

Analyzing Agile Estimation Techniques and Software Development

Anooja A

Ph.D. Research Scholar (Computer Science)
Vivekananda Global University, Jaipur

Dr. Shalini Rajawat
HOD, Computer Science

Abstract:- Current scenario of software shows that cost estimation plays a vital role in the whole cycle of software development. Software development process involves various techniques and skills which helps in accurate estimation, overall charges, delivery date, required effort and assurance of project acceptance or denial. This paper presents current scenario of knowledge in the field of software development methodologies and a systematic survey of cost estimation in Agile Software Development, which will be useful to understand current trends in cost estimation in ASD Development stages. Stages are building blocks of any software development methodology which are presented graphically. Software development methodologies are compared by highlighting strengths and weaknesses from the stakeholder's point of view.

Keywords: Software development, project management, agile, development methodology, Accuracy, Cost, Effort, Estimation

Introduction:

Early time when software development was not a serious issue that time, the software developers used adhoc processes to develop software. But when software development started becoming popular and commercial then the size of projects started becoming big with the increase in functionalities of the project. Then the adhoc process of development was not enough for successful software project. To overcome this problem, Software Project Management (SPM) is introduced. Recent research and practical results of different software developments have proved that if you want successful quality product then increase prediction accuracy of cost and effort estimation. Prediction of actual estimate became complex due to increasing functionalities which increases the project size of software. Hence To determine how long and how much time will take to deliver a new software product is very toughest task and humans are not perfect to predicting accurate results. Each project having their unique problems which looks simple but faces issues on implementing section and

undoubtedly, that can only be identified when they arise. Agile performed vital role to estimate accurate cost of software.

Agile:

Agile methodology is a practice that promotes continuous iteration of development and testing throughout the software development lifecycle of the project. Agile development and testing activities are concurrent not like a Waterfall model. ^[1] An agile method makes project flexible and allows for responding to changes given by the customer at any stage of development. This enables continuous testing and maintenance. Hence a highly flexible and quality product is produced. ^[2]

Agile System Life Cycle:

The Agile technology allowing teams to break the large requirements in small segments, build, and test hence delivering working software quickly and more frequently. ^[3]

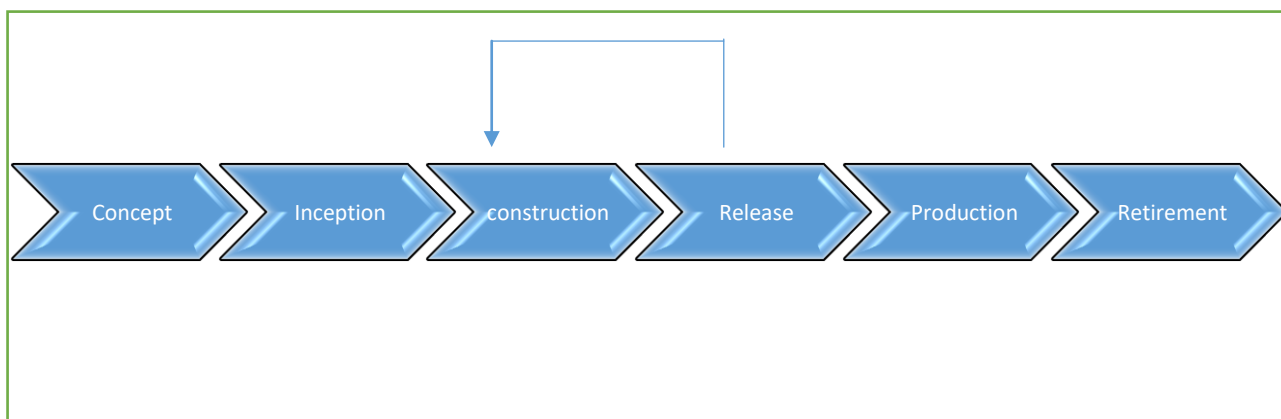


Figure 1: Agile Life Cycle

- 1) **Concept-** Selection of project among various project according to priority, feasibility study etc.
- 2) **Inception-** Initiate the project, select team members and set timeline.
- 3) **Construction-** Begin work, Revisions etc
- 4) **Release-** Releasing the product after testing, addressing defects and documentation.
- 5) **Production-** Ongoing support to users.
- 6) **Retirement-** Removing Product from the system.

Reasons behind inaccurate estimation in Agile:

- 1) Lack of Procedures to deal with any failures and problems.
- 2) Improper communication between client and developers.
- 3) Pressures of timeline.
- 4) Flexibility
- 5) Self-knowledge independency

Recent Researches:

1. Article of Abrahamsson et al. ^[4] explains how to collect metrics for measurement of productivity, quality and scheduling of estimation, cost and effort estimation for an Agile Software Development project using XP. The author giving proofs in various situations agile methodologies are more effective and suitable.
2. Williams et al. ^[5] investigated the usage of a subset of XP ^[6] in IBM. The release of product using XP developed at IBM was found better than older release in prespective of improvement in productivity, schedule, and cost-effort estimation. Evan customers were also satisfied with the products developed using products.
3. Cost estimation in agile development projects by Kieran Conboy National University of Ireland, Galway ^[7]
4. Effort estimation in agile software development - ACM Digital Library by M Usman^[8]
5. Research Challenges of Agile Estimation by RashmiPopli, Dr. Naresh Chauhan^[9]
- 6) Top-Down- Estimate and test entire system

6. A Review of Agile Software Effort Estimation Methods by Samson WanjalaMunialo, Geoffrey MuchiriMuketha^[10]
7. Comparative analysis of software cost- effort estimation and agile in perspective of software development by Anooja A. ^[11]

Research Outcomes:

- 1) Analyzing and comparing existing technologies and find best cost effort estimation technique.
- 2) A Proposed approach.

