A Review on Software Development and Project Estimation Process

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Abstract – Software Development is a term to enclose the processes of software engineering combined with the research and targets of software marketing to develop computer software products. As the development of software increases it required to estimate the projects. Estimation of the various resources is required, which is required for the conclusion of any project. Cost estimation is the important part of every type projects management and control. The Accurate cost estimation helps us complete the project within time and budget. One of the greatest challenges for a project leader is to successfully deliver on all aspects of a project both according to the client's specifications and within the allotted budget. Accurate cost estimation helps to complete project within time and budget. In this paper we describe the development of the software according to last three decades and Software Development Priorities after that we studied about the software estimation process, its needs, its development and the steps required for the estimation of the software.

Keywords: . Cost Estimation, COCOMO, Development Priorities, Lines of Code.
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I. INTRODUCTION

In any Software project understanding of a project is required, under estimation leads to low quality products and also it leads to missing the target deadlines, over estimating of a project leads to increase in cost and also it reduce the competition of the project. In this paper we describe the development of the software according to last three decades and after that we studied about the software estimation process, its needs, its development and the steps required for the estimation of the software.

Software Cost Estimation is a process used in software development industry to estimate or predict the resource, efforts, cost of any development process, furthermore to the management controlling and monitoring process over the software development process.[1]

A system is needed to be check before it is used. So Testing of that system is a very effective to assure the quality of the software. So the Testing of a software is become an important research area. It has following parts:

Software Testing is an important part in the field of software or application. It provides most of the information about the quality of the product or application which is used by the many users.

II. LITERATURE SURVEY

Software testing also provides the independent view of software in the many fields to understand the risk of software implementation. In software testing a proper process is used by execution of a program or a application to find out any error or misbehave of the software. [6]

Software development is describe in table as follows [6]

Sr. No.	Year	Development
1.	Prior 1970	Estimation of effort was done manually by using Thumb rules or some algorithms which were based on Trial and error and Automated Software cost estimating tools were build
2.	During early 1970's	The prototyping composite model is COCOMO (Constructive Cost Model) developed by Barry Boehm
3.	1975	Function Point Analysis for estimating the size and development effort
4.	1977	PRICE-S Software estimation model was designed by Frank Freiman
5.	1979	SLIM (Software Life Cycle Model) was introduced to US-Market by Lawrence H. Putnam based on Norden Rayleigh Curve
6.	1981	Dr. Barry Boehm released his book "Software Engineering Economics" in which he highlighted the essential algorithms of Constructive Cost Model (COCOMO)
7.	1983	Charles Symons, a British software estimating researcher, he introduced Mark II function point metric
8.	1984	IBM done a major revision of his function point metric which is basis of today's function points
9.	1985	Caper Jones extended the concept of Function Point to include the effect of computationally complex algorithm
10.	1986	IFPUG (International Function Point Users Group) was founded in Toronto
11.	1990	Barry Boehm, at university of Southern California began to revise and extend the concept of original COCOMO model
12.	1992	Betteridge, R. worked on software costing. There was a method called Mark II Function Point which predicted

		cost of number of projects
13.	1993	the new version of COCOMO was introduced called COCOMO 2.0 which emerged in 1994
14.	1994	Rajiv D Banker and Hsihui Chang and Chris F Kemerer, they found it useful for cost estimation and productivity evaluation purposes'
15.	1996	Sophie Cockroft, obtained accurate size estimations from the early system specifications
16.	1997	Existing models were reviewed and more focus was on accuracy
17.	1998	Chatzoglou constructed a new model called MARCS to give predictions of the resources
18.	1999	J. J. Dolado, He made a research about the estimation using the technique of Genetic Programming
19.	2001	A new approach was proposed based on reasoning by analogy and linguistic quantifiers were used to estimate the effort
20.	2002	M.Jorgensen, expert estimation was the most frequently applied estimation strategy for software projects
21.	2003	Yunsik Ahn, Jungseok Suh, Seungryeol Kim and Hyunsoo Kim, they discussed software maintenance and proposed SMPEEM
22.	2004	he idea of EBSE (Evidence based Software Engineering) was proposed by Barbara
23.	2008	Parvinder S. Sandhu, He focused on predicting the accuracy of models.
24.	2009	During this year, some theoretical problems were identified that compared estimation models
25.	2010	Different estimation techniques were combined to reduce the error and keep control over the deviation of estimates away from actual
26.	2011	Many estimation techniques were proposed and used extensively by practitioners for use in Function Oriented Software development
27.	2012	There were many software size and effort measurement methods proposed in literature, they were not widely adopted in practice

