

# American International University-Bangladesh



## Paper Submission

**A Study on the process of Software Development in start-ups and a proposal for a novel framework to document rapidly iterating software in SaaS or start-ups**

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# **A Study on the process of Software Development in start-ups and a proposal for a novel framework to document rapidly iterating software in SaaS or start-ups**

## **Abstract**

*In contrast to traditional software development where requirements are collected for specific clients and then development is done based on the requirements, in early-stage start-ups or SaaS product development there isn't one authoritative client who will give all the requirements. Requirements and features are proposed by the founders or CEO based on customer surveys and usage data. Those features are then rapidly developed as speed to market is very important.*

*The feature is then evaluated based on customer feedback and analytics. The feature is either kept, discarded, or modified based on customer data. This rapid prototyping leaves little time for developers and testers to document the code. It is not a priority. In our paper, we will analyse how software development is done in early-stage start-ups and we will be proposing a framework where different tools and practices will be used to generate documentation with as little developer time as possible. This will not only keep code writing productivity high among developers but also document the different aspects of the code so that it's easier for future developers to work with the code. Testing this new framework in the real-world scenario is out of the scope of this paper.*

## **Introduction**

Early stage start-ups and SaaS products usually try to disrupt their industry that they

operate in. For example, Uber, Spotify, shopify etc. These companies in their early stages work under great uncertainty with limited resources. They have to develop software rapidly given their time and resource constraints. In this environment following any of the systematic approaches of software development adopted by traditional companies is not easy. Trade-offs are made and based on their goals. In this paper we will analyse different papers to see what the primary trade-off is, how software development process is documented and propose a tool and some practises to increase documentation speed. We will also do interviews with engineers of various start-ups in Bangladesh to validate the fast paced nature of software development in a start-up environment.

## **Keywords**

Agile, Software Project management, early-stage start-ups

## **Research Questions**

How is software development done in early-stage startups and SaaS and how can documentation be improved?

## **Background**

Early-stage Startups and SaaS companies are characterized by new business models with no operation history that aim to disrupt the industry that they operate in. They usually have limited resources and a highly uncertain environment. [1]. In this environment these companies have come up with their own method of software development based on their requirements.

Startups need to be highly flexible and nimble so they can adapt to the changing requirements of the software based on the data and experience that they obtain from operating in their industry. Take for example uber. Uber was initially thought of as a limo service. People who wanted a limo could order one using their phone. Later they pivoted and changed their business model and became a platform which provides ridesharing services using third-party car owners.

The challenges faced during software development in such an uncertain environment gave rise to different software development methods which modified existing agile methodologies. In this paper we will have a look at what research has been done on the software development process of early stages startups and SaaS and how documentation can be improved in such an environment.

Based on the research that has been done on the development of early-stage start-ups here are some of the main points that the authors have pointed out [1-3]

- Flexibility is required during the software development process to accommodate frequent changes
- Agile methodologies are used by they are modified based on what the requirements are in the start-up environment
- Lean start-up [4] which is a variant of agile development is widely used where MVPs are created in quick iterations to test assumptions or new features.
- XP is the most widely used development methodology due to its reduced cost and low documentation requirements
- Documentation is the biggest trade-offs that early-stage start-ups make when they have to rapid deliver features and products to market.

Sergio Cozzetti, Nicolas Anquetil, Kathia researcher gives a paper named, “A Study of the Documentation Essential to Software Maintenance”, [5] where they mention that documentation plays a significant role for maintenance project but most of the organization did not generates enough documents and tries to understand how useful establish documentations.

In the “Software Project Documentation – An Essence of Software Development”, [6] paper, Vikas, Dr. Jatinderkumer, and Bharuch lay bare the importance of the proper software documentation with specified details and exercise or example.

In the year of 2016, Satish and Anad came with a paper named “Software Documentation Management Issues and Practices: a Survey”, [7] by focusing on summarizing various problem with documentation and also try to practices proposed to address them.

As we can see because of the fast-paced nature of a start-up environment documentation is the biggest trade-off that is usually made.

