



**Collinson**

**Grant**



**Earned value management**

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## 1 Introduction

Many projects, particularly those with a component of information technology, have been recognised as too costly, too late, and failing to achieve their initial objectives.

Few people would make a journey without knowing how far they have travelled, or how far they must still travel, looking at the journey in stages. Yet many project managers do just that.

Every project or programme manager must be able to answer the question 'How are we doing?' It is essential for effective control that the performance of a project should be measured while there is still time for corrective action.

This document:

- examines the reasons for using earned value management (EVM)
- provides an overview of the approach to EVM
- discusses some of the wider situations, including business units, in which EVM can be deployed.

## 2 Why EVM?

### 2.1 A brick wall

A bricklayer is building a wall 30m long and 3m high, over flat and consistent ground. The project allows for five days to complete the wall. All the bricks were purchased before work started. When 12 metres have been built, all of which is 3m high, the project is 40% completed. However, the picture becomes more complicated when we learn that the bricklayer is paid a daily rate, the budgeted labour cost allows for five days' work, and the bricklayer has worked for three days, which is 60% of the time available to complete the work.

How are we doing? Is the project 60% complete, or 40% complete?

In this example the answer is clear. Only 40% of the work has been completed after:

- 60% of the budgeted labour cost has been incurred, and
- 60% of the forecast time has elapsed, and
- 100% of the materials have been purchased.

If the bricklayer works at the planned rate for the remainder of the project, the wall will:

- be delivered late, and
- cost more than budget.

This simple earned value analysis allows the project manager to evaluate the options for bringing the project back to schedule and budget. Effective EVM contributes to:

- better accountability
- improving communication and visibility with stakeholders (no surprises for them)
- performance tracking

- preventing creep in scope, because the impact of changes to scope on the schedule and budget can be more easily measured, and the changes resisted when they threaten the schedule or budget
- cost analysis
- project forecasting
- reduction of risk.

Earned Value (EV) is a consistent and uniform measure for the progress of a project, and the basis for analysis of the cost performance of a project. The progress of projects cannot be effectively assessed without it. 'What gets measured gets managed better'.

### 3 What is EVM?

EVM compares the actual work completed on a project with the planned work, and compares these factors with the actual and planned resources used to complete the work to this stage. It is not a measure of planned time against actual time – which has no meaning, because the amount of work completed is not assessed.

EVM looks at three basic factors:

- What value of work should have been accomplished to date?
- How much value has been achieved to date?
- How much has actually been spent to date?

Comparison of these factors can provide an objective assessment of performance on cost and schedule. Instead of simply concentrating on how much time has been taken to achieve progress, earned value looks at how much value has been achieved so far.

#### *Example:*

Suppose we know only four facts about another brick wall project. It will require two weeks to complete, and we expect 60% of the wall to be completed after one week. A chart of progress will appear as:

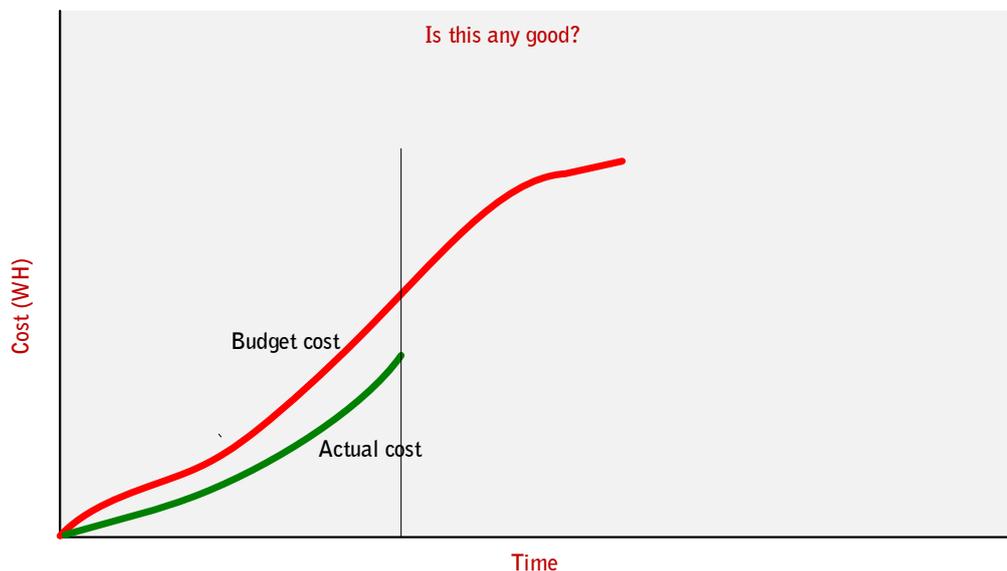


Figure 1

The project manager and Finance department are satisfied with progress because the superficial analysis of this chart suggests actual costs (the green line) are 'below budget' (the red line).

Too many projects are measured in this way. By adding several EVM controls, shown in the following chart, we can establish that the project is underperforming against a number of measures. The project manager can use this information to manage the project to achieve the targeted criteria:

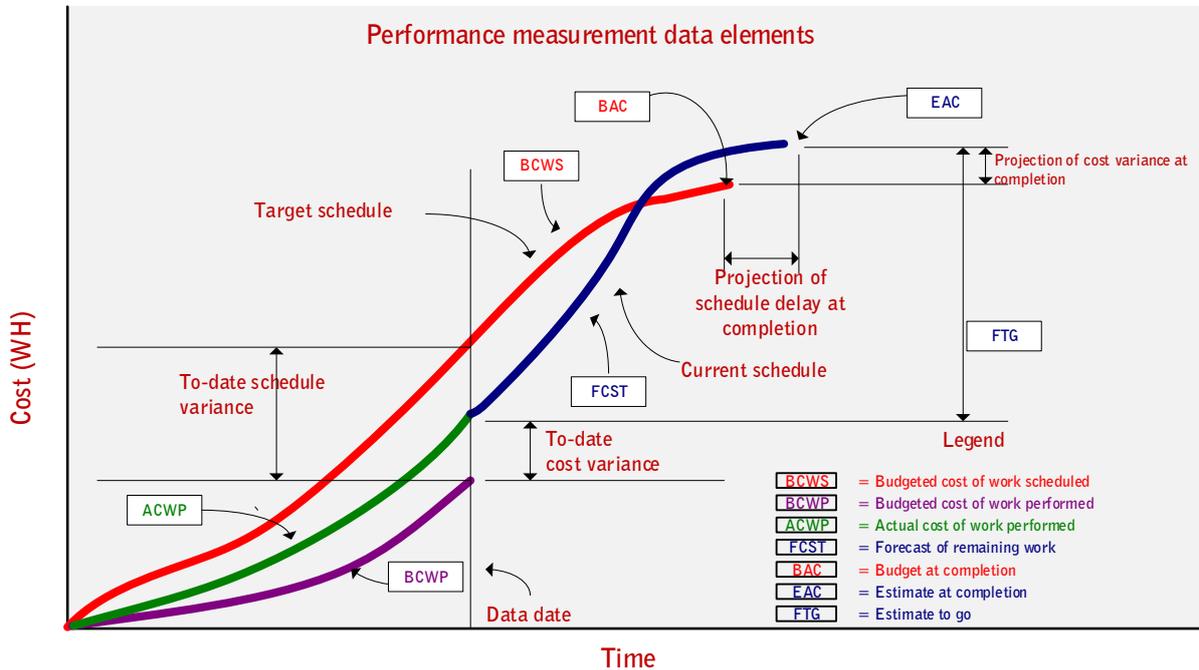


Figure 2

BCWS is the budgeted cost of work scheduled, which is the planned cost of work that should have been achieved according to the project schedule, which is usually defined by the work breakdown structure.

