

Agile With EVM

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Abstract- This paper would highlight difference between the traditional waterfall and Agile software development life cycle. Also it describes about the approaches for implementing the EVM in the agile process. It analyzes how EVM can be implemented in Agile at different stages of process in terms of cost and schedule.

Keywords: Agile, EVM, Waterfall, Agile Cost, User Stories

I. INTRODUCTION

EVM is well known used for the water fall process. It is widely known to track the cost and schedule for project execution. Normally it is the assumption that EVM cannot be implemented with the AGILE process. The Agile project is based on SPRINT progress whereas waterfall is based on MILESTONE progress. The traditional software application widely emphasizes to follow waterfall software life cycle development. It follows sequential steps of analysis, design, development, testing and rework, implementation. The forthcoming step would not take place, until the previous phase is completed. There is no conflict or overlap between these phases. A thorough analysis of the entire software application is

done during the analysis phase. Design is done only after completing the analysis phase. Software coding starts only after all the functions are analyzed and designed. Testing begins after every software features is coded. If a bug/defect is identified in a later stage e.g., in testing or implementation stage, it is costly to solve it, as it may require re-work of previous steps of analysis, design and coding. Requirements are gathered at initial step. Requirements change in scope is costly to incorporate in waterfall project, as it may need to re-work of many of the previous stages of software development. The milestones and Work Breakdown Structure (WBS) for the entire software application is decided early in the project during the planning process group. Waterfall approach becomes costly if a change comes at later stages.

Agile methodology acknowledges that the requirements and that the scope of the project will change. It is easy to accept the changes if it comes and it has always short plan /cycle (week/month) . In an agile project, change requests can be incorporated in the future iterations in a matter of weeks, or months. Agile project can accommodate these changes because of its short release cycle (SPRINT).

International Journal Of Core Engineering & Management (IJCEM) **Volume 1, Issue 8, November 2014**

In agile project, the application is broken into features, which are assigned to multiple user stories. The features are then taken forward as USER STORY and then USER STORY could be broken down into tasks. Iterations (SPRINT) are based on their priorities. The SPRINT length normally would be 4-6 weeks. Analysis, design, coding, testing and implementation are done only for the features that are in the current iteration. Analysis, design, coding, testing and implementation of the software application are done for this SPRINT only. Agile project uses progressive elaboration. Waterfall project always has base plan early in the project. Changes could be added as priorities changes of business. Waterfall project sets the scope up front and it is costly to make scope changes. EVM is implemented in waterfall process on milestone basis whereas in AGILE it is implemented on SPRINT basis.

II. MOTIVATION

The software application development success has basically 3 pillars (schedule, cost and quality). Project manager always exercise EVM in waterfall methodology for cost and schedule but in AGILE there is a misconception that EVM may not be implemented on same. Here we need to look into that whether EVM could be implemented on SPRINT on progressive development environment as its being implemented in waterfall methodology for milestones basis to keep track on schedule and cost. EVM calculation in agile project will be based on Iteration (SPRINT). Scope changes are usually implemented in the future or forthcoming iterations. As such, the current iteration work can be predefined and will not be changed on the duration the SPRINT development.

III. PROBLEM STATEMENT

It is always challenging that which process need to be applied on which kind of project and same time how it is going to be tracked and monitored with any technique like EVM (Earn Value Management). In

organization sometimes, you get development project, sometime you get maintenance and sometimes we work on product.

EVM concept used in waterfall project is equally applicable in agile project. However, the interpretations could be different. EVM in agile project can be calculated on every iteration (SPRINT).

IV. RELATED WORK

The EVM has been implemented on waterfall methodology based on WBS.WBS for the entire software application is created. The accuracy of the EVM calculation depends on the accuracy of WBS that was created during the planning process. Percent complete for work packages is used for calculating EVM. Waterfall project uses the traditional metrics of EVM. These traditional metrics of EVM as applied in waterfall project is provided below:

Planned Value (PV) or Budgeted Cost of Work Scheduled (BCWS): This is the baseline that is planned for the entire application at the planning phase. It is measured in monetary unit.