Software Metrics:

Some traditional metrics are used for estimation cost and effort--

- 1) Size Oriented
- 2) Function Oriented
- 3) Object Point
- 4) Use Case Point
- 5) Test Case Point

According to literature review three main effort estimation methods were found—

- 1) Algorithmic Estimation- These methods are based on mathematical models which produce function of a number of variables-

$$\text{Effort} = f(x_1, x_2 \dots x_n)$$

where $x_1, x_2, \dots, x_n$ denote the cost factors i.e. software metrics. ^[12]

Ex: COCOMO, Puntametc

- 2) Expertise Estimation- These Methods are used when there is complexity to collecting data and requirements. There is no evidences but situations where we can expect expert estimates to be more accurate than other estimation models.

Ex: Delphi, Rule based etc

- 3) Learning Oriented- These methods are advance version of algorithmic and expertise estimation where conclusion obtained by previous projects, examples and current knowledge.

Ex: Neural and Analogy. ^[12]

- 4) Price to Win- Estimates according to budget of the software.
- 5) Bottom-up- Estimate and test each components of the system.

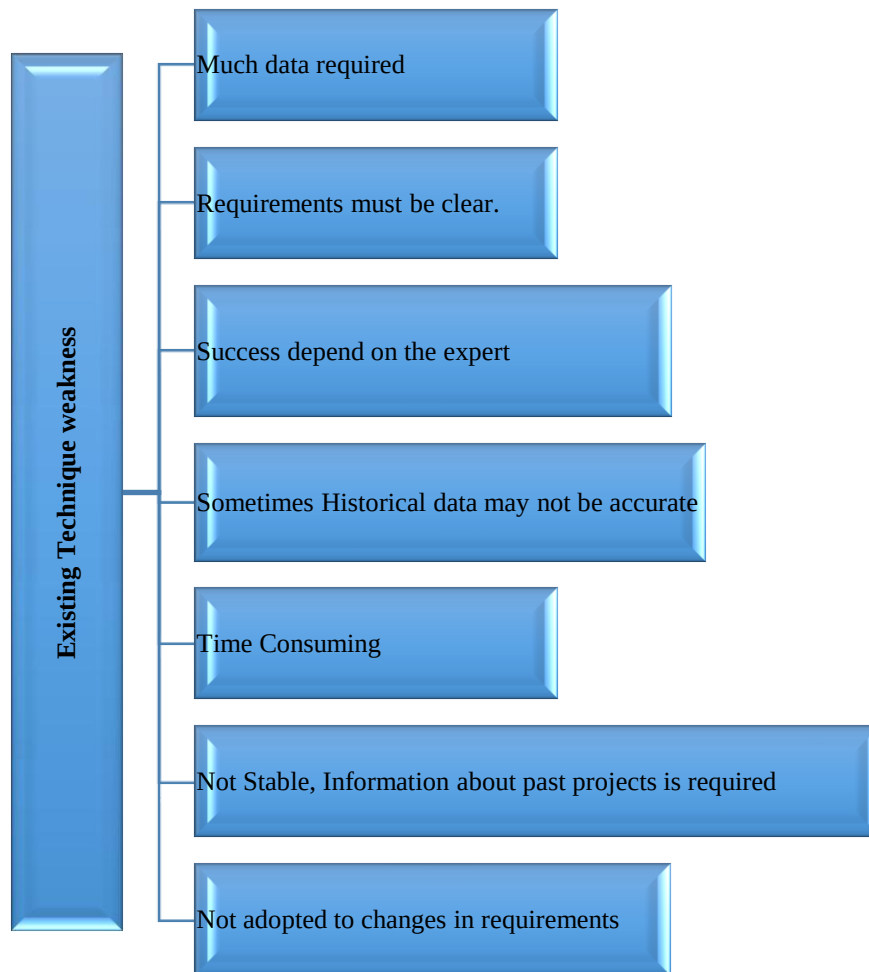


Figure 2: Traditional estimation methods weakness

Analyzing and comparing agile estimation techniques:

Agile is a popular development method due to great communication with customer and developer, fast delivery and flexible nature. Estimation means relative (size and complexity) and absolute (Time) estimating. Some major methods^[13]-

1) Planning Poker

- a) All participants having numbered cards to estimate items
- b) Product owner explain expectations and user story
- c) Each participants selects numbered card to show his/her estimation
- d) If numbers are same then estimation done else re-estimate until all are same
- e) During this they can explain why they are giving numbers.

2) T-Shirt Sizes

- a) All team members mutually and openly discussed and take decision about sizes.

- b) According to user stories participants give sizes XS,S,M,L,XL,XXL
- c) If small task then S, heavy task XL and soon
- d) Uses for large backlogs

3) Dot Voting

- a) All participants having small number of small stickers for voting individual items.
- b) According to priority of task participants give sizes dots(stickers)
- c) If less priority then less dots else more dots
- d) Uses for small backlogs

4) The Bucket System

- a) Create several buckets in series of Fibonacci.
- b) According to complexity give marks for each complexity in form of Low=1, Medium=2, High=3

- c) Then add all marks and check which bucket is near to that mark then decide story point
 - d) Uses for large backlogs
- 5) Large/Uncertain/Small
- a) The team asked to estimate item according to three categories.
 - b) Simplify the bucket system.
 - c) Uses in smaller groups with comparable items.

Conclusion

This paper provides an overview of existing software cost estimation models which explains key factors relevant in estimating the cost of software and situations which estimation method will be appropriate. No model is available for accurate estimation. To improve the efficiency of the existing techniques and launching the new for estimation for current software project requirements can be the future works in this area.

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