ACWP is the actual cost of work performed. It represents the actual cost of the activities that were completed.

BCWP is the budgeted cost of work performed. It represents the planned or scheduled cost of the activities that are completed. The distinction between BCWP and BCWS is that the latter represents the budget of the activities that were planned to be completed and the former represents the budget of the activities that were actually completed.

These are the three major components of EV. At any point in time it recognises the planned work, the actual work and the cost of the actual work. With the inclusion of further controls, a full analysis of the progress and performance of the project can be obtained.

Other related terms shown in Figure 2 are:

- BAC (budget at completion) – the original plan of cost and time to complete the project.
- EAC (estimate at completion) – the estimated cost and time to complete the project.
- FCST (forecast of work remaining over time)
- FTG (forecast to go) – the estimated cost of work remaining.

It is evident from this chart and from the calculation of the underlying EVM controls that at this point (the data date):

- the project has achieved less value than originally forecast (BCWP compared with BCWS), at greater cost than forecast (ACWP compared with BCWP)
- completion of the project will occur later and at a higher cost than forecast (EAC compared with BAC).

#### 4 Wider use of EVM

EVM allows better control of projects, programmes and business units that are primarily engaged in realising projects.

- It can be used on projects with tangible inputs such as raw materials or manufactured parts and tangible outputs such as construction or manufacture. But there are particular benefits if the outputs are the product of creative or intellectual activity.
- Design engineering is a popular application: for example, EVM can be used to control projects in an Engineering department. Implementation of EVM requires little by way of additional tools – mainly just changes to the planning and controlling processes, and their effective operation by a department's planning section.
- A key element for success is the development of a good breakdown of tasks within work streams. Packages of work and milestones must avoid any tendency to the general and unspecific.
- Better visibility of the plan and current status results in more people knowing more about the size and nature of the task. This knowledge is the starting point for motivating the staff and justifying requests for extra effort or working time.
- Better planning, tracking and forecasting lead to better decisions (although not necessarily easier ones).
- While making decisions may not be easier, the amount of managerial time and effort needed to make them is reduced; and the likely fall in pressure of work can result in better management of time - a virtuous circle in which fire-fighting and constant progress-chasing cease, in time, to be the norm.
- And, at a more fundamental level of thinking, the tighter control over capacity that results from better information enables managers to push harder for output and productivity, and to spot where improvement is most needed.
- The implementation and competent use of an EVM tool, and the consequential improvement in planning by work breakdown, can lift effective capacity by between 5% and 15%.

#### 5 Banana skins

Examples of poor EVM include:

- Each project may be broken down into elements, but these are not used to prepare an analysis of the structure of the project or to define milestones by generic criteria.
- A Microsoft Project spreadsheet can be created, but the dependencies that normally feature in such a plan may not be embedded in it, because often most of the work can be done at any stage throughout the life of the project. Consequently, the method of tracking (using graphs) only counts off hours used and the balance left against the estimated total – projects programmed to last many months and using thousands of man hours are tracked in this way on a single chart. So it is not possible to tell which elements of work are ahead, or behind, or which have been added after the mobilisation of the project – the degree of detail employed to plan and track is insufficient to give

enough transparency or assign enough individual accountability to create and sustain control.

- A deficient methodology for planning and controlling the work in the projects also prevents effective matching of load and capacity; and therefore proper allocation of resources.
- Work to be done is not planned and tracked against calendar time by work packages and milestones, so there is no possibility of aggregating data on resources in a way that demonstrates over- or under-loading in the past, present or future.
- A suitable aggregating technique is needed continually to monitor and forecast an overview of the whole departmental match or mismatch. For example, if work packages are structured in a way that recognises skill sets and grades, it becomes possible to plan, test and forecast in work breakdown terms any load against types of capacity (for example drafting), or to see where the capacity does not exist to achieve particular target dates because resources are not available.

## 6 Long-term accounting

A further benefit of EVM is the provision of more accurate management and financial reports. These assist in the better management of cash flow and in the reporting of results to shareholders.