Actual Cost (AC), or Actual Cost of Work Performed (ACWP): Cost that is incurred, measured in monetary unit.

Earned Value (EV), or Budgeted Cost of Work Performed (BCWP): It is the value of the work performed, measured in monetary unit.

Schedule Variance (SV) = EV-PV

Schedule Performance Index (SPI) = EV/PV

Cost Variance (CV) = EV – AC

Cost variance Index (CVI) = EV / AC

Above indicators are used to forecast Estimate at Completion and project the completion date in a waterfall project. However there are limitations of EVM when implement to waterfall methodology. These are the few points:

International Journal Of Core Engineering & Management (IJCEM)
Volume 1, Issue 8, November 2014

1. EVM does not track the scope of the project. EVM does not measure the quality of the deliverables and the technical performances. It only accepts the deliverables upon completion of work packages or milestone.

2. Schedule Performance Indicator (SPI) is an inaccurate measure during the later part of the project, especially if the project is behind schedule. At the later part of the project, SPI gets close to 1, although the project may be over schedule.

3. EVM uses percent completion of a work package for measuring the project progress. Percent complete could be a subjective measure and not an accurate indicator of the completion of the work package. As such, it is not unusual to find work package that took considerable more time than what was planned to finish the remaining 10% of the work package.

4. EVM costs time and money. Considerable time is spent in tracking these metrics. It is difficult to track EVM metrics in large projects that last for years and cost millions of dollars. Small corporations may not have resources to track these additional metrics. Project managers may not clearly understand the benefit of applying EVM for short, well-defined projects.

V. PROPOSED WORK

Following interpretations are made for calculating EVM in agile project:

AC: Cost incurred to date in iteration, measured in monetary unit.

EV: Value delivered to the customer, measured in monetary unit. It can be measured by adding the story points delivered to the customer, or by adding the dollar value of the functions delivered to the customer. Agile project accepts the user stories that are 100% complete. This is in contrast with waterfall project which accepts percent complete for a work package of WBS.

PV: Value planned to be delivered to the customer, measured in monetary unit. PV can be measured by adding the story points that were planned to be delivered, or the dollar value of the features that were planned to be delivered. Comparing the features that were planned to be delivered in iteration with the features that are actually delivered. Figure 2 displays a different view of the Burn Up chart for the same iteration where graphs were drawn by comparing dollar that was planned to be spent versus the dollar that was earned by delivering the features to the customer. The Planned Feature shown in Figure 1 and the Planned Dollar shown in Figure 2 are synonymous to PV in EVM used in waterfall project. Features Completed in Figure 1 and Earned Dollar in Figure 2 are synonymous to EV.

The difference between planned features and the completed features in Figure 1 at any point in time in iteration indicates variance, which is synonymous to SV used in EVM of waterfall project.

In the same way, difference between Planned Dollar and Earned Dollar in Figure 2 at any point in time in current iteration indicates variance, which is synonymous to CV used in EVM of waterfall project.

