

# Project plan for Master degree project

PA 2534: Master Thesis in Software Engineering

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Thesis	Tentative title	Agile adaptation during testing phase in context of large software agile projects.
	Classification	Agile software development, large software projects, agile testing practices
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## I. Introduction

The research thesis to be conducted is in the stream of software engineering. Software development is a part of social and technical system interactions [1]. Software development is a series of analysis of requirements, design and documenting the design blueprints. Then programming the raw product, testing and bug fixes. Finally creating and maintaining the software applications and frameworks that are crucial in software release life cycle resulting in product release this entire execution is part of software development. Software development life cycle models namely as follows[2]

*Waterfall model:* It is sequential, development process start after the previous phase is complete [2].

*V-shaped model:* It is similar to a waterfall but instead of moving downwards the process steps are bent upwards after coding phase [2].

*Evolutionary prototyping model:* For creating prototypes for software applications[2] .

*Spiral model:* It is designed to combine both design and prototype in steps while utilizing both bottoms up and top down concepts [2].

*Iterative and incremental model:* It overcomes the weakness of waterfall, it starts initially with planning and ends with deployment with cyclic interactions in between [2].

*Agile software development:* Is unique and based on iterative and incremental development. Requirements and solutions are evolved through continuous cross-functional team collaboration [2].

Our primary research focus is on agile software development. Agile methodologies that are widespread in software development are scrum and extreme programming [3]. Agile has a number of techniques that aim to improve software testing, interestingly in agile both development and testing run parallel to the iterative, agile development [4]. Efficient practices in agile testing include automated unit tests, test driven development, regression testing, exploratory testing [5]. The software projects are classified as small medium and large projects they can be explained based on lines of code they develop normally in small ( $0 < \text{LOC} < 10000$ ); medium ( $10000 < \text{LOC} < 100000$ ); Large ( $> 100000$ ) [6].

## **1. Motivation and Related work**

*Related work in agile software development:* Since 2001, agile software development or agility is one of the attracting topics and is a picking up stream in research agenda [1]. The agile software development is different from other software development models. Agile is a subset of iterative and evolutionary methods [4]. The iterative process is repetitive in nature during software product developing phases. The agile is based on iterative enhancements where each iteration is a mini project [7]. It is critical to study how the behavior of agile exits during all these phases in small, medium and large projects and respective variations. The agile methods are more likely suitable for developmental and non sequential projects. Agile focuses more on success than planning [8]. The original agile methodologies that are embraced by agile alliances are scrum, extreme programming, feature driven development crystal methods, dynamic system development methods and adaptive software development [3]. Among the agile methodologies, some are used for managing the projects. At its core, agile is about managing the impact of complexity and uncertainty on a project and thus provides a new approach to planning and managing software [9][10]. Introducing agile for developing software does not change the knowledge for developing software but amend the nature of communication, coordination and collaboration while developing[10]. Isolation of teams in software development doesn't yield success in projects unlike in only very few cases this does not work in latest arena. Agile methodologies consider the software development to be an empirical process and they necessitate "inspect and adopt" loop through out the process [3].

*Related work of agile in the context of software projects:* Agile software development even though applied in small and collocated settings, increasingly used in large scale projects [11]. In recent years, there is a significant increase in using agile methodologies in globally distributed software development[11]. New areas of research in large exclusive projects include inter-team coordination, scaling of agile projects large project organization or portfolio management [12]. Studying these areas help to improve the agility in large projects. A question arises while dealing with agile methods that, why should you focus on different methods instead of focusing on one, this is because there is no single shoe that its all of them [13]. It is always best to take the best of different approaches and apply to the projects based on specific needs. The practitioners are worried if integrating agile project teams will ensure the quality assurance in large software projects[4]. Agile in the context of small software projects are successful and are already in progress with progressive results period. 3 case are reported with respect to successful agile model

implementation in small scale projects [9].