The determination of profit for an accounting period involves the allocation of costs and revenue to reporting periods. Special consideration needs to be given to long-term contracts, because they provide similar challenges in evaluation to the treatment of projects outlined in the previous section.

For most companies, long-term contracts cause no major problems, because goods and services produced take a relatively short time to complete, usually less than 12 months. The revenue from such work and the cost incurred in producing the goods can be easily ascertained. Thus, a company can report reasonably accurate profits for the work undertaken in this same 12-month period.

However, many companies undertake work that is not completed within 12 months. The construction, for example, of a major bridge or tunnel can take many years.

Difficulties arise in such circumstances at financial year ends. A business needs to report annual profits or losses. How can it do this accurately when work is still incomplete, total costs are not known with any accuracy and it is possible that unforeseen costs may arise? A tunnelling company may unexpectedly find unstable ground during construction. Bad weather may seriously delay completion. It is not uncommon for costs to exceed original estimates.

The general rules and procedures for long-term contracts are covered in a Statement of Standard Accountancy Practice (SSAP) Paper 9. SSAP 9 states that work-in-progress should be stated at the lower of cost and net realisable value. In the case of long-term contracts, paragraph 28 of SSAP 9 requires each contract to be assessed as activity progresses. Paragraphs 28 to 30 give further guidance on how this should be done.

## 7 Summary

Control of a project, a programme of projects or a business unit that specialises in longer-term projects will be enhanced by using EVM.

EVM requires that all projects should be broken into appropriate sections, with a well-developed WBS. This allows each stage of a project to be measured and controlled. The impact of problems can be assessed quickly and, often, remedial actions taken to bring the project back within scheduled time and budget.

EVM enables companies that have substantial, longer-term work-in-progress activities to assess, manage and report their profit and cash flow more accurately.

In business units where longer-term projects are 'the norm', the implementation and competent use of an EVM tool, and the consequential improvement in planning by work breakdown, can lift effective capacity by between 5% and 15%.

## 8 Collinson Grant

Collinson Grant is a management consultancy with a history of profitable growth. We help large organisations all over Europe and in the United States to restructure, merge acquisitions, cut costs, increase performance and profit, and manage people. We build long-term relationships, and have worked for some clients for over thirty years.

Our emphasis is on implementation, results and value-for money. We expect to give a substantial return on the investment in us. So we do not recommend action unless we are sure that the outcome will be worth it. We are not afraid to give bad news, or to champion ideas that may not be welcome.

Most of our work is on three themes – organisation, costs and people. We use this simple framework to manage complex assignments – often with an international dimension – and to support managers on smaller, more focused projects. We help them:

- to restructure and integrate – following acquisitions or to improve profits
- to improve the supply chain. We examine every process and interface to improve efficiency and service
- to set up financial and managerial controls. We create robust systems to improve decision-making and reduce risks
- to refine business processes and introduce lean manufacturing. We analyse and improve how work is done, and use new ways to create change and make it stick
- to cut costs. We make systematic analyses of overheads, direct costs, and the profitability of customers and products. This helps managers to understand complexity, and to take firm steps to reduce it
- to manage people. We draw up pay schemes and put them into effect, guide managers on employee relations and employment law, get better performance from people, and manage redundancy.

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Collinson Grant

Ryecroft Aviary Road Worsley Manchester M28 2WF United Kingdom Telephone +44 161 703 5600 Facsimile +44 161 790 9177

33 St James's Square London SW1Y 4JS United Kingdom Telephone +44 20 7661 9382 Facsimile +44 20 7661 9400

Fort Business Centre Mriehel Bypass Birkirkara BKR 3000 Malta Telephone +356 2776 1710

Mainzer Landstraße 50 60325 Frankfurt am Main Germany Telephone +49 498 088 3356

12 place Saint Hubert 59000 Lille France Telephone +33 66 88 09 75

Web [www.collinsongrant.com](http://www.collinsongrant.com)