Earned Value Analysis

8

E.V.A

Protecting Profits
Controlling Costs
Integrating the 0rganisation
Transparently

STEVE WAKE

Earned Value Management System Standard Equivalence Agreement

Government Electronics and Information Technology Association (GEIA) Systems, Standards and Technology Committee and National Defense Industrial Association Program Management Systems Committee (NDIA) are the subject matter owners for the ANSI/EIA-748-A; Earned Value Management Systems (EVMS) reaffirmed August 28, 2002.

Association for Project Management (APM) is the subject matter owner for the APM Earned Value Management (EVM) Guide dated May 2002 ISBN code1-903494-03-6.

APM and NDIA agree:

- The EVMS Guidelines in the respective documents cited above are equivalent in their intent as of the date of this agreement.
- Both are living documents and must be revised periodically to reflect emerging program performance management practices.
- APM and NDIA will review ANSI/EIA-748-A and APM EVMS Guide every three years at a minimum and more frequently in the event of a significant change to either document in order to maintain equivalency.

APM and NDIA will publicize this agreement to Government and Industry organizations and encourage them to recognize the equivalency of ANSI/EIA 748 and APM EVM Guide in contracts, partnering agreements and other applicable business transactions.

This Equivalency Agreement for EVM Guidelines is effective commencing July 1, 2004 and remains in effect until either APM or NDIA provides written notification of withdrawal, to be effective 90 calendar days after the date of the notification.

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Welcome to the eighth edition of EVA. Preparing for a new edition has always been relatively straightforward. Don't touch the first half. It's perfect. Overhaul the second half with any new additions. Throw in a few quirky bits and send to the printer.

Well I think I've reached grumpy old man stage or reverted to angry teenager because good bad or indifferent I felt it was time to give a radical overhaul to things written thirteen years ago. Even if it meant breaking something that wasn't broke.

You spend your early days challenging the establishment, then you become the establishment and then you spend your time preserving the *status quo*. Which means you end up repeating the same thing again and again and again. Not unlike the aptly named rock group.

It's not a feeling I very much like. The new boss is the same as the old boss. Everything's different but nothing has changed.Change can be frightening and inhibiting but it can also be exciting, invigorating and necessary.

I don't think the journey signposted by EVA is anywhere near over. But it's definitely the end of the beginning.

So EVA is here and should be the tool of choice into which all other project managerial activity integrates.

Project management is moving steadily to the heart of things. Why we do things is becoming as important as what and how.And there are ethical dilemmas coming which EVA can help expose and explore.

Steve Wake February 2008

Purpose

This book discusses EVA. Earned Value.

It's short so you might actually read it.

It's simple so you won't give up.

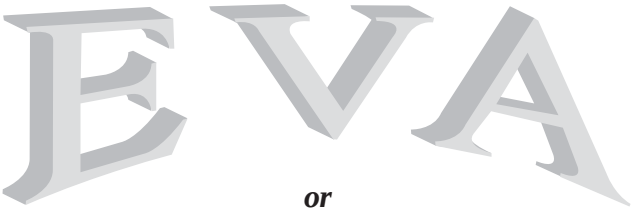
It will help you understand Project Managers.

It might help Project Managers understand you (and themselves).

It's funny if you're not Australian or German.

Section 1

THE GOVERNANCE THING



or

When were you last lied to?

If this section doesn't ring any bells then you have already sorted things out (or chosen not to).

15 years ago this caught my eye. I thought EV was the solution. I still do.

This is an extract from the Public Accounts Committee's report "The Proper Conduct of Public Business" (Report No. 154, 93/94 Session).

"In recent years we have seen and reported on a number of serious failures in administrative and financial systems and controls within departments and other public bodies, which have led to money being wasted or otherwise improperly spent. These failings represent a departure from the standards of public conduct which have mainly been established during the past 140 years".*

When you read the whole report you see the same old problems; inadequate financial controls, failure to comply with rules, inadequate stewardship and failure to provide value for money.

15 YEARS ON EVERTHING IS DIFFERENT BUT

NOTHING HAS CHANGED

HAS IT?

Enron happened.

Northern Rock happened.

And the French have just beaten us at something other than rugby.

Stock market fraud on an unparalled scale. Chapeau!!

We also live in a world that has never been so deregulated, dangerous and tightly controlled. All at once.

We've never had it so good.

Our kids will be so proud.

Still we've got GOVERNANCE...

Governance is a set of rules by which to run an organisation. A code of conduct for directors. So America gave us:

Clinger Cohen and Sarbanes Oxley.

Which resulted in Turnbull in the UK and has even trickled down to projects with much downloaded guidance published by our very own Association for Project Management.

The trouble is that many think we've solved the problems by getting a book. Whereas that's only the start. There has to be legislation enforcement and reinforcement. Until a few more high profile directors go to prison it will be like we've banned mobile phones whilst driving.We have to capitalise on the fact that ignorance is no longer an excuse for directors.

Essentially the link between Governance and Project Management is this.

Boards of Directors have to show they are aware of what is going on in their organisation. To their shareholders and external auditors legally and investor stakeholders contractually.

So a way is needed to determine what is being done, how much it's costing, when it is being done and how much has been done already.What better way to do that than with good project management.

If an organisation can demonstrate that it is using good project management to control its activities then that makes it easier for investors, insurers, shareholders, customers and even employees to make informed choices.

Which brings us to ETHICS and Moral Dilemmas.

Many organisations are out of control. They have no real idea of their true business position. They survive because there is cash flowing into the organisation. And the emphasis is on maintaining the flow often by extracting extra work out of existing deals where clarity of scope is avoided in order to do just that. A common practice in Construction and Service industries.

Better project management would make that harder to do. A project manager is often in conflict with his own commercial department over this very issue. The price is low to win the business and then it's up to the implementation team to make the job profitable through changes.

Whilst the Project manager looks like an idiot because the budget just got revised up to nearer reality again.

Many believe that the five-ringed circus due in 2012 was deliberately and knowingly under estimated. If that is true there must have been project managers involved. Is keeping your mouth shut the right way for project managers to behave?And if correct estimates are available is it OK for Directors to knowingly ignore them?And Customers should get smarter too rather than join in the dance. It's not all the nasty Consultant's fault. The imminent arrival of the Chartered Project Manager should be used to focus attention on this area now!

Professional integrity requires that Project Managers are seen as trustworthy. The prime role of the Chartered Project Manager is to be a trusted source of information.

Currently and in the light of many major projects they appear to be second in any decision making hierarchy and do what they are told. Even if it means lying. Project managers must decide if they are lackeys or leaders. And if they are leaders it will be a long hard fight. The other decision makers will see to that.

Section 2

THE STATUS THING

or

If we're really on the Moon why is that flag flapping?

I was taught that Project Management was all about delivery to time to cost and to specification. It's not. It's about delivery to expectation. That's the Management bit.
That means plans might change a bit doesn't it?
What do you need to know in order to manage change? Well, first and foremost you need to know exactly where you are. Then you need to know where you're going to. When you've got those you manage the journey.
But you can't take even one step securely without knowing your current position.
Why do you think three buses arrive at the same time? Beacause they're working to a plan not managing to meet expectation.
So beware of people showing you plans but not aware of current status. They are ticking boxes to keep their nose clean.
Focus on status. Make it your major goal. Imagine the credibility that knowing status can generate and how that will reverberate through your and your customers.
Project managers that are truth-sayers. People we can trust. Not objection-handlers and BS merchants. Seen to offer explanations not excuses or empty promises.

Note to salesmen and directors. Control of status has a direct impact on profit.And your bonuses should be linked to this. Not revenue.

Note to auditors and shareholders: The vast majority of organisations have no real idea of status. Ask them to show you and see if it makes sense.

BETTER **understanding and sharing of**

COST MANAGEMENT would help.

The trouble is that cost management is:

BORING !! PETTY !! BUREAUCRATIC !! PEDANTIC !! & LIFE IS TOO SHORT TO GET INVOLVED IN IT !!

This popular perception of image is probably why cost engineers, project engineers, auditors, and accountants have such a tough time with the dashing entrepreneurs of this world, characterised by their "I live in the real world" attitude.
Unfortunately this is a victory of style over content and a recipe for disaster if it is not resolved in some way.
The trouble is , no-one listens to anyone in a "cost" role for long enough !
They just switch off. It's not their problem. After all they're the ones making the money!

Well yes. But only if the money turns a profit. And revenue doesn't always do that does it?

When things go wrong everyone is an expert.
"I knew that would happen".
Everyone is wise after the event.
There are *gaps* here.
Gaps between those who bring in the revenue and those who have to make product..