*Related work of agile in the context of software testing:* Generally, software testing is investigating a service/product to ensure the quality of the product, this information is valuable to the stakeholders [5]. In our research questions we define the terms agile testing, testing tools. Agile testing is the software testing practice that follows the agile software development principles [14]. Testing tools are the tools to useful to measure the quality of the product/service by comparing actual outcome with predicted outcome's [15]. There are five categories of testing software testing tools such as free software testing tools, GUI testing tools, load testing tools, Unit testing framework and security testing tools. Testing is a part of software development [15]. Testing is one of the cornerstones in agile software development in past present and future. Systematic mapping is conducted in the software testing and agile software development to measure the effectiveness [16]. More empirical studies like systematic literature reviews are needed in other than extreme programming to measure agile software development effectiveness [17]. The primary areas in which more focus is made from 2002 to 2012 on agile software development in software testing are Test driven development, specifications, unit testing, acceptance testing. The effectiveness of Test driven development concerning quality, productivity are identified by authors [18]. There are some cases in which the increase in quality is not true to improve the effectiveness while using Test driven development [17]. The areas in which the papers are mainly published on agile testing are solutions, experiences, philosophical, opinions, experiences and evaluations [19].

## **2. Identified Research gap**

We observed there is a significant amount of future work that needs to be performed in the area of agile testing [8]. Beyond identifying the quality of the code, effort in post-release bug fixes there is a need to identify the effectiveness of testing in the context of agile software development can determine the effort of agile software development [20]. We identified future works from the article [21] that it is important to address what type of problems are identified by agile testing this can lead to map with the benefits of different types of agile testing. We also identified from future work in the article [12] that it is important to identify applicability of set of tools to agile testing which enables to find the available test tools support and where there is a need for more test tool support. In our motivation, we believe if we can reach these targets it can enable to understand what test tools are suitable for use in agile software development environment and where more focus can be shifted to improve the agile in the context of software testing. In our research question we motivated the type of scope reducing scheme we are planning to follow. For research question 2 as there are a lot of parameters that can be looked into. Selecting the set of tools to provide where there is need for support like specific language based tools, based on type of software testing tools available, the current existing language based specific set of tools and most commonly used existing set of tools. As of now we are not yet aware with respect to literature in this selecting criteria but we are planning to reduce the scope.

## **II. Aim and Objectives:**

Our main aim of our research project is to identify the problems addressed while implementing the agile test practices and associating them with the benefits of different types testing tools that are suitable for Agile test environments.

The corresponding objectives to reach the aim are as follows:

- While implementing the agile test practices some problems are identified, to identify and study those problems a literature review is conducted.

- To identify where there is more need for test tool support that can improve the agile software development effort by conducting a survey.

### III. Research questions

1. What are the type of problems that are expected to be addressed by agile test practices?

*Motivation:* The Research question help to design a framework between the problems addressed and benefits of different types of agile tests. For example: In TDD some papers suggest about improve in quality others contradict by saying only grown by 24 to 30 % which is not 100 % [14]. One place where the problems addressed by the agile test practices and the framework to relate to corresponding benefits. Our motivation is to consider the research after 2012 as we have seen one paper research contribution from 2002 to 2012 later the new 2013-2015 are taken into consideration for literature review and are validated as well.

2. What are the testing tools that are applicable to agile testing situation?

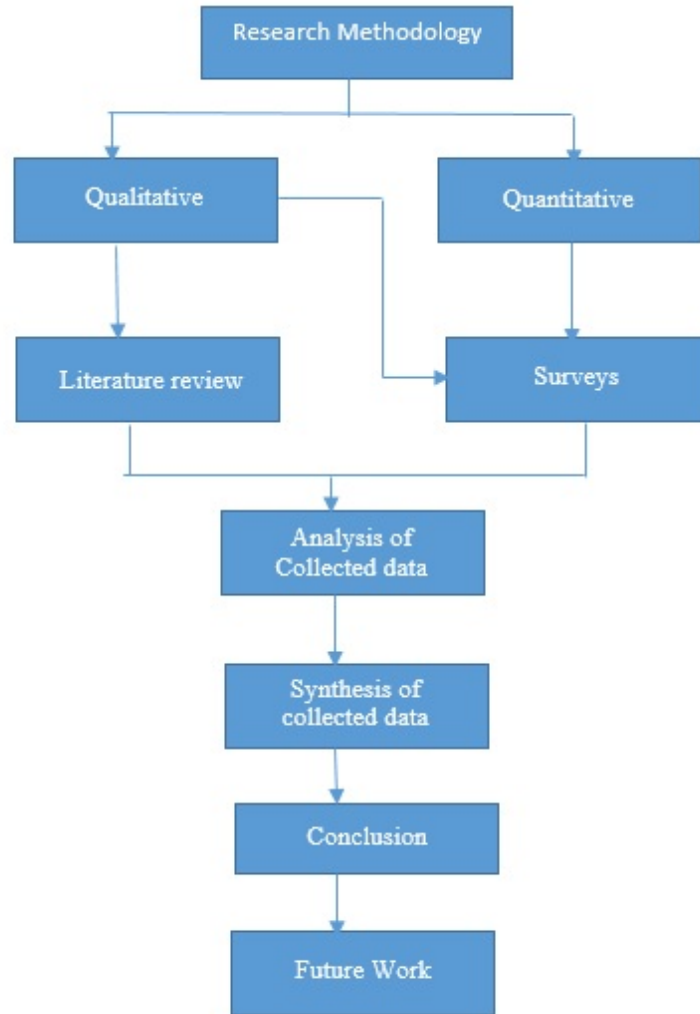
*Motivation:* There are several tools that are applicable during agile testing situations. Different tools contribute to different programming languages. Example CppUnitTest, which can be used in c++ language; Junit which can be used in java programming language; RakePyUseCase which can be used in python. Our Motivation is currently to look into all the test practices, but in future we would like to select subset of tools in a specific programming language or the tools that are existing currently in the industry and remove those tools whose usage and maintenance is stopped.

