTRODUCTION

The formal definition of software engineering is “the application of a systematic, disciplined, quantifiable approach to the development, operation and maintenance of software[1]. Software Engineering is very broad concept and it is not only limited to programming and development rather it covers a wide range of profession from business to graphics design or video game development. Software engineering plays a vital role in the development and maintenance of software products. This field is committed to analyzing, specifying, designing, developing, testing, and maintaining software products that is beneficial and effective for the industry as well as client. It ensures that the software built is of good quality and it is as per need of end user. We can say that it act as an information transformer because it produces, manages, acquires, modifies, display or transmit information. Software engineering is basically used to simplify the procedure of software development and also we can say that with the help of

II. LITERATURE REVIEW

The At ICSE04, Kitchenham et al suggested software engineering researchers should adopt “Evidence-based Software Engineering” (EBSE). EBSE aims to apply an evidence-based approach to software engineering research and practice.[10]

Hossain et al. (2009) studied the use of SCRUM in GSE (Government sponsored enterprise), as agile practices seem to be extremely popular in GSE projects. They studied approximately 200 papers and extracted results from about 20 of them. The main conclusion was that it is hard to provide solutions for GSE problems as the type of development distribution differs from project to project[11].

In 2017, Cosentino et al. explored the software engineering researches related to GitHub through a mapping study, attested the high activity of research in the field of the open source collaboration. The authors revealed a set of shortcomings and proposed actions to mitigate them. And in, the importance of

open source platforms and projects as data sources of conducting ESE research was emphasized[9].

Zhang et al. presented a literature survey on tasks, challenges and future directions of bug resolution in software maintenance process and identified that the process of software maintenance helps to improve the software process time to time[10].

In 2017, Ahmad et al. conducted a systematic mapping study on empirical research in cloud-based software testing[11].

Cohen et al (2010) proposed and evaluated a SDLC model which by the use of communication and collaboration among stakeholders, improved system implementation was successfully achieved.[11]

In Goparaju et al (2012), the author focused on the productivity measurements of software development team and provides techniques and models to measure the productivity.[11]

Chi (1997) introduced the Software Engineering Process Simulation (SEPS) model for the dynamic simulation of the software project development process. SEPS is a planning tool to inspect agenda, trade-offs of cost, functionality and to test the implications of different managerial strategies on a project's outcome.[10]

III. FEASIBILITY ANALYSIS

When any software is built it is judged by the end users and the features it offers to the user. The application must satisfy the following needs:-

- Operational Feasibility:-** This feasibility basically describes how software works and it also determine the correctness and safety of the products. It also determine how easily the product will work and the usability of products.[3]
- Technical feasibility:-** It determines whether the software is technically feasible or not. In this area all the resources i.e both hardware and software resources along with the required technology are analyzed which helps to develop the projects.[3]
- Economic Feasibility:-** This feasibility basically determine whether the software is economically feasible or not. This area basically generalize on the point that the software which has been built has been built under the expected cost or it has increased the required budget.[3]
- Legal feasibility:-** This feasibility conforms that the proposed projects has been built under the proper rules and regulations which is determined by the government of country.[3]
- Transitional Feasibility:-** This feasibility basically comes into the play when an application is shifted from one platform to another. With the help of this feasibility one can determine the portability and adaptability of the projects.[1]