## Methodology

Though there are many papers on the software development processes like agile. Not a lot of research work has been done on the software development methodologies of early-stage start-ups. Each company usually has their own practises based on their environment and requirements. We will analyse papers which have done surveys and studied start-up companies and extract some of the common practises and propose a method to improve documentation in these development environments.

Moreover, we have conducted 3 personal interviews [8-10] with engineers of various start-ups in Bangladesh.

During the interview session we asked them how long they worked there, is they involved any project work such as development, testing, deployment, and front end or back end programmer, is they generate or build up any documentation for the project, then is documentation is necessary for projects, is documentation need for new employee or user, then what methodologies that they followed during development.

As expected they mentioned during the early stages of a startup they didn't follow any particular methodology but modified an agile framework based on their needs. After that we asked that why they or organization did not build any documentation. They answered that they have not enough time to write document and also organization have to pay extra payment for it. After that we ask that is extra comments of the code create hassle, they agree that it creates hassle. So, the Documentation wasn't a priority and what was most important was shipping code as fast as possible to test different features in the market. Though they did mention that at a later stage of a startup when there is a large user base, software development becomes more stable and there is more breathing room for them to follow proper agile guidelines and do more documentation.

Moreover, we proposed a tool which will be avail to create necessary documentation automatically by giving VS code plugin integration and also generate documentation without leaving the IDE. Additionally it also avail to generate document by giving apart from the traditional documentation and the Developers will use special comments to quickly generate documentation for the code Hearing this proposal the three engineers agree to use and build up this tools that will be helpful for developer,

tester, as well as user and organization also.

## **Proposed framework and discussion**

Though there are many papers on the software development processes like agile. Not a lot of research work has been done on the software development methodologies of early stage startups. Each company usually has their own practises based on their environment and requirements. We will analyse papers which have done surveys and studied startup companies and extract some of the common practises and propose a method to improve documentation in these development environments.

In this section we will propose a framework along with a documentation tool which will help developers to generate documentation without leaving the IDE. The software tool will be a cloud-based SaaS that will integrate with different IDEs. Apart from the traditional documentation Developers will use special comments to quickly generate documentation for the code.

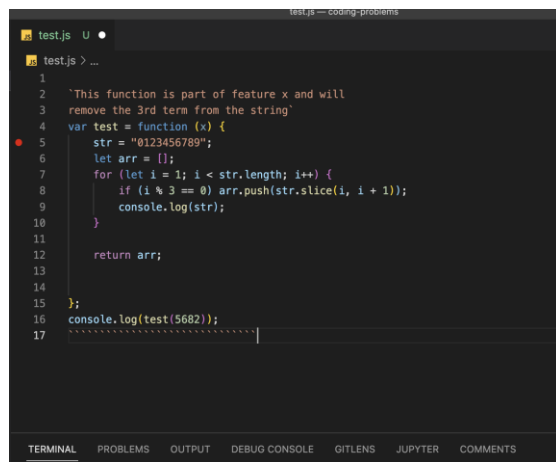
The framework will consist of two different components

1. Documentation tool and a VS code plugin integration
2. Methodology for rapid documentation

Based on customer survey data/analytics the product owner will propose a feature with a name, Id and description. Other decision-makers will discuss the feature and give their justification for or against implementing the feature in the platform.

Once a new feature is finalized its status will be changed and handed over to the dev team. In the dev team designers will read

the description and create the UIs. The designers will upload the final version of the UIs in the documentation tool. Developers will start coding the feature. They will use special comments to mark the code, comment what the code is doing and A VS code plugin will scan the code files and generate documentation for the feature being worked on based on the comments. All the documentation will be auto compiled and pushed into the tool. This auto generated documentation will be editable if required in the future. An example of how the code commenting will look like is given below



**Fig: 1** Mockup of the code commenting on visual studio code

This will create rapid documentation of the feature description, design and code documentation without the team putting in too much time for manually creating the documentation. Testing the framework in real life scenario is beyond the scope of this paper.

## Conclusion

Based on the research done on start-ups we know that software documentation is one of the biggest trade-offs that occurs in a fast-paced early start-up environment. Our proposed framework and tool will allow developers to stay flexible but at the same time create rapid documentation which will

increase code maintainability and help keep the development team on the same page in the future.

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