So, the clear lesson is that if you want to be listened to you need at least one of the following:

1. To be in charge
2. To have interesting information
3. A big stick

What is "interesting information" ?
Most companies will have the best ledger systems money can buy. The Finance Director will be able to tell how much money he's got and how much he's spent or is planning to spend. If you throw in a few points to question achievement or value like "who, what, why, when, and where", the average F.D. will not have this at his fingertips. In fact ..... no-one will.

There's the *gap* again.

The *GAP* is a mixture of spoilt communication, lack of interest, vested interest, denial, politics ... anything you like, but there's always a reason. An excuse.

Unfortunately this creates a culture where most Project Managers, when cornered, will swear on all that is holy that their over-spent, over-schedule baby, will come in on time - on budget - on specification. It will be a modern miracle. These Project Managers tend to be young.

Some Project Managers, the older ones, will recite a well-rehearsed litany that contains things like risk analysis, changes to specification, re-estimating, management philosophy, legislation, industrial action, plague of frogs or even incompetence (of others). All as reasons for delay and overspend.

In the private sector these people are alive or dead due to the fit of their face. Personal survival often has little to do with project performance.

In the public sector where fair dealing has to be seen to be done the parliamentary committees are like a lynch mob without a rope. The defendant's answer is always smarter than the question.

The elephant in the room is this. The people who sold low to 'win' the business feel no connection to the projects people who often have to pick up the mess and live in a warzone whilst things are being delivered.
So for some reason inexplicable to me we all carry on and accept this. The real world is like your mum and dad,(google Philip Larkin). We have a choice and we can get a big stick.

What we need is a language that everyone can understand and use. What we need is:

Earned Value Analysis

The right information in the right format to recognise and negate the excuses and create a dialogue for cultural organisational change.

In fact, used constructively E.V.A. is the perfect way of defusing the adversarial atmosphere of supplier -v- customer, through the sharing of information that permits all the parties to work in partnership to achieve their common goals. The WIN WIN situation.

Section 3

EARNED VALUE ANALYSIS - WHERE HAVE YOU BEEN ALL MY LIFE ?

or

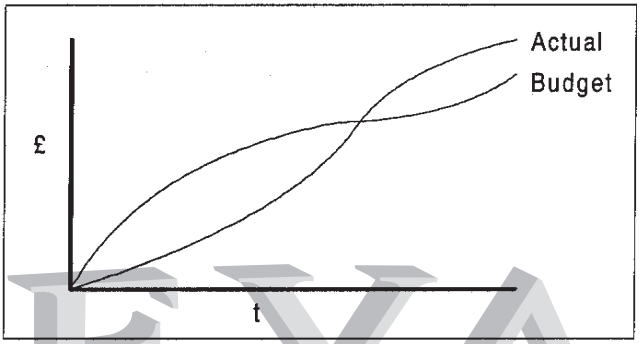
The reasons why managers and auditors and even People people should love Earned Value Analysis

You can talk about uncertainty and ambiguity and soft people type stuff till the cows come home. It's fascinatiing stuff - real debate where it's the strength of the argument that wins. Not the facts. This is very important but it doesn't pay the bills. Certainty does.

It seems to me that if we can join the softer thinking approach to the harder factual stuff then we would have improved the way we managed projects.

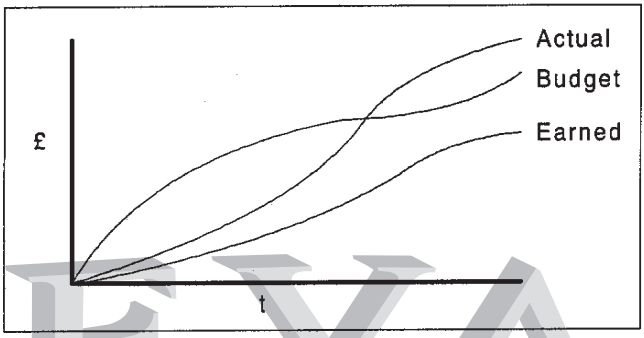
So by all means talk but have some facts and figures in front of you as well. It makes the People people more credible and the numbers people more human.

The Right Answer ?



This is a standard budget v actual graph.
It is the most common representation of project progress. What does it tell you?
Does it give you an accurate picture of where you are on the project? The answer is a resounding NO!!!
It tells you how much you have spent and compares it to the budget planned to be used by the report date. That is all.
It does *not* tell you if you are ahead or behind schedule.
It does *not* tell you if you are truly over or under spent.
It does *not* tell you if you are getting value for money.
It does *not* tell you if you have spent money on the right things
It does *not* tell you if your problems are over or have only just begun.
As a measure of performance or status it is of no value whatsoever.

The Right Answer *II*?



This is the same standard budget v actual graph but with a third line.

The **Earned Value** or **Achievement** line. A third dimension. It represents the proportion of the budget (what you said you were going to do) that you have actually done. What is **physically complete**.

For example, it could represent a case where of the 100 activities budgeted only 80 have been done and more money has been spent than was planned to date. Expressed in monetary terms it means of £100 budgeted value of work, only £80 has been accomplished at a cost of £120.
Now we can actually have a meaningful conversation about this rather an exchange of opinion.

So:

Q: Ahead or behind schedule?
A: *Behind. We earned less of the schedule than we budgeted for.*

Q: Over or under spent?
A: *Very over spent. We're performing below budget and spending above budget.*

Q: Money spent correctly?
A: *No. It is costing more to achieve less than budget.*

Even at this simple level, people may start to listen to the following interesting analysis :

Q: Value for money?
A: *No. How can it be?*

Q: Problems over or just starting?
A: *They are far from over. Performance is way below budget with little hope of recovery. <u>But</u> there have been problems right from the start. We've consistently under performed throughout.*

Why hasn't anyone picked this up ?

Earned Value or the value of work performed provides the right answer.

If you know how to use it.

A sobering thought ...

In the United States the A12 aircraft project was reputedly a billion dollars overspent before it was canned. The earned value information was available throughout, yet politics and self interest allowed it to be ignored. In the hands of those solely committed to self-preservation even this method is useless. It is essential that those who check and monitor this information have a loud enough whistle to blow. That whistle stops people, companies and governments being misled.

And no-one likes being misled.

A Definition(s)

Earned Value is the amount of budget you can claim, representing completed work, without reference to actual costs.

This is not very interesting, is it? But as an element of Earned Value Analysis it is vital.

To some, Earned Value is just another set of reports; to management, Earned Value is not only reports, but reports *plus* head scratching *plus* action.

The high impact reports are cost curves showing variances, trends and estimates at complete and cost performance indices showing *value for money.*

Unfortunately, to the uninitiated these reports can induce severe headscratching and very little else.

The Benefits of Earned Value

EVA protects shareholder value and keeps you in a job.
Use of E.V.A. in some countries is obligatory. Use of it might win you that contract. You've got to be in the game to play.
E.V.A. is now mandated at the MOD and it is spreading fast.
Improved profitability. Companies who use E.V.A. are in charge of their costs which as we all know affects the bottom line.
E.V.A. shows customers and suppliers whether they're getting Value For Money.
E.V.A. proves to internal management and to external parties, such as auditors, that the right information is available to manage the project.
EV.A. allows project information to be consolidated to give an overall Company/Programme/Department view.
E.V.A. provides information that can allow the objective early cancellation of a project, potentially saving billions.
E.V.A. is currently the best way to determine the real status of a project. As well as telling you how much you have spent it shows you how much you have achieved. Further, it tells you how much you still need to do and provides a good indication of final costs and dates.

To speak Earned Value you need to learn the whole 9 terms below. I think you can manage that. It beats shouting.

BCWS - **Budget Cost of Work Scheduled**
What we're going to do. THE PLAN

ACWP - **Actual Cost of Work Performed.**
What really happened

BCWP - **Budget Cost of Work Performed.**
What we did of the plan. THE EARNED VALUE.

EAC - **Estimate at complete**
Expressed as a single number

ETC - **Estimate to complete**
Expressed as a series of figures e.g. monthly totals

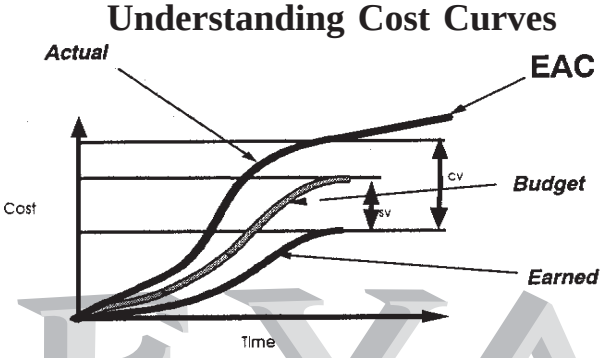
CV - **Cost Variance**
BCWP - ACWP = CV

SV - **Schedule Variance**
BCWP - BCWS = SV

CPI - **Cost Performance Index**
BCWP/ ACWP = CPI

How much it really costs to earn one pound of budget. The Value for Money Indicator.

