

Software Projects Tracking– Problem, Proposed Methods & Limitations

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Abstract- One of the major challenges faced by project managers is to manage successful delivery of the software project with minimal cost and high quality of software by constantly reducing & mitigating delivery risk. Cost control & Success of a project becomes key criteria, need arises for controlling cost & meeting delivery dates. One of the key project objectives to measure project status effectively at any given point of time Let's consider hypotheses: Pro-active & effective measurement of software project status at given point of time, used for developing software impacts success rate, risk, and cost & on time delivery. To test this hypothesis, 1. We need to arrive at effective status measurement technique 2. Correct status measurement leads to increased success of on-time delivery 3. Cost measurement & controlling can be done more effectively. There is Earn Value

Management Technique to tracking projects but some people feel it is more elaborative approach and software practitioners find it difficult to apply EVM. We need to look at difficulties in applying EVM and propose possible solutions to these difficulties. Our research explores problems & possible solutions for problem being recognized, applying these solutions enables effectively tracking software projects which gives rise to on-time delivery & pro-active cost management & thus increasing project success rate.

Keywords: Software Project Status Tracking, Earned Value Management (EVM), Effective & Pro-active measurement of Project Status & Cost

I INTRODUCTION

Imagine driving to an important trip to a distant place where you have never been for. No-one in their right mind, set off to such a journey without knowing at least the name and the general direction of the destination. Other important considerations are the distance and the available routes that take you there. Armed with this information and a good map one can feel more comfortable about taking the trip.

Managing a Software project is much harder than planning a trip. The biggest difference is that no matter how hard you try, challenges in

predicting the right amount of testing to be done for software so that cost and quality of end product in well in control. There are however striking similarities. Knowing the general direction is necessary in both the cases.

To go somewhere at a targeted Location, we first should know where are we today so that we can estimate for our targeted journey.

Software development is also like a journey where at any point of time we have to know the status how much is completed and how much is remaining.

A. OBJECTIVE APPROACH

Why tracking software projects? What to track? & Problem(s) in tracking software projects? The objective of this study is to answer some of these questions and to perform extensive analysis towards understanding the problem of software project tracking and eventually facilitating strategic planning. Understanding available methods which are much detailed like Earned Value Management (EVM).

B. DETAILED APPROACH

Now, let's first understand Earned value Management Technique i.e. Software Project Management using Earned Value Management (EVM)

Software Project Management & tracking using Earned Value Management (EVM) helps project managers to measure project performance. It is a systematic project management process used to find variances in projects based on the comparison of worked performed and work planned. EVM is used

on the cost and schedule control and is very useful in project forecasting. EVM provides quantitative data for project decision making.

a. Descriptions of the basic EVM elements & Problem Faced

Basic EVM Technique elements are

Planned Value (PV) describes how far along project work is supposed to be at any given point schedule. It is a numeric reflection of the budgeted work

Earned Value (EV) is a snapshot of work progress at a given point in time. It reflects the amount of

work that has actually been accomplished to date (or in a given time period).

Actual Cost (AC) is an indication of the level of resources that have been expended to achieve the actual work performed to date (or in a given time period).

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Project Management Question	EVM Performance Measures
<i>How are we doing time-wise?</i>	Schedule Analysis & Forecasting
- Are we ahead or behind schedule?	- Schedule Variance (SV)
- How efficiently are we using time?	- Schedule Performance Index (SPI)
- When are we likely to finish work?	- Time Estimate at Completion (EACT)
<i>How are we doing cost-wise?</i>	Cost Analysis & Forecasting
- Are we under or over our budget?	- Cost Variance (CV)
- How efficiently are we using our resources?	- Cost Performance Index (CPI)
- How efficiently must we use our remaining resources?	- To-Complete Performance Index (TCPI)
- What is the project likely to cost?	- Estimate at Completion (EAC)
- Will we be under or over budget?	- Variance at Completion (VAC)
- What will the remaining work cost?	- Estimate to Complete (ETC)

(Referred from Practice Standard for Earned Value Management, PMI & PMBOK 4th edition, PMI)
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The biggest problem in using EVM technique is – it requires detailed work for tracking, it needed cost estimates for each every element of the software project which becomes difficult & very extensive for software managers, however large projects can still benefit from it but that too not practiced in software industry.

b. Software Project Tracking Problem in Detail

When a software project is tracked using any typical project tracking tool, tool is fed with some basic data and then schedule variance, effort variance needs to be computed to arrive at cost variance at any given point of time say on daily basis, weekly basis or fortnightly basis.

As we know effort variance & and thus cost variance depends on effort invested till any given point of time and also needed to know planned effort at that point i.e. effort which should have invested till that point of time.