### IV. Research Method

The selected research methods are described in detail. A brief description on how the research design data analysis is going to be carried out is also being mentioned. Note the research design and data analysis is yet in developing phase so, there is a possibility that the structure adopted currently can be slightly changed which we believe might happen and we hope it doesn't affect our thesis.

#### 1. Method:

***Literature Review:*** *Procedure for RQ1 is as follows-* Based on Kitchenham guidelines we are planning to conduct a systematic literature review [22]. literature review purpose is to provide an exhaustive literature in existing area relevant to research questions. Literature review consists of current knowledge in findings, theoretical and methodological contribution in a particular topic. Based on a research question the literature is focus on trying to identify select and analyze high-quality evidences available relevant to the research questions [23]. Snowball sampling is used as our sampling selection criteria to study from relevant literature and retrieves the data until no more is related to the research question [23].



**Sampling Method:** Snowball sampling is important as our research question where agile test practices nil the problems. so, the efficiency is important criteria here which can be achieved by utilizing the snowball sampling technique. To start the research, the primary keywords that can be used to ideally start literature review can be done by using keywords agile test practices, benefits, problems addressed. Narrative synthesis is used for the data analysis phase to explain the problems addressed with the benefits of agile test practices. This helps to identify what are the problems being addressed while using the agile test practices tools.

**Survey:** *Procedure for RQ2:* based on the literature data obtained and the relevant problems addressed what are the testing tools that are highly used while implementing the agile test practices can be analyzed using the survey [24]. The research question 2 is based on survey based questionnaire (data collection tool) to obtain quantitative data. We use survey which is based on data collection tool questionnaire. The Questionnaire that are generated are specific to help respondent to understand without confusion [25]. In our case we plan to involve both open-ended questions and close ended questions. We are planning to use snowball sampling which means reaching the population that are hard to find through the process of connections. Convenience sampling helps to find a few people that are working in the relevant topic can be contacted with

the help of few contacts we have. Electronic forms are also used to collect data from the research question 2. The data analysis is made by applying the statistical analysis techniques [26] to identify from the formulated research questions where the focus is needed while implementing testing tools.

## **2. Choosing Other methods:**

Although interviews and case study can also be conducted in our case[27]. We can conduct a semi-structured interview. The Semi-structured interview is one of the type of interview where the respondent is freely able to talk as long as the subject is relevant to the topic [28]. It is also an effective way of communication which involve both verbal and non verbal communication while gathering information. We use survey over interview because it is cost effective and efficient and easy to compile data. Case study help to consider the group and the individual within the group. Case studies are useful to gather both qualitative and quantitative data[29]. Currently, we are not in contact with the software industries to identify the connections and establish a protocol to implement it can be possible when we start our project but as of now we do not have any connections. We are not sure, so we are not enclosing any further information related to case studies at this moment. Experiment is also a close study within the industry where the independent variable is manipulated and the dependent variable is measured. IT involves control variables as our connections with industry is poor to evaluate the control variables so, we limited our option to survey.

## **V. Expected outcomes**

The expected outcomes for the research questions identified for agile in the context of software testing are as follows.

