

A Study Analysis on Effect of Software Scope Management and Scope creeping Factors in Software Project Management

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Abstract—Scope, time, and cost permanently effects each other and most of Information Technology projects fails due to these three factors. Scope shifting mostly occur due to time and cost. At project start, lack of understanding of project and product scope is focal involvement that leads to unsuccessful projects. Complete software scope definition determines quality of project. Defining the customer requirement and the definite scope of project has key role for implementation of project management. The complications originates when systems are developed from impractical expectations and misunderstanding requirements. These problems are cause of many changes, occurs in system development and leads to poor scope management. Scope creep is one of the momentous prompting parameter on the success of project. The failure in manage scope creep leads for 80 percent of software projects failure. However, using agile approach the impact of scope creep on projects become insignificant. A correctly distinct scope tends us to develop a quality product, within identified plans and decided cost to the stake-holders.

Index Terms—Scope creep, Software Engineering, Software Project Management, Work breakdown structure, Agile method, Traditional Methodology, Functional point analysis, Stakeholders

I. INTRODUCTION

It is difficult to develop high quality software. High quality of project depends upon constraints such as cost, time, and scope. The limits and boundaries of the software project is defined by scope definition. It includes what the project should have and haven't. It is most intricate and important task of software project management [1]. The success of any project is dependent upon scope to produce high quality product. Project fails due to lack of understanding and incomplete scope definition. Well defined scope leads to successful project. Complicated project have scope definition which is difficult to describe completely [12]. A good scope definition includes the information related to product that will be

produced and project itself. Project scope has information related to project,

its scheduling, cost and budgeting, human resource, stakeholders, project execution information [6]. Project requirement is foremost step in defining scope of project. Requirements are given by the customer in natural language and it cause ambiguousness and incompleteness in the requirement collection. Project nature makes scope to be defined. In order to have a good quality scope definition there are some tools and techniques. Functional Size Measurement (FSM) methods and Function Point Analysis (FPA) are tool for quality scope definition [10]. The survey on IT project depicts that 92 percent of participants reporting project failure and about 60 of them were project manager. Failure of project identifies multiple factors like time, cost, user involvement in requirement collection, idealistic expectation, poor management of scope, etc. The main three points of project failure is poor scope management above cost, above time. There are some issues that need to accomplished to address project failure that are project management experiences particularly in similar project, risk and quality management adjustment depends on project's scope and threats associated with it [5]. Scope creep effects other factors of that are necessary for project performance and also badly effects the software quality [4]. Software engineering evolve and produces an important spheres of construction cycle, it is difficult to develop a high software quality. Constraints are meet in order to grasp the software with high quality [3]. Poor project scope description can increase the probability of extreme variations and modification during the project

execution phase and also major cause time of delays, budget assaults [1].

II. LITERATURE REVIEW

A huge number of Software projects fails from many years in contrast with other industries, to overcome this, software project management has become consideration core [1]. According to The Software Engineering Book of Knowledge (SWEBOOK), project management techniques for producing quality assured software, includes seven knowledge areas; a) project integration management, b) project scope management, c) project time management, d) project cost management,

e) project quality management, f) project human resource management, g) project communications management [8]. Project Management Body Of Knowledge (PMBOK) declare scope management as prime knowledge. Project scope setting is foremost phase of the project progress. [3]. It is done to keep the track of particular spread of potentials that has to be completed during the project, to extract this, requirements and expectations of stakeholders for the projects are assembled through Requirements management. The process of Requirements management differ with respect to the domain, but usually the process includes the following: a) requirements elicitation, b) requirements analysis, c) requirements specification, d) requirements validation e) requirements management [2]. Requirement Changes are done in development phase to meet customer goal and satisfaction. These changes will affect Scope Goal, Time Goal and Cost Goal. Scope changes in IT Project are referred as small changes and big changes. Scope Creep is adding informal feature from user desire and is called small change. Whereas, Scope Change cause elementary scope to change from early project planning to all part of developed system and is called big change. [5]. Software development is improved by adopting agile methodologies for software developments [6]. The product is deliverable whereas project is process of developing that deliverable. Project scope and product scope has different requirements, areas, purposes, participants, and interfaces but the product is compelled through the project scope. The accomplishment of scope objectives is measured as the most important element for management productivity. The following steps help to for scope compilation: a) Requirement Identification, b) Stakeholder Identification, c) Project Drivers Identification, d) Scope Statement examination [7]. Poor scope definition is one of the main cause of software failure. Reasons that tends to poorly defined scope are partial requirements, less customer participation, unrealistic user expectations, blurred objectives, planning shortage, expertise futility. Poor project scope description can increase the probability of extreme variations and modification during the

project execution phase and also major cause time of delays, budget assaults [1].