MR - **Management Reserve**
*Money linked to risks. **Not** for extra scope!*



A Standard Three Curve Report

What it Means

Remember *budget* is where you should be. The *earned* curve is telling you that you're behind and what's worse the *actual* line is telling you you're way over on cost! Remember it is the difference between *earned* and *actual* which gives the variance. Comparison of *actual* with *budget* is misleading.

The estimates to complete can be plotted (or even hand- drawn by "experienced professionals"). In the United States, multi-million dollar value projects are now reviewed and sometimes cancelled on the basis of confidence in trend analysis data available from using historical earned value models.

Predicting the final outcome of a project can be a mystical experience:

Whose word do we take?
What do we believe?
How do we get an objective view?

The prediction of potential EACs has become increasingly accurate by using performance statistics from similar projects. These statistics become templates that are overlaid onto the existing cost curves of a project and provide an independent and objective estimate of the final cost and completion date. Something that everyone is interested in.

If your reporting structures are well thought out then you can have one of these reports for any bit or level. The complete programme or that little component down there!

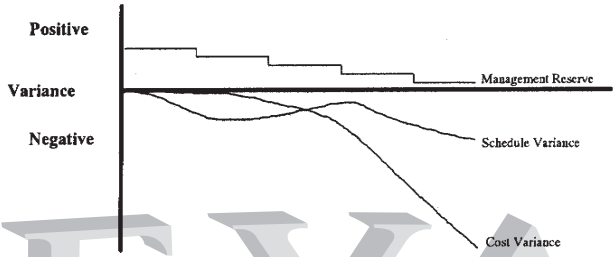
The simple comparison of budget v. actual is a complete waste of time without the third dimension of earned value to tell you how much has been accomplished. This is the fundamental point of Earned Value.

When you understand this, like folklore, it seems to have been there all the time and then you think, "why doesn't everybody do this! " But they don't know or see the value. Simple as that.

The concept of EV is beautiful in its simplicity.

Understanding Cost Variances

One picture tells all, but having this one as well sure helps ....



What it Means

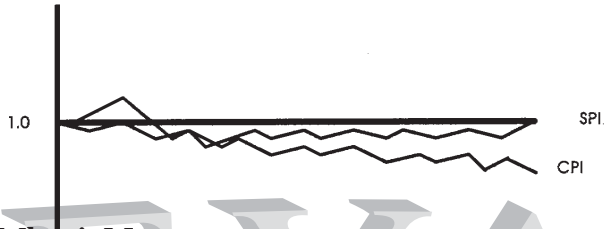
SV - Schedule Variance is obtained by comparing budget with earned.

CV - Cost Variance is obtained by comparing actual with earned.

You plot these over time. Below the line is bad, above the line is good. Watch which way the lines go. In this example, Management Reserve (MR) money is being pumped into the project and the schedule is recovering. But only temporarily. Costs are now dramatically increasing. The danger is that MR will be exhausted and work funding will grind to a halt, sending schedule in the same direction as cost.

Understanding Indices

And if they are still not convinced....



What it Means

CPI - Cost Performance Index: ***The Value for Money Report***

SPI - Schedule Performance Index

CPI is the one to use. SPI tells you is how complete you are and tends towards 1.0 as the project progresses. It's the measure of physical completeness.

Below the line is bad; above the line good. CPI is earned divided by actual. e.g.

$$CPI = \frac{BCWP}{ACWP} = \frac{4500}{8000} = 0.56$$

For every £1 spent you are earning £0.56p of value. To earn £1 of value it is costing you £1.77. Not good.
Enormously simple yet enormously powerful.

HEALTH WARNING

This page used to have a picture of an iceberg to reinforce how much detailed effort went into gettting the project foundations to work. Without good accurate data all the project reporting will be rubbish and whichever method is used will not do the job. Which will enable you to keep calling the consultants in to do your job.

Anyway the iceberg has melted due to Climate Change.

Use EV to manage projects focused on siustainability and help save the planet.

And if you find that a project isn't using EV then at least take the time to find out and understand why and how they are measuring physical status. Not every project has to use EV. Better to be safe than sorry. Positive exclusion.

Too complicated or too expensive aren't good or rational excuses.

And remember. You don't have to be a project manager to ask or find out.

Section 4

pIMP MY PROJECT

or

Practices to Improve Managing Projects

How do I calculate my Earned Value ?

Earning Methods : There are several methods. Each one having an applicability to a given type of work. For example,

50-50 - Half at the start, half at the end

Budgeted Milestones - Agreed levels of payment against milestones

100 - 0 - Up front payment

0 - 100 - Payment at the end

Units Complete - Paid against a rate per unit

Apportioned Effort - e.g. quantity control

Level of Effort - Management time

Remember you only need an earning method when you are actually working on something. If you haven't started the work, its value is 0, if it is finished it takes the full value.

Life is not always so straightforward though, and many organisations will "retain" a percentage of the value of some elements of a project until the "whole" is completed. Great for teamwork and getting people to look at the big picture.

Actuals Making sure that actual costs are recorded accurately at the corresponding level of the estimate, and in time for the reports to be relE.V.A.nt to those taking decisions on them.

Changes All projects change their specification. How good is your change control system? Have you got one? Impact on budget and required achievement must be tracked.

Materials Are you tracking and accounting for the use of stock as well as people? Define when material value is "earned" and be consistent.

Overheads How are they managed within a project?

Variance Thresholds When and where the alarms ring.

Management What actions do management take and is it documented somewhere?

Good practice, text books and consultants are one thing, but now it's down to you. In reality there is no right or wrong answer, only an appropriate one for you and your organisation.

THINK

Be prepared to change it and *still* call it the BIG PICTURE. This is called strategy.

There is no unequivocal definition of project success. **Cost**, **Schedule**, **Specification**, are often used to declare it. Think about it. This isn't success, it's compliance.

If you want success then it is normally expressed in the opinions of yourself, your peers, subordinates or bosses, but not necessarily at all levels at the same time.

No two implementations are the same. Just because the last project was successful it doesn't follow that the project manager will succeed again. The project manager may be burnt out or may just leave. They get there by luck. The people relationships may be different.

Organisations protect themselves by being armed with a methodology. A methodology makes good people better not bad people good. It is no guarantee of success. People are. Here are some tactics learnt from experience that will help good people succeed.

The trouble with projects is that you don't actually get the chance to do that many. The world is full of people affected by them but there is actually very little experience around. In some companies managing projects is a way of gaining promotion. In others it is like a posting to Siberia. Think of an implementation of E.V.A. and think of learner drivers - they

know the theory but they lack the fluency that comes with experience. Don't avoid this scenario: acknowledge it and don't expect too much. Alternatively employ a respected team.

Remind, reinforce and remind again about the aims and benefits. People forget quickly.

I.T. or not I.T.? That is the Question

It takes 90 days to 3 years to implement E.V.A.. There is nothing wrong with trying to implement faster if you feel you need to prove something. Take up the challenge but be careful that you don't travel too fast and miss something

Learn from the experiences of others. Most people will swap experiences. At least you're not alone.

Information technology is there to store information and process it fast. If it doesn't, don't use it. It's also there to automate processes and save time. If you don't automate, then things like E.V.A. become or remain an overhead and gain a bad name. If you cannot automate immediately make sure you have a plan that convinces you that you will. Copy other installations. It's all been done somewhere else.

In the world of immediate information, buy time to think, so that your decisions are good. It is amazing how often people are asked to change an instruction given forty-eight hours previously. Think, but don't procrastinate. It is almost certain that your investment in software will be matched by your investment in implementation services.

Isolation or Integration ?

E.V.A. can be set up in isolation of other systems but the potential benefits may wither and die before your very eyes.

When you integrate E.V.A. it is likely that re-engineering of your current systems will need to take place. Establish what this is. Many happy hours can be spent discussing who should fund the changes.

Try and use one structure and one structure only for reporting on a project. This will make auditors happy and allows for the construction of meaningful and trusting partnerships between customer and supplier. Plus you don't waste time keeping two set of books (or more, as in the old days of lies, damn lies and statistics).

If you're very clever you might try and standardise project structures so that at the higher levels if becomes easy to consolidate and compare them. Think how powerful this could be.

Insist until blue in the face that, whatever the project is, the most detailed estimate possible is obtained and pray that it is rigorously reviewed. It may save only a pound, or a billion or two in the later stages.

Earning methods are used to assess "work in progress". Don't lose sleep on which method is best, just be consistent.

Change Happens - Control or *in* Control ?

Make sure you have a procedure for changes to specification. They are going to happen and you don't want to lose control, do you?

Define and standardise your reports and procedures. Enough said.

Controlling What ?

Overheads can represent 50% of a company's activity. If you're not controlling them then you're not in control. Plus you can give a false picture of project performance. But you might want to. You must be aware of this. Also beware of over-calculation of overheads. They are often inflated and become a second contingency fund when cuts need to be made. You only need one fund under management control.