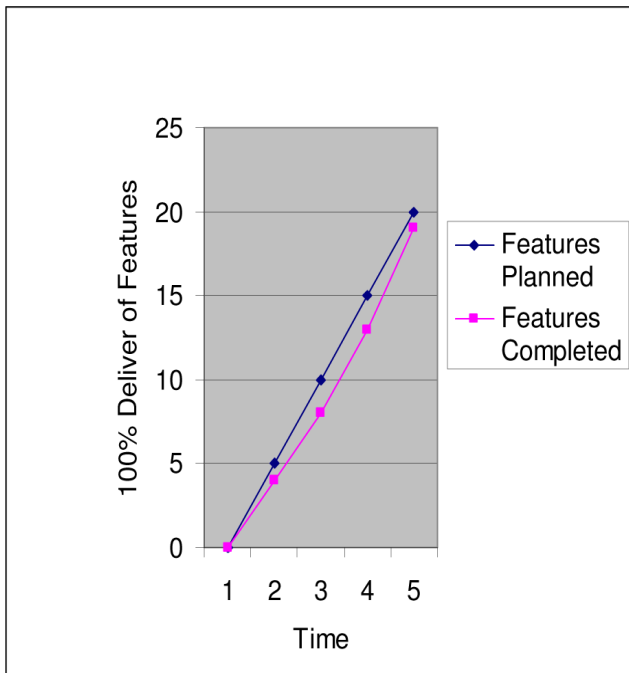


Figure 1. Burn Up Chart Using 100% Delivery of Feature

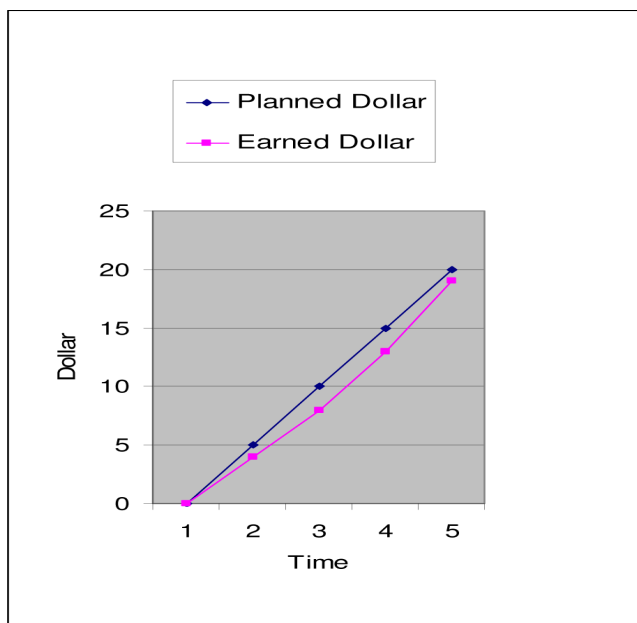


Figure 2. Burn Up Chart Using Dollar Value

Burn Down chart in Figure 3 shows the number of features that are yet to be implemented. This chart also shows the change requests made on the features planned in current iteration. The change requests are typically implemented in future iterations so that the features to be delivered in the current iteration are still delivered within the timeline of the current iteration

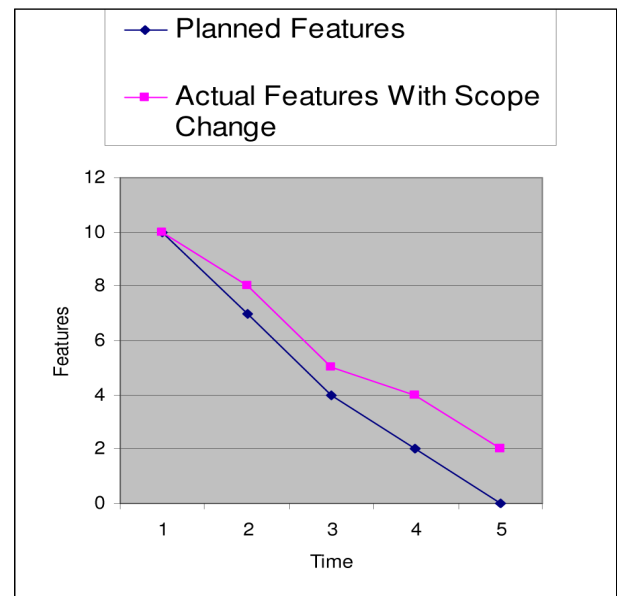


Figure 3. Burn Down Chart

VI. CONCLUSIONS

This paper indicates that the concept of EVM is applicable in agile software project. Not only that, the agile project overcomes the inherent limitations of EVM that applies to waterfall project. Although the adoption of EVM is limited in agile community, it will become popular with training and education and additional research.

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