III. ANALYSIS

A. Factor Effecting the Scope

Scope creep has influence on the controlling factor of project including schedule, budget human resources. In order to make the influence dominant there occur the comparison between traditional method and agile method used in the project.it has been inferred through data analysis that traditional model has high influence on the project scope creeping than the agile model in the development phase [8]. The process of project scope management includes requirements collection, scope definition, work breakdown structure creation, scope verification and control. Requirement collection is basically the stakeholder's need, what he want from the project. The requirement of the system defines the scope of the project properly, so the requirement collection is main step toward

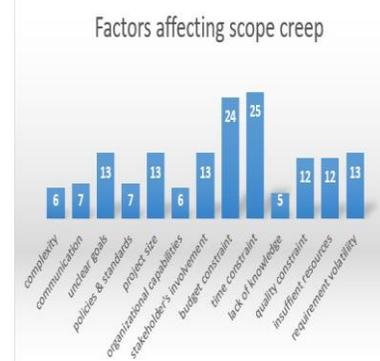


Fig. 1.

start of project. Requirement must have sufficient detail and analyzed in the start of project to get clear scope description and avoid problem of scope creeping [6]. Communication between team of project plays an acute role in presentation of scope changes, standards, and managed in project. When communications are not controlled and disturb scope management then three concerns occur that are misunderstanding, response, and consequences. Productivity slaughterer for project is misunderstanding and it can lead people to do the things wrong and create additional complications. It will take regeneration and rework and cause resources to waste. To avoid this confusion coordination between the project team and participants are important. As the scope has been written in natural language, while writing the scope, one must follow 5 c's of effective communication. Scope writing must be concise, clear, concrete, context, coherent [10]. Factors that affect the scope creep are explained in Fig. 1

B. Tools and Techniques of Scope to Avoid Scope Creeping in Software Projects

Project scope definition has great importance on the success of project. Scope definition includes the better scope control and identifying the features. There are some limited tools and techniques to measure the scope definition of project. These tools and techniques are applicable for the traditional and agile project or the combination of both. The problem of scope creeping can easily be resolved by process of better scope planning, scope definition and scope verification. The scope of project can be managed using tools but the quality completeness of scope can't be measured with any tool. Feature breakdown structure (FBS) is a tool for scope that exhibits the appropriate work breakdown and helps to define and verify scope. Story mapping is a tool that can control scope and provides assistance in defining scope of release. Scope can be estimated by Function Points (FP). FP is eminent techniques that uses metric which includes the user stories or total FP, per iteration team productivity, percentage change velocity and density of defects. Agile EVM is a tool that compute and control scope changes of project and helps in assimilating scope, plan and assets. Stacked Area Chart is supportive tool in estimating big picture of the project's status and progress for scope accomplishment in correspondence of time. Tree Map is visualization technique for a superior product bottleneck in which the size of block tells the size of the product scope and glooms represent the project's progress towards achieving its goals. Burndown Chart is a tool for estimation of planning and progress that can be according to time and speed and remaining work. Burnup Chart is a substitute of burndown chart. Agilefant is a simple tool that is supportive for iteration and release management with respect to time and work. Cumulative flow diagram helps in representation of work quantity removes bottleneck. Task board can find the items of concern quickly and estimate the completion rate of projects. Analogy technique study the previous projects that are similar to the current one and make evaluations on the basis of information gained from the past projects. Price-towin is method which evaluate the project focusing on the ability of customer to pay but it overruns in cost and time. Wideband Delphi method is a suitable technique that can estimate the project with vibrant requirements. COCOMO methods are widely used for assessment of budget and work of software projects with pure and comprehensive requirements. AgileMOW uses expert judgment and procedures to estimate the budget and work done on the project [12]. The summary of these techniques are given in table 1.

IV. CONCLUSION

Scope definition is most complex and critical part of project management. Failure or success of any project depends scope definition. Incomplete scope definition is root cause of many

software project failure. In order to define, verify and control scope there are many tools and techniques that are supportive, but it is complicated to measure the quality and completeness of scope. Scope creeping is one of the most prime criteria that effect the project.

V. ACKNOWLEDGMENT

This work is support by Fatima Jinnah Women University's student name Muneeza Khalid under the Supervision of Miss Mehreen Sirshar from Software Engineering department as semester project of Software Project Management course.

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TABLE I

Tools/Technique	Traditional/Agile	Scope	Scope control	Identifying feature
Work Breakdown Structure	Both	Yes	Yes	Yes
Feature Breakdown structure	Agile	Yes	Yes	Yes
Story mapping	Agile	Yes	Yes	Yes
Scope change control system	Both	Yes	Yes	No
Function size measurement	Both	No	Yes	Yes
Function point	Both	No	Yes	Yes
Expert judgment	Both	No	No	Yes
Template, forms and standards	Both	No	No	Yes
Identification of alternatives	Both	No	No	Yes
Stakeholders analysis	Both	No	No	Yes
Performance analysis	Both	No	Yes	No

Requirement matrix	Agile	No	Yes	No
Cumulative flow	Agile	No	Yes	No
Agile EVM	Agile	No	Yes	No
Stack area chart	Agile	No	Yes	No
Burn down chart	Agile	No	Yes	No
Burn up chart	Agile	No	Yes	No
Iteration status chart	Agile	No	Yes	No
Agilefant	Agile	No	Yes	No
Tree map	Agile	No	Yes	No
Task board	Agile	Yes	Yes	No
Planning poker	Agile	Yes	Yes	Yes
Analogy technique	Both	No	No	Yes
Price to win	Both	Yes	Yes	No
Wideband Delphi	Agile	Yes	No	Yes
Construction cost mode (COCOMO)	Agile	Yes	No	Yes
Agile MOW	Agile	Yes	No	Yes

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