Rainy days and Mondays....

Management reserve. The contingency fund. Use it carefully. Obviously.Use risk to allocate it. It's not a slush fund is it?

Has your project got a management reserve ? Why not?

How do you get more money into the project? Does everything grind to a halt until you do?

Variance Thresholds or Stress Thresholds ?

Variance thresholds shouldn't be set in concrete. Tune them over time. Remember, overspent projects rarely recover. If you are outside the thresholds then get a recovery plan fast, and an associated budget. Treat this budget as an additional item. Don't encourage sand-bagging of budgets as underspent is as much a sin as overspent in many cases.

You need documented procedures. Even if you 'wing it' and don't use them. They are good for baselining an audit so you can check where you are. Maybe rewrite them as a result. They are also jolly good for proving to auditors that you are a professional outfit.

Don't let E.V.A. reports become a substitute for management. Don't believe everything you read. The information is telling you that you need to check something before you take action. Keep in touch.

You can bully a lot of people with E.V.A. information and lose friends fast. Treat it as shared knowledge that can be used to maintain and develop trust.

When things change write it down and let people know. An unreported task is worse than not doing it at all. How many times have you asked for the simplest of things to be done and it hasn't been done as you expected? Write it down. Agree it!!

If you want to avoid the "finding out when it's too late" syndrome then make sure that project activities are well-defined and are either short or have obvious, frequent checkpoints.

Don't get overawed by the size of a project. You are only doing a bit at a time. The rest of it you have either completed or haven't started.

A Sense of Perspective

Many organisations will claim to have all their people costs recorded accurately. Beware, these may only be a small percentage of the overall project budget. One of the main areas of debate is to do with material costs and when they are recorded against a project. For example, is it when you request them? When purchasing orders them? When they are paid for? When you authorise their requisition from stores? When they go into stores? When they are in the factory? When they have been converted? When they are shipped? When they arrive at the customer? When they are invoiced? When a statement is raised?

You must not let this take over your life. Within the total life-cycle it is irrelevant. The problem is that the discussion involves many parts of a business. A directive from on high should sort it out. All you have to decide is one point for all materials. You will then get consistency if nothing else and save a lot of time and argument.

Sub-Contractors

If you use subcontractors then make them report in the same way that you do. That way you get ***all*** the project information, no nasty surprises and you remain in control.

Until you're totally sure of a sub-contractor's ability to deliver you must micro-manage them. Fixed price firm dates and penalty payments don't fix or control things. And it's you the customer blames. Not the sub-contractor.

And if they are reluctabt to provide status information start worrying. Can you be sure they know themselves?

Persistence

EV will not get implemented by itself. It must be championed and supervised. It may take a few turns of the wheel to make it work and get the data right. People are generally sceptical and willing to give up very easily and for a variety of reasons. Expect and anticipate trouble. Don't expect to be thanked or welcomed. And if you succeed go and do another one.

E.V.A. tells you:

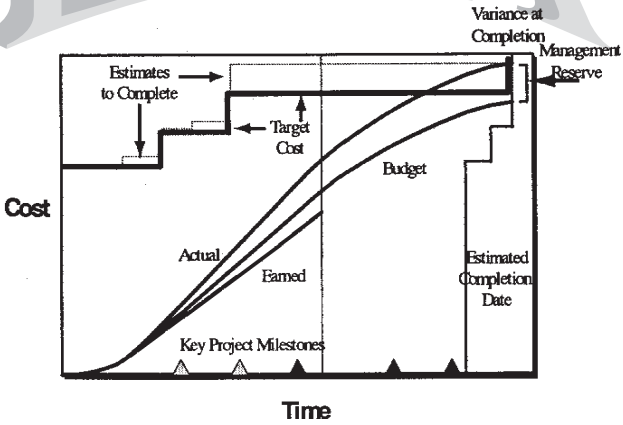
where you really are

what value for money you're getting

how much it is really going to cost

where it's going right and where it's going wrong

whether you should carry on or abandon a project



Risk Management Plus

(what iceberg?)

"A problem is a risk whose time has come."

The Steve Jackson tribute quote.

Risk Management used to be called 'thinking the job through'. In the same way that Quality used to be called 'doing the job properly'. Now, in many cases, they have become optional extras with prices attached.

It was probably in the Eighties when money was freely available and the British economy was super-heating that less attention was paid to quality and risk. So much so that they seemed to disappear. Only when the world economic climate changed and money became tight did their absence become apparent.

Risk management has now become the systematic assessment of factors to be taken into account when managing an undertaking. This can be a project, a programme, an enterprise, almost anything. You could call it scenario management, where the probability of something happening is calculated, where possible outcomes are determined. And you thought all those years playing Dungeons and Dragons was a waste of time.

Risk is both qualitative and quantitative. Although the qualitative factors are often converted into some form of number.
Checklists with all the questions you need to ask about a project are now used extensively. The questions are often awarded marks which can then be totted up to see if the project is likely to become a problem.

Costs and timescales are analysed to produce the range of probabilities, good to bad, that can be predicted.

Risk Management is now mandated by the MOD and is in use extensively by all types of organisations. Not just defence suppliers. It's a great idea. Manage events before they become problems and avoid a disaster.

When asked why a project is overspent or late, more often than not the MOD will say "We use risk management now and unfortunately this project was started before then." End of statement. End of argument.

At this point let me state that I truly believe that Risk Management is good, important and essential. BUT I don't think it is properly executed and, even if it were, I still think that it can be improved by other complementary techniques. Can you guess which one in particular? I'll tell you later.

Risk Management and Project Management are one and the same thing. Good project managers have always had a 'Plan B'. They know that there is often more than one way to achieve a desired outcome and that the various threats and opportunities have to be considered. Risk Management allows this thought process to be communicated more widely and clearly, particularly on large projects.

Lots of projects now have a defined Risk Analysis stage. The problem is that after the Risk Identification stage it seems to stop. There is no constant reassessment. After all, different risks occur at different points.

Risk management should not be used as an excuse for failure. "We had of course previously identified this as a potential risk and of course it happened thus proving the accuracy of our analysis". That's alright then.

What customers, management, project boards don't want to hear is that there is a problem. What they can live with is the news that a potential problem has been spotted and that there is a plan of action to put it right. ***A recovery plan***.Recovery plans should be prepared by referring to a previously considered impact analysis that should be conducted whenever a potential risk is added to the existing list. Too often the implications of a risk have lip service paid to them and a recovery plan is non-existent.

A reasonable balance has to be obtained between the probability of an event happening and its likely impact. Just because a high impact risk has a low probability of happening doesn't mean it can be ignored. In fact if it does happen and you haven't planned for it you might not be able to solve it.

Do not forget, as many do, that risk is about opportunity as well as threat. Sometimes, things go better than planned or new advantages are revealed that need to be accounted for. A product may sell better than expected. The incentives to complete a project early may be so lucrative that there is nothing planned to do afterwards. A gap may need to be filled with another contract. The planned funding of a project may have to be brought forward to maintain momentum. These are opportunities to expand the business. Nice problems to have. They rarely figure in Risk Analysis. Perhaps this is because they are not within the project being analysed. If they aren't then your company will spend more time protecting the pot of costs rather than expanding the pot of revenue in order to secure its profit. *Keep an eye on the big picture.*

Whilst it is essential to monitor the costs and schedule aspects of a project do not base all your risk judgements on data purely from this source. Technical compliance is all important and can normally be measured quantitatively.

But this still does not deal with qualitative types of risk or the outside world where a change of government or new legislation might have major impact.

Customers and suppliers almost always have different agendas for risk. A change to specification is normally a cash bonus to a supplier and a cost to a customer. It depends which side of the fence you're on. Customers talk about sharing risk when what they really mean is, "A problem shared is no longer my problem". On the other hand suppliers now say , "The customer is our partner". Only when they've got any money. Prove me wrong.

Remember that companies and organisations are now expert at providing the answers you want to hear and all you do is get angry when you catch them out. Both sides need to be more open or Risk Management will become like antibiotics.

Good for this generation, useless for the next.

E.V.A. AND RISK

(synergistic symbiosis - sorry)

Risk and E.V.A. are complementary. They are not substitutes for each other. Risk analysis is only as good as the data that informs it. Most of the time it is concerned with what hasn't happened, the future. Whereas E.V.A. is predominantly concerned with the past and the present. What has happened

and what is happening. Think of the power of integrating them and the broader picture that they will provide. Think also of the necessity for this combination in order to allow the organisations running E.V.A. systems to be leaner , less bureaucratic and more effective.

