



Deltek Earned Value Management Guide



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White Papers

What is EVMS?

How an Earned Value Management System Can Help You

An earned value management system (EVMS) is a set of best business practices, processes and tools for enterprise project planning and control. The process includes integration of scope, schedule, cost, a performance measurement baseline and earned value.

Earned Value Management provides indices used as early detection mechanisms, giving you time to implement effective corrective action.

EVMS provides a common-sense process for project management, considered by many companies and governments to be a best practice. It presents an excellent means to establish and maintain internal processes and controls as stipulated by section 404 of the Sarbanes-Oxley Act of 2002 (SOX) for project-based companies. Additionally, EVMS supplies valuable project health indicators.

The basic EVMS process comprises the following key concepts:

- Plan all of the work
- Integrate scope, schedule and cost into a baseline against which accomplishments can be measured
- Assess accomplishments objectively
- Analyse significant variances from the plan and forecast the impact

The essence of earned value management is: a budget is established at the task level and as work progresses, the budget for each task is earned. This provides a metric to measure what was spent and the budgeted amount of the work completed (or earned value).

EARNED VALUE EXPLAINED

Earned value is a means of putting a monetary value on project status to enable companies to measure project health throughout the lifecycle of the project. It can also be described as the sum of the budgets for completed work.

Earned value for completed activities is equal to the total budget for those activities. For activities not yet begun, the earned value is zero. For activities in progress, there are a number of methods for objectively measuring earned value. The basic theory behind these methods is to multiply the budget by a “percentage complete” to get the earned value.

Earned value management also provides indices as early detection mechanisms, giving you time to implement effective corrective action.

These EVMS concepts are incorporated into a process guide defined in the American National Standards Institute ANSI/EIA-748 Standard on Earned Value Management. The process can be summarised as follows:

- **Scope Definition** – Comprised of the statement of work (SOW) and the work breakdown structure (WBS). The SOW identifies the scope requirements for a project and is used as a basis for the schedule and budget. The WBS is used to break down the work into definable product elements and is used as a rollout reporting tool.

- **Programme Organisation** – Control points are established where actual costs are collected and variances analysed. A control account manager (CAM) is assigned to manage each unit of work. A schedule is created and budget is assigned to individual tasks.
- **Measuring Performance** – Short, discrete tasks in the schedule are objectively assigned status and earned value is calculated. Variances from the budget are analysed and corrective actions are considered.
- **Estimate at Completion** – As the project progresses, the remaining project costs are continually evaluated and updated. Project performance-to-date is used to analyse forecasted costs.
- **Revision Control** – As changes to the project occur, the schedule, budget, and forecast are updated to reflect the current scope.
- **Document the Process** – A document is created that describes how each of these steps will be implemented across the enterprise.

“EVMS was such a major success on one defence contract, we implemented the process on other contracts. Earned value management is basic, common sense, project management. Since implementing EVMS over five years ago, our organisation has moved away from a ‘blame culture’ to one that is open, forward-looking and more aware of its business performance,” says David Chard of BAE Systems.

EARNED VALUE MANAGEMENT SOFTWARE

Spreadsheets alone are insufficient legal documentation proving your organisation uses best practices. Companies which rely only on spreadsheets for project forecasting are in greater danger of noncompliance and criminal litigation. The best method to protect your organisation and employees from criminal prosecution is a combination of earned value management and statistical forecasting software.

BearingPoint found the following deficiencies for project controls systems that use Microsoft Excel® as their reporting/controlling software when validating publicly traded companies for SOX section 404 compliance:

- There is no integration with ERP or accounting functions and data has to be re-keyed, leading to mistakes
- There are no audit trails made to values such as authorised-for-expenditure (AFE) or scope changes
- There is no security on the spreadsheet preventing unauthorised persons from changing values
- It is too easy to have an error in a formula
- Rates and burden buildups such as overhead costs should be stored in a separate table and referenced by the project data so that it can be easily verified

“Project controls and understanding the true state of a project can change a company’s bottom line and is thus part of SOX section 404,” says Steven P. Fehr, Vice President of BearingPoint.

To reduce legal liability, statistical forecasting software should perform the following tasks:

- Understand the true health of your project
- Determine accurate project completion costs
- Lend evidence and credibility to a forecast

Understand the true health of your projects

Project managers often own responsibility for large projects. How is it possible for them to feel confident they have the most accurate information regarding all of their project? Measuring the health of projects by comparing a budget to actual costs without project status or earned value may misrepresent how well your projects are performing.

For example, if your project’s budget is £10 million pounds, and you have spent £9 million pounds, you appear under your target budget. But if you have only completed £5 million pounds worth of work, then your project has a £4 million overrun of costs. If this is the case, the project is behind schedule and the completed work costs much more than originally planned. Evaluating your projects with earned value management principles in addition to forecasting software may help determine whether a cost overrun is a “material” financial issue as defined by SOX.