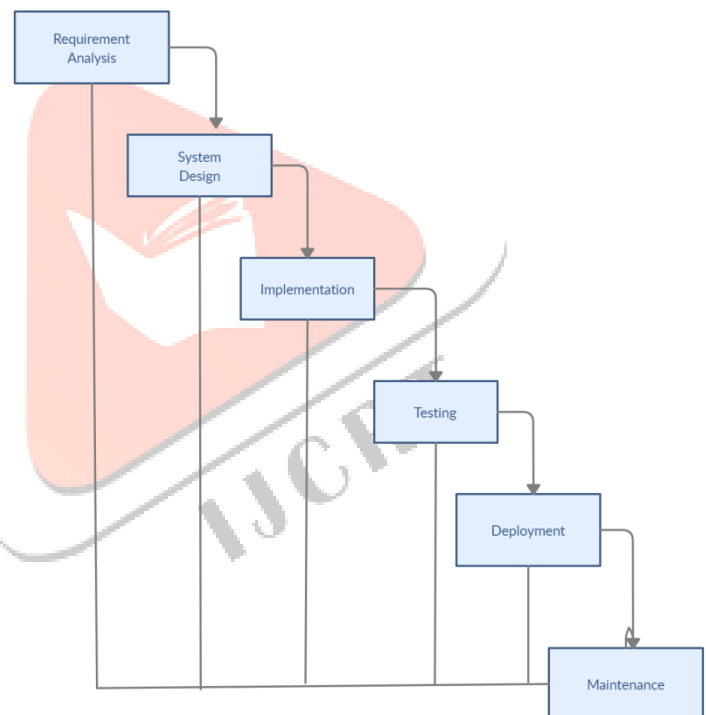
DIFFERENT TYPES OF SOFTWARE DEVELOPMENT METHODOLOGY:-

Some of the methodologies and techniques are adapted by the software engineers in order to develop an effective software products. Some of them are:

- Waterfall Model:-** This was the first model which was introduced and that's why it is regarded as the universally accepted model[1]. This method is very simple to understand and easy to use. In waterfall model there are several phases and each phase must be completed before the next phase can begin. The waterfall model defines the software development process in a linear sequential flow. In this model, there are basically seven phases and all the phases are interrelated to each other.

In the following diagrammatic illustration we can see the seven phases:-

Waterfall Model

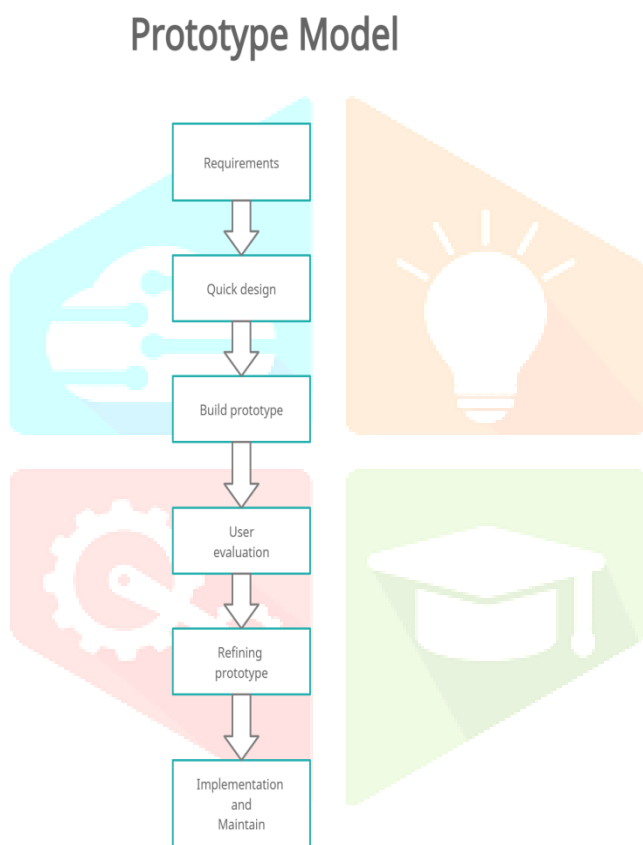


- Requirement gathering and analysis:-** Before developing any software products, the first step is to gather all the resources which are required in order to develop the projects. In this phase we basically try to collect all the hardware and software requirements which will be required to develop the projects.
- Design:-** This phase basically deals with the layout of the software product. It will help software developers to determine the overall architecture of the product.
- Coding:-** This is the phase where software developers come into the scenario and they try to write the optimal code.
- Testing:-** After the coding part, software testers try to test the code by providing various input that it is working

or not.

- e) **Deployment:** Once the software is tested , the product is deployed in the market.
 - f) **Maintenance:-** After the software is deployed in the clients environment , the process of maintenance is being carried out , where the goal is to enhance the software product.
2. **Prototype Model:-**It is one of the most common method which is used by the project team in order to develop a successful product.This model describes that before creating an actual model , we first create the prototype of that model.[6]This things helps to increase the efficiency and reliability of the project.