Any project worth its salt will have had a structure defined for it. This is a model that describes all the things that are needed to do the project. It is referred to as the Work Breakdown Structure or the Project Breakdown Structure. This structure is ideal for storing and defining information about the project and is normally used as a reporting structure as well. Each bit of the project can be examined in detail or else rolled up and summarised. If you're doing E.V.A. then you are bound to have one. It will have been built up and elaborated during the estimating stage and will probably contain things like costs, timescales, budgets, descriptions and resources. All conveniently structured and ready for use in Risk Analysis.

This structure already serves the requirements of E.V.A. and would provide a logical and convenient structure for risk reporting. Each element in the structure contains the data that is commonly used to inform quantitative risk analysis and would also provide a convenient peg for noting qualitative risks at the point where they are likely to occur. Further, if the structure defines the whole project then a complete risk checklist can be stored and compiled with no risk of oversight.

However, this will only be true for those things that are within the structure. Projects are also affected by external events and these should be taken account of when developing the structure even if this is just an extra pigeon-hole for these type of risks to be logged and considered. Risk data that is preserved in these common structures will then be available for future use on future projects in an accessible and usable form. Business object and repeatability addicts please note.

Summary of steps to integrate EVM and RM

(Thank You David Hillson)

1. Creating the baseline spend plan (BCWS/PV)
   - **a. Develop costed WBS to describe scope of work, without hidden contingency**
   - **b. Produce fully costed and resourced project schedule**
   - **c. Assess estimating uncertainty associated with initial time/cost estimates**
   - **d. Perform risk identification, risk assessment and response development**
   - **e. Quantify time and cost risk exposure for each risk, taking account of the effect of agreed responses**
   - **f. Create integrated time/cost risk model from project schedule, reflecting both estimating uncertainty (via 3-point estimates) and discrete risks (via stochastic branches)**
   - **g. Perform Monte Carlo simulation on integrated risk model to generate "eyeball plot"**
   - **h. Select risk-based profile as baseline spend profile (BCWS/PV); it is most common to use the "expected values", although some other confidence level may be selected (say 80%)**

2. Predicting future outcomes (EAC)
   - **a. Record project progress and actual cost spent to date (ACWP), and calculate earned value (BCWP)**
   - **b. Review initial time/cost estimates for activities not completed, to identify changes, including revised estimating uncertainty**
   - **c. Update risk identification, assessment and quantification, to identify new risks and reassess existing risks**
   - **d. Update integrated time/cost risk model with revised values for estimating uncertainty and discrete risks, taking account of progress to date and agreed risk responses**
   - **e. Repeat Monte Carlo simulation for remaining portion of project to generate updated "eyeball plot"**
   - **f. Select risk-based calculation as estimate of final project duration and cost (EAC), using either "expected values", or some other confidence level (say 80%)**
   - **g. Use risk-based profile as updated expected spend from time-now to project completion**

3. Evaluating risk management process effectiveness
   - **a. Determine threshold values for CPI and SPI to trigger corrective action in risk process (or use default values of 0.75, 0.90 and 1.25)**
   - **b. Calculate earned value performance indices (CPI and SPI), plot trends and compare with thresholds**
   - **c. Consider modifications to risk process if CPI and/or SPI cross thresholds, enhancing the process to tackle opportunities more effectively if CPI and/or SPI are high, or refocusing the process on threat reduction if they are low**
   - **d. Take appropriate action either to exploit opportunities (high CPI/SPI), address threats (low CPI/SPI), spend contingency to recover time (high CPI/low SPI), or spend time to reduce cost drivers (high SPI/low CPI)**
   - **e. Consider need to review initial baseline, project plan or scope if CPI and/or SPI persistently have unusually high or low values**

Stop Press: Two years of epic struggle in the making! A guide to how EV and Risk can work together is being published in 2008 by APM.

SELL E.V.A. IN YOUR ORGANISATION

Get real hands on Director support

O.K., you've read the book, shown it around, talked to a few people and think that it might be worth pursuing. The only way you're going to get E.V.A. into the organisation is by getting it out into the open. Your aim is to get as many people on your side as quickly as possible.

Get real hands on Director support

Give a presentation. But first find a sponsor. Use the book to do this. Sponsors for this type of initiative will be board-level or wanting to get there. Engineering, finance and procurement are good areas to start looking. You might even be a sponsor yourself. This is your chance to show you're on the case.

Get real hands on Director support

The point of this presentation is to educate and to win the hearts and minds of your audience.

Get real hands on Director support

Check these points beforehand:

Get real hands on Director support

Do we need E.V.A. in order to win business?
Have we tried and failed with E.V.A. before? Why?
Are our costs and schedules well managed already?
If not, then how much are we losing?
Do we consolidate project information already?
Is it useful?
Can we take another change project?

Did I mention:Get real hands on Director support

CONTACTS AND PUBLICATIONS

www.apm.org.uk

The Association for Project Management is the UK's largest project management organisation. In January 2008 it has 15000 members and growing. It wants to have chartered status. Which is ambitious but seems to be having a good effect. A much more professional approach has been adopted.

In 2001 an Earned Value Specific Interest Group was formed. Its initial task was to draw up Earned Value Guidelines specifically for the UK. This was published on CD-ROM in June 2002 and available from APM direct. At first I thought the only way to get Earned Value in the UK would be to mandate it. It's not. The only way is to get organisations to use it because it's good for business. Part of their process. Now there are many organisations using it in a wide variety of industries because they want to. And it's snowballing, gathering speed. The guidelines are there to provide a common language and to help people avoid reinventing the wheel. Significantly these are the first national guidelines to describe a small scale implementation that can be managed with a spreadsheet as well as the huge government type.Work continues and in 2008 a revised edition is due. As well as an exam.

www.pmi.org

The Project Management Institute is the largest Project management organisation. It's not quite as free as it was with downloads of useful material but much better with consultant advertising than it was. Quite a few Europeans are members because they work for American companies. Therein lies my only gripe. Like many things American it purports to be International. If you're on the wrong side of the fence, however, that still feels like cultural imperialism. Still, "You pays your money and you lose your voice", as they say over here.There is no substitute for local knowledge.

There is only one project management standard available in the UK: BS 6079-1:2002 This is a revised second edition published in May 2002. Guide to Project Management. Buy it from the BSIBritish Standards Institution www.bsi.org.uk. A revision is underway in 2008.

Also on the horizon is an ISO for project management in 20009 or thereabouts.

There's an Earned Value Standard in the States.
Earned Value Management System Guidelines
ANSI/EIA-748-A-1998. This is the document the APM guideline is reciprocal with.
Approved: May 19, 1998
Reaffirmed: August 28, 2002
http://global.ihs.com/ and type EIA-748 into the search engine
Price $60.
This just just been revised again and will be 748-B2008.

The EVA in the UK conference is now a permanent fixture.
In its thirteenth year in 2008 It takes place in May/June.
Drop me an email if you want to be on the list or speak even.
swprojects@blueyonder.co.uk.

THE AMERICAN CRITERIA WITH COMMENTARY

Organization

a. Define the authorized work elements for the program. A work breakdown structure (WBS), tailored for effective internal management control, is commonly used in this process.

Good idea. Try not to have too many levels. Up to five should cater for most projects. More than five means that the project is extremely large and complex or it could be a reflection of the psychological make-up of the project manager. What we need is quality not quantity. So, will it be easy to report to? Will it mean anything when we look at it?

b. Identify the program organizational structure including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.

Who's doing the work? At least you'll know where to start looking. Beware! Just because it says that another department is doing something does not necessarily reflect the views of that department. Welcome to matrix management. Life is normally easier with sub-contractors.....until they've spent the money.

c. Provide for the integration of the company's planning, scheduling, budgeting, work authorization and cost accumulation processes with each other, and as appropriate, the program work breakdown structure and the program organizational structure.

This is not solved by rushing out and buying software. Does everyone understand the way they need to work? And more importantly do they actually do it? A pile of manuals does not prove anything. Ask the doers what they use.If you find the manual they refer to neatly filed away in more than 10% of cases it's a fair indication that the procedures need examining.

It should go without saying that the only way to amass project data, crunch it and act on it before it becomes ancient history is through the use of computers. Sometimes the introduction of software and computers actually imposes the right discipline. It will certainly highlight deficiencies. It is normally during the introduction of new computer stuff that the Information Technology boffins get the blame for everything. Whilst this is an eminently worthy activity and goes to prove that IT continues to be the domain of the socially challenged the perceptive manager must realise that IT problems are normally a smokescreen for problems elsewhere.

d. Identify the company organization or function responsible for controlling overhead (indirect costs).

That overheads should be associated with Project costs is often a revelation too far. It's a very Zen concept.
Often used to conceal fat and to allow room for manoeuvre. If you can get this buttoned down you're special.If not, read Kipling,Proust, Nietzche and Jerry Siegel: for solace not guidance. Then go back and have another go.

e. Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.

Pin the tail on the donkey. Buy some Earned Value software.Not all project management software does this. Particularly at the lower end of the market. Be careful, some software does so much that it does too much.