Table 1

Software Development Priorities and Trends:

The survey asked a series of questions to understand the primary context of software development in 2011, from the perspective of priorities to most common and popular processes and tools. Almost 86% of respondents identified their organization's current top priority being new product and application development.[2] The fig.1 shows top software development priorities.
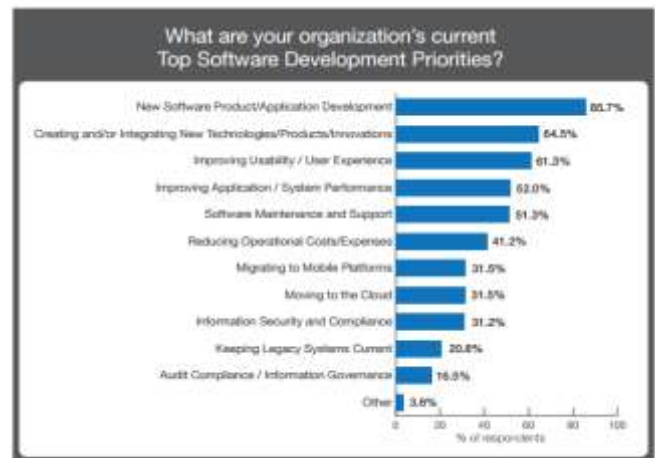

Fig.1 Software Development Priorities[2]

According to a new Gartner report, the worldwide application development software market is expected to cross $9 billion in 2012 and an increase of 1.8 percent over 2011. The report said that the growth will be driven by developing software delivery models, development methodologies, mobile application development and open source software.

Mobile application development represents a large part of the software development services market at the moment and the best part about it is that this particular branch of the IT industry is still a long way away from reaching its full potential. Mobile technology is not only changing how peoples live their lives but also employee productivity and redefining business models customer relationships.

III. INTRODUCTION OF SOFTWARE ESTIMATION

Efficient software estimation, that provides the information, which is needed to design a effective software development plan. Effective estimation of a project is extremely valuable for the project success for any software project from the small agile projects to larger projects. Effective software estimation provides some important information that is required for the project decisions, performance and essential objectives and plans.

Some elements are concerned in the determining a structure for a project, and also including requirements, architecture, quality supplies and staffing mix. The estimation required in every aspect of the project that constrains the actions, which can be overtaken in the development or upgrade of a product, and limits available options. Some people think that they can guess project scope that is based on their engineering or managing experience.

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The following are the four basic steps in software project estimation.

a) Estimate the size of the development product. It includes Lines of Code (LOC) or Function Points (FP) and also there are other possible units of measure.

b) Estimate the effort in person/months or person/hours is calculated.

c) Estimate the schedule in calendar months and finally,

d) Estimate the project cost in dollars or in local currency.

There are many estimation methods can be used for to find out the effort for software but the following are the better known.

a) The Pi times thumb method
b) The Analogy method
c) The Relational Method
d) The Weightiness method
e) The method of parametrical estimation equations
f) The Multiplicator Method
g) The Percentage Method
h) The COCOMO Method.[3]

IV. NEED OF SOFTWARE EFFORT ESTIMATION

In small projects accuracy is not very important factor and they can be estimated easily. But when the project size increases it accuracy became the important factor and it is hard to estimate the project accurately. So software estimation is required to helps to plan forthcoming activities properly.

V. STEPS REQUIRED FOR SOFTWARE ESTIMATION

In an ideal world an estimate should be produced by the following process that is described in the Figure 2.

Figure 2. Estimation Process[4][5]

Step One: Establish Estimate Scope and Purpose

A establish estimation scope and purpose is the first step that is required in the estimation process. In this step all members understand the scope & purpose of estimation.

Step Two: Establish Technical Baseline, Groundrules, and Assumptions

Establish Technical Baseline, Groundrules, and Assumptions is the second step that is required in the estimation process. It is used for establishing a good technical baseline.

Step Three: Collect Data

Collection of data is the third step that is required in the estimation process. In this core information must be acquired in order to make sure a consistent estimate.

Step Four: Software Sizing

Software Sizing is the fourth step that is required in the estimation process. It is a very important step because in this step the size of the software, which is developed, is estimated.

Step Five: Prepare Baseline Estimate

Prepare Baseline Estimation is the fifth step that is required in the estimation process. For preparing the baseline there are many approaches is used like data productivity, guessing, expert judgment etc.