Diagrammatically illustration of the prototype model:-



Steps to built an effective prototype model are:-

- a) **Requirement Gathering and analysis:-** In this phase we collect all the software and hardware resources which will be required to develop the project.After gathering the project team will analyze whether the resource collected is feasible or not.
- b) **Decision:-** This stage gives the brief scenario about the system to the user.Here , user gets a chance whether they wants some features or further modification can be adjusted.
- c) **User Evaluation:-** This phase deals with the assessment part.It helps to find out the pros and cons of the project.Suggestions and feedback are taken from the user and provided to the developer.
- d) **Refinement of Prototype:-** Suppose the user is not happy with the current prototype which has been built then the

developer will try to refine the products according to users feedback.This phase will work until and unless all the requirements are satisfied to the end users.

- e) **Implementation of Product:** Once the prototype is created and thoroughly tested , it will be sent to the clients market.
3. **Agile Model:-** This model is one of the best known model.Agile methods breaks the particular product into small-small products.[4]After that each steps it provides certain iterations and each iterations almost take about one-three weeks.This model is known to be the most flexible and adaptable model in real life scenario.The product is tested very frequently by iterating on small frames and further minimizing the risk of any major failures.

IV. OBJECTIVE

There are various objective of software engineering which developers keeps in mind while developing the project and working on the following listed objective is the ultimate goal of the developer while developing the project:-

- a) **Maintainability:-** The software which is developed it must be easily maintainable and it should not be like that the maintenance of software is very costly , it should be under customer budget[1].
- b) **Efficiency:-** The software which is built it must be efficient means it should not consume more memory , it should be under expected budget.
- c) **Correctness:-** A good software must be correct means it should be accurate and the software is developed as per clients requirement[1].
- d) **Re-usability:-** The software which is developed , it must be re-usable.
- e) **Portability:-** A software which is built , it must be portable.It should not be like that we can access it at a particular location rather it can be accessible by anywhere.
- f) **Completeness:-**The software design must include all the components like data structure , modules in order to increase the efficiency of the product.
- g) **Adaptability:-** A good software is also very adaptable in nature means it takes very less time to understand its operation and functionality.

VI. CONCLUSION

In this paper , we had basically tried to explain the importance of software engineering and how software engineering plays a dynamic role in the development and maintenance of software products.We had also tried to illustrate the different types of software development methodologies in which we had basically discussed waterfall model , prototype model and Agile model.Waterfall model is basically helpful when we want to develop small products[1].Secondly,Prototype model is best for the customers as they get plenty of chance to see

the working model and the end user also have a chance to get modified by the developer according to their needs[6].Furthermore we had also tried to explain the Agile model which is also handfull because teams can quickly adapt to requirements changes and it also provide very high quality software product which improves customer satisfaction[4].Beside all these things we had also explained how industrialist gets benefited by the steps of software development in order to build quality product in estimated budget and time.

REFERENCES

- [1] Software Engineering:A practitioner's approach,Roger S Pressman,Sixth edition.McGraw-Hill International Edition,2005.
- [2]<https://m.economictimes.com/definition/software-engineering/amp>
- [3]<https://www.geeksforgeeks.org/types-of-feasibility-study-in-software-project-development/amp/>
- [4]https://www.tutorialspoint.com/sdlc/sdlc_agile_model.htm
- [5]<https://www.castsoftware.com/glossary/importance-of-software-engineering-code-of-ethics-future#:~:text=Software%20engineering%20is%20important%20because,happen%20as%20soon%20as%20possible.>
- [6]<https://www.guru99.com/software-engineering-prototyping-model.html>
- [7]https://www.researchgate.net/publication/312473242_A_Review_on_Various_Software_Development_Life_Cycle_S_DLC_Models
- [8]<https://airconline.com/ijcses/V8N4/8417ijcses01.pdf>
- [9]<https://www.ddegjust.ac.in/studymaterial/mca-3/ms-12.pdf>
- [10]<https://www.sciencedirect.com/science/article/abs/pii/S0950584908001390>
- [11]https://www.researchgate.net/publication/312473242_A_Review_on_Various_Software_Development_Life_Cycle_S_DLC_Models