Planning, Scheduling, and Budgeting

a. Schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.

Create a network diagram. Use a computer. It's easier to store and change. The major problem is viewing and understanding the drawing on a PC where only a handful of tasks can be seen at any one time. Find yourself some large panels, print off the network and then study the enormity of your project at your leisure. It's the easiest way to discuss it with 'friends'.

b. Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.

Think about what you're making. If you're making things that fit or go together, make sure that they will. Make sure that there is an integration activity or product. Some of the best in the business have messed this up. I won't embarrass them here.

c. Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Budget for far-term efforts may be held in higher level accounts until an appropriate time for allocation at the control account level.Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost including estimates for authorized but undefinitized work. On government contracts,if an over target baseline is used for performance measurement reporting purposes, prior notification must be provided to the customer.

The budget baseline should be established once and once only. Any revision should be a major event. It is still commonplace for projects and their managers to delude themselves that they are doing a great job by regularly revising the budget and eradicating those nasty variances. Some organisations even go so far as to do this deliberately so as to deceive their customers.
Of course, I don't mean you.

d. Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of subcontractors.

The pragmatic amongst you will convert the above 'etc.' into ' any other overhead'. For the vast majority that will be three more than are usually recorded. Now all you have to do is figure out how to collect the data.

e. To the extent it is practical to identify the authorized work in discrete work packages, establish budgets for this work in terms of dollars, hours, or other measurable units. Where the entire control account is not subdivided into work packages, identify the far term effort in larger planning packages for budget and scheduling purposes.

An issue is being fudged here. This should not be discretionary. However some companies love, value and trust their own employees so much that they don't allow them to see any information of this nature.....ever! They spend the rest of the time disputing the same issues with their customers on the grounds of commercial confidentiality. In reality this is shorthand for not wishing to reveal just how much money is really being made.....or lost, for that matter. EVA demands openness to work. If access to facts ,figures and methods was all it took to be successful we'd all be Japanese or German led by university lecturers by now. Weak management still thinks that information is power. It's not. It's how you use it.

f. Provide that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.

Apparently for some reason they don't always add up. I refer you to my comments in e) above and rest my case.

g. Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is unmeasurable or for which measurement is impractical may be classified as level of effort.

How many senior managers do you know who refuse to accept that anything is unquantifiable with the exception of their own position?

Alliteratives please note also that the quest for quantification can kill creativity completely.

h. Establish overhead budgets for each significant organizational component of the company for expenses which will become indirect costs. Reflect in the program budgets, at the appropriate level, the amounts in overhead pools that are planned to be allocated to the program as indirect costs.

Have you remembered to bar-code your shirt?

i. Identify management reserves and undistributed budget.

Bearing in mind that secrets are difficult to keep and that everyone will want some. Concentrate more on the release mechanism. Is it fair, is it rigorous? Is a reserve genuinely available or is it just a guarantee?Is it just padding for management delinquency? Who controls it? It must be the project/programme manager.

j. Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.

There is no hiding place.

Accounting Considerations

a. Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.

This one is great fun. Here you have an opportunity to work with an accountant and to tell him which boxes you need the beans to go in. The accountant will ignore this insult and reward you with a wall of silence or today's business oriented version will tell you how to do your job. Normal behaviour also dictates that the information provided by the project will not be available from the accounts for at least six weeks. This is a golden opportunity to let out of control projects stay there. People will also start keeping their own records which will never match anyone else's. Great fuel for heated debate.

b. When a work breakdown structure is used, summarize direct costs from control accounts into the work breakdown structure without allocation of a single control account to two or more work breakdown structure elements.

If you are using computer software this will not happen. If you do want this to happen there just might be something wrong with your structure.

c. Summarize direct costs from the control accounts into the contractor's organizational elements without allocation of a single control account to two or more organizational elements.

Once again, check your structure.

d. Record all indirect costs which will be allocated to the contract.

If you're not recording these then you will never be able to gauge the true profitability of your project. Which means you're deluding yourself and may be concealing a nasty surprise for your organisation.

e. Identify unit costs, equivalent units costs, or lot costs when needed.

Who said accountants couldn't be project managers?

f. For EVMS, the material accounting system will provide for:

(1) Accurate cost accumulation and assignment of costs to control accounts in a manner consistent with the budgets using recognized, acceptable, costing techniques.

(2) Cost performance measurement at the point in time most suitable for the category of material involved, but no earlier than the time of progress payments or actual receipt of material.

Managers beware! Sometimes it takes years for raw materials to convert to finished goods. You must track this Work in Progress and track it accurately. After all this is where most of the money goes. If you don't you will never get your customers to make those life extending progress payments.

(3) Full accountability of all material purchased for the program including the residual inventory.

A place for everything and everything in its place. Goodbye double counting , phantom stocks, variable standard costs and other performance enhancing ruses.

Make sure your inventory booking procedures are water tight.

Analysis and Management Reports

a. *At least* on a monthly basis, generate the following information at the control account and other levels as necessary for management control using actual cost data from, or reconcilable with, the accounting system:

(1) Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance.

EARNED VALUE - PLANNED COSTS

(2) Comparison of the amount of the budget earned the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance.

EARNED VALUE - ACTUAL COSTS

b. Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance,and provide the reasons for the variances in the detail needed by program management.

Software will help do this. Make sure the data is complete and accurate before you lynch them. The problem with unreliable data is that it is too easy to blame the computer. A public flogging of the guilty inputters should do the trick. Monthly reports are great. Make sure that they always come out on time and with minimal delay. Schedule their production. They are not an afterthought. Look for opportunity as well as threat.

c. Identify budgeted and applied (or actual) indirect costs at the level and frequency needed by management for effective control, along with the reasons for any significant variances.

Make sure the reports you use are useful. Some management are so jumpy that they would prefer to be directly connected to the computer themselves. Their knee-jerk reactions only serve to create an atmosphere of panic in a project. Take a deep breath before responding to data being waved at you by a screaming madman. Always check where and how reports were generated.

d. Summarize the data elements and associated variances through the program organization and/or work breakdown structure to support management needs and any customer reporting specified in the contract.

Variances occur.They always will. They are not always bad. Categorise and rank them and then act on them.

e. Implement managerial actions taken as the result of earned value information.

The receipt of reports should be accompanied by the sound of champagne corks popping or the buzz of people developing creative solutions not the screams of falling or being pushed onto swords.

f. Develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Compare this information with the performance measurement baseline to identify variances at completion important to company management and any applicable customer reporting requirements including statements of funding requirements.

There is nothing sinister going on here. People hate nasty surprises. All the activity described here is designed to reduce the likelihood of them happening. A lot is at stake in projects. Expect, offer and demand nothing less. It shows you mean business.

Revisions and Data Maintenance

a. Incorporate authorized changes in a timely manner, recording the effects of such changes in budgets and schedules. In the directed effort prior to negotiation of a change, base such revisions on the amount estimated and budgeted to the program organizations.

Everything visible and traceable.

b. Reconcile current budgets to prior budgets in terms of changes to the authorized work and internal replanning in the detail needed by management for effective control.

I repeat. Everything visible and traceable.

c. Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments should be made only for correction of errors, routine accounting adjustments, effects of customer or management directed changes, or to improve the baseline integrity and accuracy of performance measurement data.

Don't cook the books. Retrospective change is still condoned, allowed,supported,encouraged by some of the UK's largest organisations as a means of overhead cost recovery. Programme/project managers have more than enough challenges already and changes like this pull the rug from under them. It makes a mockery of baselining. If cost rates need changing then admit that you made a mistake and revise them. But use them from time now and into the future.

d. Prevent revisions to the program budget except for authorized changes.

I repeat. Don't cook the books.

e. Document changes to the performance measurement baseline.

Are we clerks or project managers?
Both.

What happens if you do cook the books? A severe telling off from the customer? Oh dear. A pat on the back from the boss? It happens. The punishment **must fit the crime**. Above all you must be professional in your approach. Remember that power comes with reponsibilty attached. Don't abuse it.

Purchasing Paradise

If you want EV used it has to be in the contract. Here's a draft EV clause to cheer suppliers up with.