- ✓ For research question 1 we determine what problems being addressed while using the agile test practices then later a framework can be generated by following systematic mapping displaying problems addressed with benefits of types of testing. Then a tangible outcome can be represented showing the problem addressed by specific tools with corresponding benefits.
- ✓ Research question 2 enables to give data on what type of test tools are used during agile testing this helps to identify where the test tools need more support to increase the agile software development effort while testing. Our motivation is to provide a tangible outcome showing which tools are existing in the language, and that need more focus on further tools support needed. Outcomes of Research question 2 can be changed based on ur motivation to reduce the scope during project implementation so, only very generic expected outcome is being addressed here.

## **VI. Time and activity plan**

The time plan for our activity throughout the course is as follow: Work done by: Kavya for particular event: 1; KARTHEEK for particular event: 2

2016-01-07	Started working on project relevant literature study (1) and Formulating the research questions (1).
2016-01-21	Started documenting the project plan (2).
2016-02-07	Project plan submission to examiner (1).
2016-02-08	Started doing literature review (1)(2).
2016-02-03	End of Literature Review (1)
2016-03-03	Preparing Questionnaires (1)

2016-03-08 Performing the Survey (2)  
 2016-04-05 Transcribe all the interview data (1)(2)  
 2016-04-11 Starts analyzing the data (1)(2)  
 2016-04-15 Results are discussed with supervisor (1)(2) and  
 Data analyzed is conducted additional source of evidence (1)(2)  
 2016-04-19 Starts drafting the final thesis (1)(2)  
 2016-05-18 Final draft submission of the thesis (1)(2)  
 2016-05-29 Reported the document to opponent (1)  
 2016-06-01 Presentation of Master Thesis (1)(2)  
 2016-06-12 Final Submission of thesis Report (1)(2)

## VII. Risk management

General risks in the view of the project to be conducted [30].

S.no	Risk	Cause	Mitigation Strategy
1.	Improper Time Management	<ul style="list-style-type: none"> <li>Not able to complete the projects within deadlines.</li> <li>External entity influences and deviates the project from schedule.</li> </ul>	Maintaining weekly reports and having meetings with the project supervisor, reporting the project progress to the supervisor and doing necessary revisions and corrections to the schedule.
2.	Technical Risks	<ul style="list-style-type: none"> <li>Updates may arise all along the project to improve the version of the software.</li> <li>Testing tools are efficient but are not used within organizations.</li> </ul>	<ul style="list-style-type: none"> <li>Adhering to a fixed version of utility software tools and not upgrading them through out our project.</li> <li>Reduce the scope by considering only favorable tools.</li> </ul>
3.	Scope	<ul style="list-style-type: none"> <li>The scope of the project can be changed in the course of the project's progress.</li> </ul>	<ul style="list-style-type: none"> <li>Planning thoroughly and effectively the entire project can mitigate this. And feedback must also be taken from the supervisor regularly to make sure whether the project is inside the scope or not.</li> </ul>
4.	Human error	<ul style="list-style-type: none"> <li>Some research articles may exclude in overview.</li> </ul>	<ul style="list-style-type: none"> <li>One should be careful while searching for the articles by taking the relevant search strings to the topic you choose and formulating it.</li> </ul>

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Risks that may arise while working in on research methods Below table shows the identification of risks and its likelihood, impact, avoidance and mitigation strategies are addressed.

Risk	Why it occurs?	What are the impacts?	How to avoid it?	How to mitigate it?
Interpretation validity	It generally occurs when incorrect interpretation is done from the collected data.	Depending on one's own notation of understanding rather than what the actual data is given.  Manipulating the data based on his own view point rather than the view point of collected data.	In order to avoid the interpretation validity, we can add open ended questions to answer elaborately.	Interpretation and communication skills can be improvised. Questionnaire should not be confusing.
Descriptive validity	It occurs when the data collected or given was not recorded correctly.	It might result in false values that impact and change the end systematic mapping framework.	It should be recorded and maintained properly.  Recorded data shouldn't be the shorter version of what actually being said or collected.	In order to mitigate, it is important to keep track of all the record. We can use online tools to store the collected data.
Theory validity	The initial specific theory that the researcher believes should not be aligned with what the actual data is collected.	This impacts the entire project. Industrial practitioners do not trust false proofed statements.	We ensure that we do not coerce the data. Try not to match the obtained data with the expected data by manipulation.	Each and every detail should be presented. Results should be accepted even if it does not prove initially stated theory.

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