Computation of Planned Effort till a given point of time becomes key challenge, and any inappropriate

assumptions considered in base data can lead to incorrect computation of this metric

First understand, what metrics are available or inputted by project in charge.

Pre-set metrics available in tracking tool (or Excel based Tracking)

- Total Planned Effort
- Planned Start Date
- Planned End Date
- Revised End Date

Input metrics at any given point of time

- % Completion of Project
- Status in words – Any additional information provided or gross level status

Computed at any given point of time

- Actual Invested Efforts (till Date) – computed - as timesheets is filled regularly by entire project team (maintained in Excel / system)
- % Actual Invested Efforts (till Date)
- % Time Elapsed(till Date) – computed – using start date & current date

Now based on these available metrics, in order to arrive at effort variance & cost variance at any given point of time. We need to devise effective ways to determine the status and the address the problem.

c. Software Project Tracking – Proposed Methods & Limitations

Before we proceed & devise an effective remedy, having understood the plan information & information about past and up to the present situation, we need to understand the few critical parameters of future

How much more effort required?

How much more time required?

These critical inputs to be collected as a must ingredients.

Now based on these available metrics, in order to arrive at effort variance & cost variance at any given pint of time, let us first see how using various

possible methods Planned Invested Efforts (till Date) is computed and intern used to further compute Cost Variance % % & Effort Variance % Effort Variance % (till Date)

$$= \frac{\text{Effort Invested (till Date)} - \text{planned invested efforts (till Date)}}{\text{planned invested efforts (till Date)}}$$

Method-1

$$\text{Effort Variance \% (till Date)} = \frac{[(\text{Effort Invested (till Date)} - \text{Total Planned Effort}) / \text{Total Planned Effort}] * 100}$$

This method will generate huge variance till the very end of the project even in best case of project running on-time and on-cost.

So, this may not be appropriate

Method-2

$$\text{Effort Variance \% (till Date)} = \frac{[(\text{Effort Invested (till Date)} - \text{planned invested efforts (till Date)}) / \text{planned invested efforts (till Date)}] * 100}$$

Where Planned invested efforts (till Date) = % Completion Total Planned Effort

Assumption: efforts are uniformly distributed over entire time period

May not be appropriate where underlying assumption is not satisfied, so, need to look forward for general method

Method-3

$$\text{Effort Variance \% (till Date)} = \frac{[(\text{Effort Invested (till Date)} - \text{planned invested efforts (till Date)}) / \text{planned invested efforts (till Date)}] * 100}$$

Assumption: Assuming Schedule Variance is due to additional efforts being spent and so effort variance will also be in same proportionate.

$$\text{Effort Variance \% (till Date)} = \text{Schedule Variance \% (till Date)}$$

Where

$$\text{Planned invested efforts (till Date)} = \frac{\text{Effort Invested (till Date)}}{\text{planned invested efforts (till Date)}}$$

$$\left(\frac{\text{Schedule Variance \% (till Date)}}{100} + 1 \right)$$

May not be appropriate in certain situations where underlying assumption is not satisfied, so, need to look forward for a more general method.

II CONCLUSION

Software Projects Tracking – The Problem & Remedy, there are numerous problems leading to a challenge. The biggest problem in using EVM technique is – it requires detailed work for tracking, it needed cost estimates for each every element of the software project which becomes difficult & very extensive for software managers, however large projects can still benefit from it but that too not practiced in software industry. To seek a more practical way of software tracking, first detailed problem need to be understood so that it can be tackled effectively. Generally, following information is available from which a effective way is to be devised for status. Total Planned Effort

- Planned Start Date
- Planned End Date
- Revised End Date
- % Completion of Project
- Status in words – Any additional information provided or gross level status
- Actual Invested Efforts (till Date) – computed - as timesheets is filled regularly by entire project team (maintained in Excel / system)
- % Actual Invested Efforts (till Date)
- % Time Elapsed(till Date) – computed – using start date & current date
- How much more effort required?
- How much more time required?

Based on these various formulated methods can be used as proposed in detailed approach, one of the best choice may be method-3 as proposed, Effort Variance % (till Date)

$$= \left[\frac{\text{Effort Invested (till Date)} - \text{planned invested efforts (till Date)}}{\text{planned invested efforts (till Date)}} \right] * 100$$

Where

$$\frac{\text{Planned invested efforts (till Date)}}{\text{Completion Total Planned Effort}} = \%$$

Assumption: efforts are uniformly distributed over entire time period
 Thus cost variance & effort variance can be computed a – software project can be tracked effectively and accordingly corrective measures can be planned as may be required.

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