NOTICE OF EARNED VALUE MANAGEMENT SYSTEM
(a) Earned Value Management (EVM) as used in this clause, means a project management system that effectively integrates the project technical scope of work with schedule and cost elements for optimum project planning and control. The qualities and operating characteristics of earned value management systems are described in Earned Value Management: APM Guide for the UK First Edition May 2002. A copy of the standard is available from teh Association for Project Management www.apm.org.uk.
(b) In the performance of this contract the contractor shall use an earned value management system to manage the contract that –
(1) Has been recognized by the contracting officer or her/his authorized representative that complies with the guidelines in Earned Value Management: APM Guide for the UK.
(2) Provides on a monthly basis, or more often as deemed necessary by the contracting officer, the following project status information:

(i) Budgeted (planned) cost of work scheduled (BCWS); ** = Planned Value (PV)

(ii) Budgeted cost of work performed (BCWP); ** = Earned Value (EV)

(iii) Actual Cost of work performed (ACWP; ** = Actual Cost (AC) and

(iv) Provide a cost curve graph plotting BCWS, BCWP, and ACWP on a monthly basis from inception of the contract through the last report, and plotting the ACWP curve to the estimated cost at completion (EAC) value

(v) In addition, provide the following EVMS variance analysis:

Cost variance = (BCWP minus ACWP);

Cost Variance % = (CV/BCWP X 100%);

Cost Performance Index (CPI) = (BCWP/ACWP);

Schedule Variance = (BCWP minus BCWS);

Schedule Variance % = (SV/BCWS X 100%);

Schedule Performance Index (SPI) = (BCWP/BCWS);

Two independent Estimates at Completion (EAC);

ACWPcum + 1/CPI X (BAC minus BCWP cum);

ACWPcum + 1/CPI X SPI X (BAC minus BCWPcum):

Variance at Completion (VAC) = (BAC minus EAC) for both EACs above;

Variance at Completion % + (VAC/BAC X 100%) for both EACs above;

Expected Funds to Completion (ETC) ** = Budget At Completion (BAC); and

Expected Completion Date.

****Denotes Project Management Institute Updated Terms**

(3) Explain the reasons for all variances greater than 10%.
(4) Provide performance variance. Explain, based on work accomplished as of the date of the report, whether the performance goals or milestones will be achieved (performance goals or milestones per the contractual WBS).
(5) Provide the contractor EAC and the differences with the two independent EAC calculated as above.
(6) As applicable, discuss the corrective actions that will be taken to correct the variances, the risk associated with the actions, and how close these actions will bring the project to the original baseline. Define proposed baseline changes, if necessary.

(c) The Government may conduct an integrated baseline review within ___(should be before contract award, but as soon as practicable after award) days after contract award, exercise of significant contract options, or incorporation of major contract modifications. The objective of the integrated baseline review is for the Government and the Contractor to jointly assess areas, such as the Contractor's planning, to ensure complete coverage of the statement of work, logical scheduling of the work activities, adequate resources, and identification of inherent risks.

(d) Any Contractor proposed EVMS baseline changes must be agreed to by the contracting officer and the contractor prior to implementation.

(e) Contractor will invoice the FCC by task as the tasks are described in the Contractors proposal and the Work Breakdown Structure (WBS) or Contract Work Breakdown Structure (CWBS), if applicable. This will involve keeping track of time worked on each task by contractor. Invoices will be subtotaled by task. All major deliverables and/or milestones achieved shall be reported by task in the a periodic performance report, generally on a monthly basis or as otherwise agreed upon. On cost or T&M efforts, hours expended shall be included on the performance report or the invoice itself.

(f) The CWBS may be used to define the level of reporting that the Contractor will provide the FCC. This CWBS will include less detail than the WBS that the Contractor uses to manage his project internally.

(g) The Contractor agrees to provide access to all pertinent records and data requested by the contracting officer or a duly authorized representative. Access is to permit Government surveillance to ensure that the EVMS conforms, and continues to conform, with the performance criteria referenced in paragraph (a) of this clause.

(h) The Contractor shall require the subcontractors specified below to comply with the performance criteria of this clause (Insert list of applicable subcontractors).

(End of Clause)

Glossary

(baffle your boss and gain credibility)

A conundrum of language is that the more precise it gets the more puzzled a listener becomes. Professional jargon tends to exclude rather than include. For those of you who don't know, these lists will help you join the gang. When you're in the gang try and get rid of the jargon. The audience that needs to understand E.V.A. will be easier to convince if you tell them in plain English.

ACRONYMS

ACWP - Actual Cost of Work Performed
What you've really done.

AE - Apportioned Effort
Work that is related to a task and cannot take place without the task e.g. quality control.

BAC - Budget at Completion
The one 'they' never let you forget!

BCWP - Budgeted Cost for Work Performed
The Earned Value.

BCWS - Budgeted Cost for Work Scheduled
The Budget. The Plan.
Planned Costs

CA - Cost Account
Also called a Control Account. The place where Cost and Schedule data is amassed so that E.V.A. can take place. To define a CA you need to know what piece of work is being done and which part of the organisation is doing it.

CAM - Cost Account Manager
The person responsible for managing Cost Accounts. Likely to be a cross-functional role and far easier said than done.

CBB - Contract Budget Base
The negotiated contract cost plus the estimated cost of authorised unpriced work.

C/SCSC - Cost/Schedule Control Systems Criteria

CV - Cost Variance
If the variance is negative you're in trouble.

CPR - Cost Performance Report
A defined standard in those countries using C/CSCS based systems.

CTC - Contract Target Cost

CWBS - Contract Work Breakdown Structure
Work Breakdown Structures look like family trees and show how all the sub-elements of a project relate to each other in order to produce the finished product.

EAC - Estimate at Completion
An objective formally arrived at figure.
The one for public consumption.

EV - Earned Value (BCWP)

FM - Functional Manager

LOE - Level of Effort
Effort that doesn't produce definite products but is nevertheless essential e.g. project management.

LRE - Latest (Suppliers) Revised Estimate
The Gut Feel. What you tell your real friends.

MR - Management Reserve
The Contingency Fund.

OTB - Over Target Baseline
You've replanned your work and you haven't got enough money to do it.

PCS - Project Control System
Scapegoat's scapegoat

PM - Programme Manager
Scapegoat

PMB - Performance Measurement Baseline
The time phased budget less Management Reserve. The planned expenditure.

PMO - Programme Management Office
Mission Control

PP - Planning Package
Things that have been identified to do but not yet planned in detail.

RAM - Responsibility Assignment Matrix
A two-dimensional grid where role respon sibilities and task elements of the WBS are shown.

SOW - Statement Of Work

SV - Schedule Variance
A negative means that you haven't done as much as you planned.

AB - Total Allocated Budget
The sum of all the contract budgets.

UB - Undistributed Budget
What you still have left to give out. Not Management Reserve.

VAC - Variance At Completion

VAR - Variance Analysis Report

WP - Work Package
Discrete bundles of work that have units to be produced, dates and monies associated with them.

FORMULAE

Cost Variance
CV = BCWP - ACWP

Cost Variance in %
CV% = (CV / BCWP) x 100

Cost Performance Index
CPI = BCWP / ACWP

To Complete Performance Index
TCPI = (BAC - BCWP (cum)) / (EAC - ACWP (cum))
or Work Left/Funds Left

Schedule Variance
SV = BCWP - BCWS

Schedule Variance in %

SV% = (SV / BCWS) x 100

Schedule Performance Index

SPI = BCWP / BCWS

Schedule Variance in Months

SV(months) = SV(cum) / Average Monthly BCWP

% Spent = (ACWP(cum) / BAC) x 100

% Complete = BCWP(cum) / BAC

INDEPENDENT EAC :

STATISTICAL EXAMPLES

Basic Formula

EAC = ACWP(cum) + PF(BAC - BCWP(cum))

where PF = Performance Factor and

popular PF is = ACWP / BCWP or 1 / CPI

EAC_2 = ACWP(cum) + (BAC - BCWP(cum))

IEAC for the committed

$$IEAC = ACWP + ETC$$

$$IEAC_1 = \frac{BAC}{CPI}$$

$$IEAC_2 = ACWP_{Cum} + \frac{BAC - BCWP_{Cum}}{0.8CPI + 0.2*SPI}$$

$$IEAC_3 = ACWP_{Cum} + \frac{(BAC - BCWP_{Cum}) * 3}{(CPI_{-1} + CPI_{-2} + CP1_{-3})}$$

$$IEAC_4 = ACWP_{Cum} + \frac{(BAC - BCWP_{Cum})}{CPI*SPI}$$

It's always a good idea to use more than one IEAC. You'll get a range of answers. If nothing else it will remind you that this is more art than science. Never forget that. The numbers are to help you manage. They are not there to replace management.

Variance At Completion

VAC = BAC - EAC

Variance At Completion in %

VAC% = (VAC / BAC) x 100

Budget/Earned Rate

B/E Rate = BCWP(£) / BCWP(hours)

Actual Rate

Actual Rate = ACWP(£) / ACWP(hours)

Rate Variance

Rate VAR = (B/E Rate - Actual Rate) x (Actual Hours)

Price Variance

PV = (B/E Price - Actual Price) x Actual Quantity

Usage Variance

UV = (Earned Quantity - Actual Quantity) x Earned Price

To-Go Rate

To-Go Rate = ETC(£) / ETC(hours)

Efficiency Variance

Eff VAR = (BCWP Hours - ACWP Hours) x (B/E Rate)

Brace Yourself

There aren't many new things in EV.
Nor are there many people prepared to put their heads above the parapet and take the flak.
Kym Henderson from Australia and Walt Lipke from ancient Oklahoma are two of the few.They have looked at some sacred EV cows and found them wanting.

