Project Governance and Control Symposium
Canberra, Australia Capital Territory
14-16 August, 2018

Oklahoma and Earned Schedule

*** when ***

"Failure Is Not An Option"

…Many Times it Is Not A Choice

PGCS PROJECT AND PROGRAM MANAGEMENT SYMPOSIUM • Better Management • Better Projects

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Oklahoma

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Oklahoma City

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Alfred P. Murrah Federal Building

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Fireman and Bloody Child

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Memorial Anniversary Service

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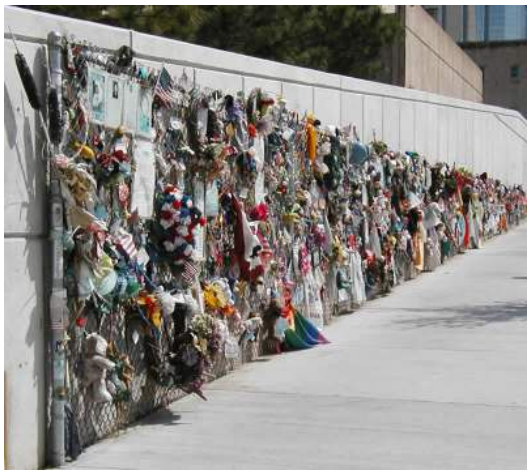
Memorial Fence



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OKC Memorial Marathon

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OKC Marathon – Tara & Me

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Norman, Oklahoma

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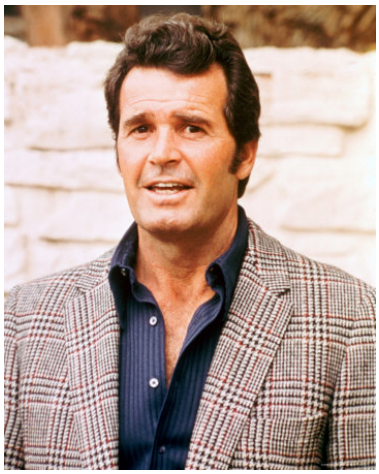
James Garner



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James Garner Sculpture

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Monster Tornado

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Plaza Towers Elementary School

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Storm Chasers

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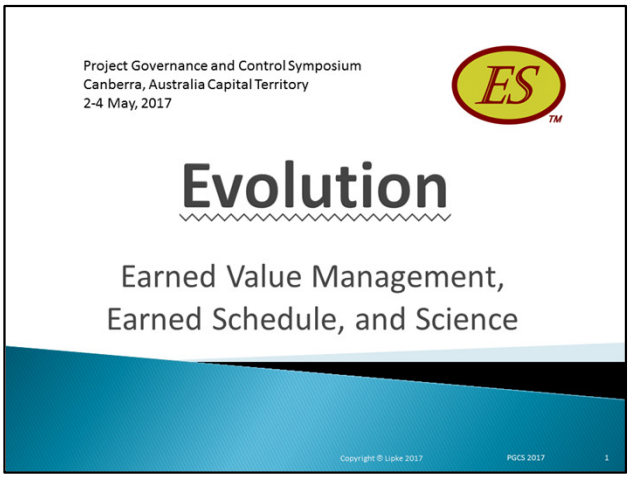

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Question 1

What was the impetus for creating Earned Schedule?

a. Software Process Improvement
b. Quentin Fleming
c. Failure of EVM schedule indicators

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Quentin Fleming

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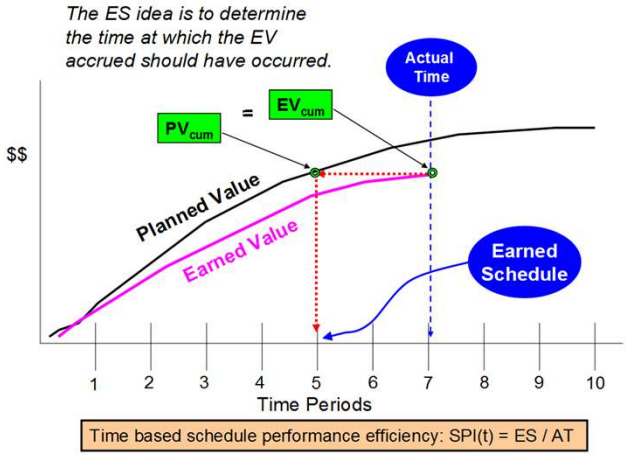
Earned Schedule Concept



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EVM & ES Notation

Attribute	Earned Value Management	Earned Schedule
Accomplish	EV	ES
Plan	PV	
Actual	AC	AT
Variance	CV = EV – AC	SV(t) = ES – AT
Efficiency	CPI = EV/AC	SPI(t) = ES/AT
Forecast	IEAC = BAC/CPI	IEAC(t) = PD/SPI(t)
Prediction	TCPI = (BAC – EV)/(EAC – AC)	TSPI = (PD – ES)/(ED – AT)

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Question 2

Once the method became known, did Earned Schedule "catch on" immediately with the EVM community?

a. Yes, ES was embraced and a movement began to replace the EVM schedule indicators
b. There was some skepticism. Many believed more testing and prototyping was needed.
c. No, ES was characterized as pseudoscience, ridiculed, and dismissed.