Step Six: Quantify Risks and Risk Analysis

Quantify Risks and Risk Analysis is the sixth step that is required in the estimation process. It is important to understand about the risk and in itself; it does not necessarily for posing threat in a software project. If it is properly acknowledged and addressed before it becomes a bigger problem.

Step Seven: Estimate Validation and Review

Estimate Validation and Review is the seventh step that is required in the estimation process. There are many ways to authenticate estimation. Estimate Validation and Review, both the process used to build the estimation and must be evaluated.

Step Eight: Generate A Project Plan

Generate a Project Plan is the eighth step that is required in the estimation process. It includes taking the estimation and reviewing the cost and prepare according to the schedule.

Step Nine: Document Estimate and Lessons Learned

Document Estimate and Lessons Learned is the ninth step that is required in the estimation process. In every estimation process it is necessary to document the estimate information and also record the lessons that are learned by you.

Step Ten: Track Project throughout Development

Track Project throughout Development is the tenth and final step required in the estimation process. In this process all the information are collected and comparison with the original plan take place. [4][5].
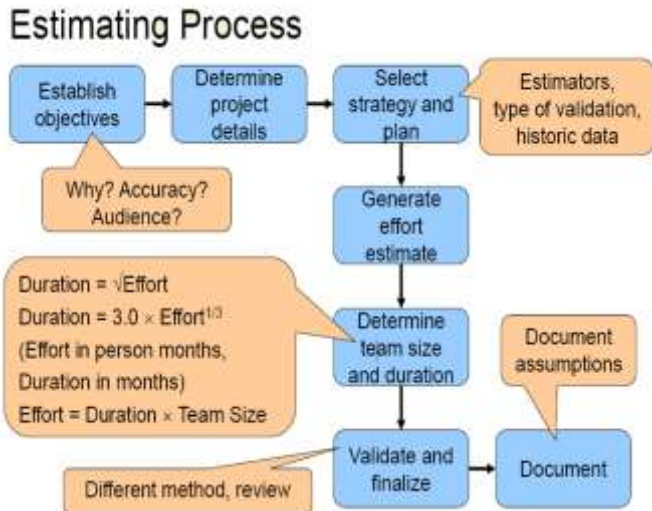

Figure 3: Estimation Process

VI.   DEVELOPMENT OF SOFTWARE ESTIMATION TECHNIQUES

Following table shows the different software estimation technique developed in past decades.

S. No.	Software Estimation Technique	Example
1.	Model Based	SLIM, COCOMO
2.	Expertise Based	DELPHI. RULE BASED
3.	Learning Based	NEURAL NETWORK
4.	Dynamics Based	ABDEL, HAMID, MADNICK
5.	Regression Techniques	OLS, ROBUST
6.	Composite	COCOMO II

Table 2.

VII.   EMPIRICAL ESTIMATION MODEL

An estimation of software project is essential for the reliable cost. Usually it involves following steps:

- Perform project decomposition
- Apply an empirical model to obtain estimates of software cost, effort and duration
- Identify the project scope
- Compute the empirical metrics KLOC and/or FP
- Use for comparison automated estimation tools

VIII.   ESTIMATION PROCESS FOR THE OBJECT-ORIENTED SOFTWARE

In the estimation process for the object-oriented software four basic activities are used, which are shown in the figure 4.

In the first process an estimation approach is selected, after that in the next step map and calibrates of the project's structure is used. Then compute estimate is the next process.
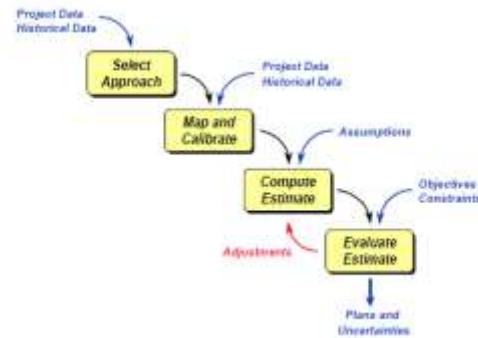

Figure 4: Generic Estimation Process. [7]

IX.   CONCLUSION

Project planning is one of the most important activities in software projects. Software project managers should be aware of the increasing of project failures and over budget. The main reason for this problem is imprecision of the estimation. In order to get accurate estimation result, we must carry good cost estimation process Estimation of the effective software project is the top most challenge and an important task in the software development process. Without the proper estimation, we can't achieve proper project planning and completion. We have to spotlight a reasonable effort for improving these situation and we will get better result.

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