Earned Schedule adds to the formulae we have for forecasting time to deliver.

The 20% rule is shown to be not set in stone.

And I am glad to support their work. It shows that at least someone is thinking. Not taking things for granted and working hard to improve things.

To their critics and opponents. Shame on you!

EVM 20% Stability Rule

Kym Henderson

The cancellation of the United States Defense Department (US DoD) A-12 Avenger stealth fighter program in 1991 resulted in research during the 1990s, which investigated the reliability of Earned Value Management (EVM) cost prediction and the behavior of the Cost Performance Index (CPI) using US DoD project data. A finding regarded as particularly significant from this research was that CPI stabilizes by 20% of project completion. The CPI stability rule is "the range of the cumulative CPI from the 20 percent completion point to contract completion was less than 0.20 for every contract. This result is usually interpreted to mean that the cumulative CPI does not change by more than plus or minus 0.10 from its value at the 20 percent completion point, and is used to evaluate the reasonableness of projected cost efficiencies on future work". [1]

These research findings have been widely referenced and come to be regarded as generally applicable across all project types using EVM across multiple industry sectors [2] [3] [4] [5]. One reason that the finding of CPI stability by 20% of project completion was considered significant was that it was thought that the final cost outcome could be reliably predicted within a narrow statistical band early in the project lifecycle.

Following the initial validation of the Earned Schedule method, interest developed in ascertaining whether the SPI(t) exhibited similar stability characteristics to those extensively reported for the Cost Performance Index (CPI). A recent research paper [6] has reexamined CPI stability and compared the stability behavior of the Earned Schedule SPI(t) with CPI.

The commercial EVM project data sample utilized by this research consisted of:

- Twelve Israeli Hi-Tech projects for the SPI(t) and CPI stability research
- Twenty UK construction projects for the SPI(t) stability and ten for CPI stability research
- Five Australian IT projects for the SPI(t) stability and four for CPI stability research.

The research evaluated CPI stability using statistical hypothesis testing. The question tested was, “Can it be stated generally and reliably that the final value of the performance index is within 0.10 of its value when the project is 20 percent complete?” The statistical testing results were negative for each of the three samples, as well as the composite of all samples. Simply stated, stability was not achieved for either CPI or the SPI(t) by the time the project was 20 percent complete. [6]

The researchers obtained corroboration for these findings from a research study conducted within the US DoD (NAVAIR), previously unpublished which has now, with permission, been placed into the public domain on the PMI Sydney Chapter website [7].

While that research did not focus on CPI stability, charts which can also be used for assessing CPI stability were completed as part of that study. These charts correlate the cumulative CPI for the percentage complete in each 10% complete percentile band to the CPI Final for all projects in that sample.

The chart of interest from this report showed the correlation between the cumulative CPI at 10-20% complete and the CPI Final for all projects in that sample. By enclosing the area of this chart with dashed lines to bound the area in which the CPI stability rule applied, it was shown that those plots which occurred outside the enclosed area were also in conflict with the CPI stability rule. The limited data samples used in that analysis were sufficient to show that the CPI stability rule cannot be generalized even within the US DoD project portfolio.

The researchers also found that CPI stability was usually achieved very late in the project lifecycle, often later than 80% complete for both the commercial sector and NAVAIR project samples. Stability achievement for the SPI(t) was also consistent, again often after 80% completion for the commercial sector EVM projects.

The NAVAIR study did show that the 20% stability rule does apply in many cases in the US DoD programs used in that study. It has been hypothesized that the CPI stability rule may only apply to "long duration and likely very large effort" projects [8]. Further research is required to determine the project characteristics and/or reasons, if any, where the CPI stability rule is likely to apply.

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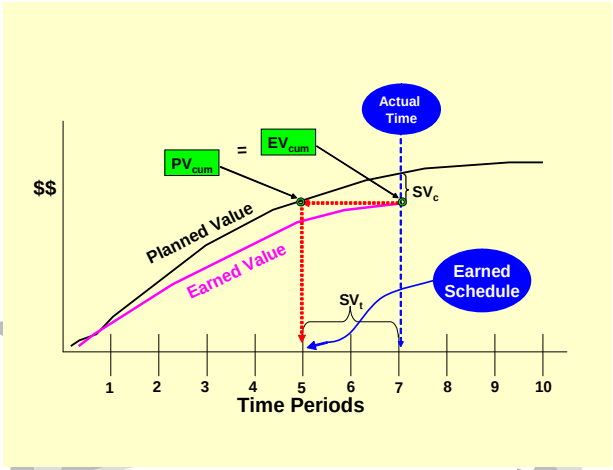
Earned Schedule
Walt Lipke

Earned Schedule (ES) is an emerging practice extension to Earned Value Management (EVM).[1] Its method corrects the EVM schedule indicators inconsistency of describing perfect performance at completion, when in reality the project completed late.

The ES method provides reliable schedule indicators and facilitates similar performance analysis and forecasting techniques for schedule as exist for cost from EVM. Using more advanced techniques, ES provides capability for the evaluation of critical path performance and warning of the existence of process constraints or impediments and the possibility of future rework.

The ES idea is a simple one*: identify the time at which the amount of earned value (EV) accrued should have been earned*. By determining this time value, useful and more cognitive management information becomes available.



The diagram above illustrates how the ES measure is obtained. Projecting the cumulative EV onto the PV curve (i.e., the PMB), as shown by the diagram, determines where planned value (PV) equals the EV accrued. This intersection point identifies the time that amount of EV should have been earned in accordance with the baseline schedule. The vertical line from the point on the PMB to the time axis determines the "earned" portion of the schedule. The duration from the beginning of the project to the intersection of the time axis is the amount of earned schedule (ES).

For general application, the determination of ES is more readily usable as a calculation. The calculation of the cumulative value for ES (ES_{cum}) is performed using two operations, counting (C) and interpolation (I), as defined mathematically below:

- ES_{cum} is the number of completed PV time increments EV exceeds (C), plus the fraction of the incomplete PV increment (I).

- $ES_{cum} = C + I$

  where: C = number of whole time increments of the PMB for which $EV \geq PV$

  $I = (EV - PV_C) / (PV_{C+1} - PV_C)$

In opposition to the counterintuitive cost-based schedule variance and schedule performance index from EVM, the schedule indicators associated with ES are in units of time (e.g, weeks or months). From the value of ES and the time at which the EV accrued is measured, time-based indicators are formed. The measurement time for the EV accrued is termed Actual Time (AT), as shown in the preceding diagram. The time-based indicators from the two measures, ES and AT, are:

- Schedule Variance (time): SV(t) = ES – AT
- Schedule Performance Index (time): SPI(t) = ES / AT

The terminology and basic calculation methods associated with ES are shown in the two tables below. By design, the ES terms are very comparable to those of EVM, as indicated in the table immediately following.

	EVM	Earned Schedule
Status	Earned Value (EV)	Earned Schedule (ES)
	Actual Costs (AC)	Actual Time (AT)
	SV	SV(t)
	SPI	SPI(t)
Future Work	Budgeted Cost for Work Remaining (BCWR)	Planned Duration for Work Remaining (PDWR)
	Estimate to Complete (ETC)	Estimate to Complete (time) ETC(t)
Prediction	Variance at Completion (VAC)	Variance at Completion (time) VAC(t)
	Estimate at Completion (EAC) (supplier)	Estimate at Completion (time) EAC(t) (supplier)
	Independent EAC (IEAC) (customer)	Independent EAC (time) IEAC(t) (customer)
	To Complete Performance Index (TCPI)	To Complete Schedule Performance Index (TSPI)

PD is the planned duration of the project and ED is the estimated duration. The term PF(t) is an abbreviation for performance factor (time).

Metrics	Earned Schedule	ES_{cum}	ES = C + I number of complete periods (C) plus an incomplete portion (I)
	Actual Time	AT_{cum}	AT = number of periods executed
Indicators	Schedule Variance	SV(t)	SV(t) = ES - AT
	Schedule Performance Index	SPI(t)	SPI(t) = ES / AT
	To Complete Schedule Performance Index	TSPI(t)	TSPI(t) = (PD – ES) / (PD – AT)
			TSPI(t) = (PD – ES) / (ED – AT)
Predictors	Independent Estimate at Completion (time)	IEAC(t)	IEAC(t) = PD / SPI(t)
			IEAC(t) = AT + (PD – ES) / PF(t)

A spreadsheet for calculating ES along with additional information for basic and advanced methods is freely available from the Earned Schedule website, www.earnedschedule.com.

Contents

Further copies and information

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