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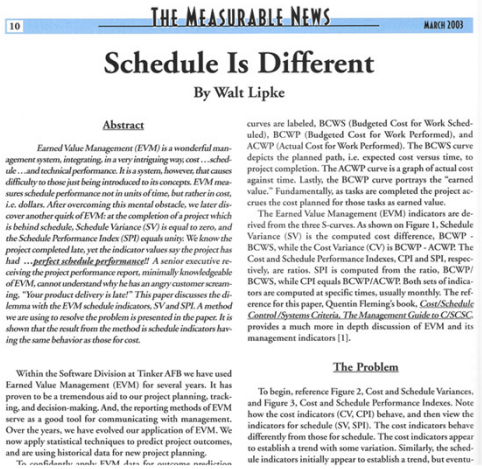
The Measurable News Article



THE MEASURABLE NEWS

10 MARCH 2003

Schedule Is Different

By Walt Lipke

Abstract

Earned Value Management (EVM) is a wonderful management system, integrating, in a very intriguing way, cost …schedule…and technical performance. It is a system, however, that causes difficulty to those just being introduced to its concepts. EVM measures schedule performance not in units of time, but rather in cost, i.e. dollars. After overcoming this mental obstacle, we later discover another quirk of EVM: at the completion of a project which is behind schedule, Schedule Variance (SV) is equal to zero, and the Schedule Performance Index (SPI) equals unity. We know the project completed late, yet the indicator values say the project has had …perfect schedule performance! A senior executive receiving the project performance report, minimally knowledgeable of EVM, cannot understand why he has an angry customer screaming, "Your product delivery is late!" This paper discusses the dilemma with the EVM schedule indicators, SV and SPI. A method we are using to resolve the problem is presented in the paper. It is shown that the result from the method is schedule indicators having the same behavior as those for cost.

Within the Software Division at Tinker AFB we have used Earned Value Management (EVM) for several years. It has proven to be a tremendous aid to our project planning, tracking, and decision-making. And, the reporting methods of EVM serve as a good tool for communicating with management. Over the years, we have evolved our application of EVM. We now apply statistical techniques to predict project outcomes, and are using historical data for new project planning.

curves are labeled, BCWS (Budgeted Cost for Work Scheduled), BCWP (Budgeted Cost for Work Performed), and ACWP (Actual Cost for Work Performed). The BCWS curve depicts the planned path, i.e. expected cost versus time, to project completion. The ACWP curve is a graph of actual cost against time. Lastly, the BCWP curve portrays the "earned value." Fundamentally, as tasks are completed the project accrues the cost planned for those tasks as earned value.

The Earned Value Management (EVM) indicators are derived from the three S-curves. As shown on Figure 1, Schedule Variance (SV) is the computed cost difference, BCWP - BCWS, while the Cost Variance (CV) is BCWP - ACWP. The Cost and Schedule Performance Indexes, CPI and SPI, respectively, are ratios. SPI is computed from the ratio, BCWP/BCWS, while CPI equals BCWP/ACWP. Both sets of indicators are computed at specific times, usually monthly. The reference for this paper, Quentin Fleming's book, *Cost/Schedule Control/Systems Criteria. The Management Guide to C/SCSC*, provides a much more in depth discussion of EVM and its management indicators [1].

The Problem

To begin, reference Figure 2, Cost and Schedule Variances, and Figure 3, Cost and Schedule Performance Indexes. Note how the cost indicators (CV, CPI) behave, and then view the indicators for schedule (SV, SPI). The cost indicators behave differently from those for schedule. The cost indicators appear to establish a trend with some variation. Similarly, the schedule indicators initially appear to establish a trend, but eventu-

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PMI-CPM EVM Practice Standard

Inclusion of Emerging Practice Insert into PMI-CPM EVM Practice Standard

Dr. John Singley, VP of CPM, introduced ES in Box 3-1 of EVM Practice Standard

Describes basic principles of "Earned Schedule"

Provides foundation for acceptance as a valid extension to EVM

EVM Practice Standard released at 2004 IPMC Conference

Box 3-1: Time-Based Schedule Measures -- An Emerging EVM Practice

In the current practice of EVM, schedule variance and schedule performance are both measures of work scope, not time. The work is represented by its budgeted cost as recorded in the performance measurement baseline. The EVM schedule variance is the difference between work performed and work scheduled, and the schedule performance index is the ratio of work performed to work scheduled. For Project EZ, these measures indicate that work is not being accomplished as quickly or as efficiently as planned.

SV = EV – PV = 32 – 48 = -16 SPI = EV / PV = 32 / 48 = 0.67

If the work were to continue at this rate, then all of the work of Project EZ would take 18 months to accomplish instead of the 12 months planned (12 / 0.6667 = 18).

These SV and SPI measures are useful indicators and predictors of performance and results. But, because they are based on work and not time, they can behave in ways that are not normally expected of schedule indicators and predictors. The problem can be illustrated with Project EZ. Whether all of the work is completed as planned at 12 months or at 18 months as predicted by the four-month SPI of 0.67, it will be completed eventually and at that time the work-based schedule variance and performance index will indicate perfect performance. For when the work is completed, EV = PV, and so SV = 0 and SPI = 1.0. This is fine if the work is being accomplished according to plan, but problematic if it is not. If Project EZ does take 18 months, SV will nonetheless equal 0 and SPI equal 1.0, when it's clear that Project EZ is 6 months late and averaged only 67% efficiency.

There is an emerging practice in EVM, which uses time-based measures of schedule variance and schedule performance as an alternative or supplement to the traditional work-based measures. This new method avoids the problems of the work-based method illustrated above. Whereas the traditional work-based method compares work performed and work scheduled at or to a point in time, the time-based method compares the actual time with the planned time for the work performed. In the case of Project EZ, the work performed after four months (AT = 4) had a planned time of three months (PT = 3) (refer to Figures 2-6 and 2-7). In a manner that parallels the use of AC and EV in traditional EVM, practitioners are beginning to use actual time (AT) and planned time (PT) to compute SV and SPI:

SV(t) = PT – AT = 3 – 4 = -1 month SPI(t) = PT / AT = 3 / 4 = 0.75

While the work- and time-based methods provide comparable results at the four-month point in Project EZ, look at the difference at project completion after 18 months:

SV(t) = PT – AT = 12 – 18 = -6 months SPI(t) = PT / AT = 12 / 18 = 0.67

SV(t) = EV – PV = 160 – 160 = 0 SPI(t) = EV / PV = 160 / 160 = 1.0

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Forecasting & Prediction

- Forecasting
  - Forecast Duration ⇒ IEAC(t) = PD / SPI(t)
  - Completion Date = Start Date + Forecast Duration
- Prediction
  - Efficiency needed "To Complete" or "To Go"
  - Formula ⇒ TSPI = (PD – ES) / (xD – AT)
    where xD = PD, ED, ND

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Question 3

Choice	ES Forecasting	ES Prediction
	Does the structure of the schedule affect duration forecasting accuracy?	Can project failure be reliably predicted, regardless of structure?
a	No	No
b	No	Yes
c	Yes	Yes
d	Yes	No

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Schedule Management Quotes

- "Engineering problems will first manifest themselves in a schedule slip someplace. Generally, as I have learned since then, if you have a technical problem someplace, or some kind of a problem, it will manifest itself first as a schedule slip. Then, it will eventually become a cost problem. If you wait to see the cost problem, something has already happened over which you have long since lost control (emphasis added). I always believed in the old adage, 'Time is money'; but if you could control the schedule, you could in fact control the cost ultimately in what was going on."

  Lt Gen "Whitey" Driesnack, USAF
  GAO Expert Meeting Minutes, 29 Sep 2015

- "We need to maintain our attention on schedule delivery. Data tells us that since July 2003, real cost increase in projects accounted for less than 3 percent of the total cost growth. …Therefore, our problem is not cost, it is SCHEDULE."

  Dr. Steve Gumley, CEO
  Defence Materiel Organization (Australia)
  DMO Bulletin, July 2006, Issue 61

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Question 4

Is managing schedule performance the best way to assure project success and avoid failure?

a. Yes – Driessnack indicates when schedule is well managed, cost will fall in line.
b. Yes – Gumley says lack of schedule control is the main driver of cost increases.

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Success Components

Two components play a significant role in having successful schedule execution and a successful project

1. Quality of the planning
2. Learning from past project performance

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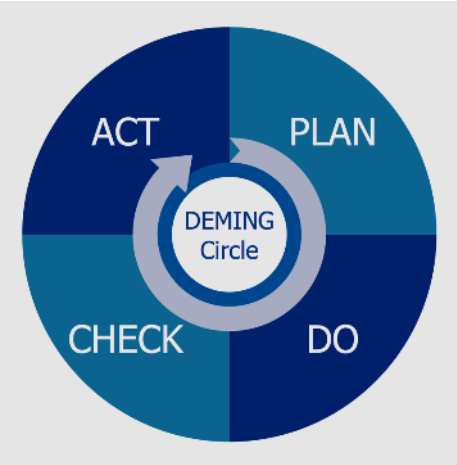
Deming Circle



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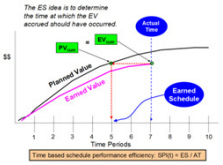
In Closing….



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Thank You!!

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