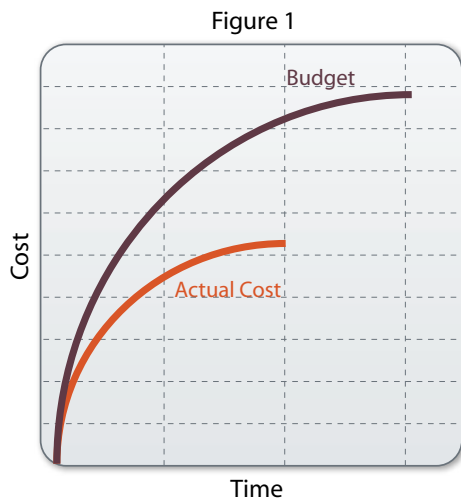


Figure 1. Figure 1 shows actual costs as less than budgeted. Without earned value, it is impossible to tell if the actual costs are less because work is progressing at a slower rate than planned or if the actual costs are really less than what is budgeted.

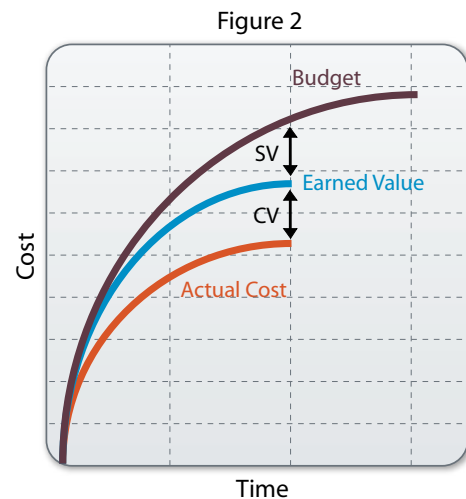


Figure 2. Figure 2 shows the Schedule Variance (SV) – the difference between the earned value and the budget – and the Cost Variance (CV) – the difference between the earned value and the actual costs.

Determine accurate project completion costs

Once a project is underway, it is the fiduciary responsibility of the project manager to continually improve the accuracy of the total project cost (also known as estimate at completion, or “EAC”). Factors including a better understanding of the project scope, complexity and resources performing the work can help project managers in this effort. Assuming the total project cost will be the same as the original estimate is not an acceptable practice; this could reduce the profit margin on the project and, based on the terms of SOX, company officials could be held criminally liable. Therefore, it is important for all project managers to regularly reassess the cost-to-complete accurately and use trend analysis to verify their estimates.

There are a number of methods which can be used to determine the project cost-at-completion, including re-evaluation of the remaining work and usage of statistical forecasts. The most accurate method to determine project cost-at-completion is thoroughly re-evaluating the remaining work and compensating for the performance-to-date of the project. However, this method is time-consuming, especially on large, complex projects.

Statistical forecasts are more practical for calculating completion costs because they use past project performance to estimate future project costs. If the project costs-to-date are higher than budgeted, looking at the baseline plan from the current time through completion will be misleading, since it represents improved performance. Unless there is an appropriate explanation how this improved performance

can be achieved, a performance factor should be applied to the remaining work in order to properly project the final cost.

Average performance-to-date is calculated by dividing the cumulative earned value by the cumulative actual costs. The resulting value is the cost performance index (CPI). A CPI of less than 1.0 reflects unfavourable performance. For example, a CPI of 0.85 means that for every pound spent, only 0.85 pounds worth of work is completed. Dividing the remaining budget by the CPI of 0.85 provides a cost estimate which reflects a more realistic scenario (where the performance-to-date is assumed to continue until the end of the project).

The schedule performance index (SPI) is a similar index which is calculated by dividing the earned value by the budget. An SPI of 0.85 means that for every pound of budget, only 85p worth of work is completed.

Statistical forecasts created using indices like the CPI and SPI allow for very accurate forecasts because they consider both project status and past performance. They may provide early warning signs of project overruns and can be used to evaluate the accuracy of a manually entered EAC.

Lend evidence and credibility to a forecast

People tend to be optimistic. Oftentimes, project managers announce, “I know the project has been over running in costs to-date, but I’m going to make it up.” Since statistics prove that few projects do make it up, how can project managers

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Deltek (NASDAQ: PROJ) is the leading provider of enterprise applications software designed specifically for project-focused businesses. For more than two decades, our software applications have enabled organisations to automate mission-critical business processes around the engagement, execution and delivery of projects. More than 12,000 customers worldwide rely on Deltek to measure business results, optimise performance, streamline operations and win new business.

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and senior management feel confident in project forecasts?

The to complete performance index (TCPI) is the ratio of the remaining work to the remaining cost. It indicates the level of performance which must be achieved to reach a particular estimate at completion. It is used to gain confidence in the reported forecast for the remaining work.

To validate a given forecast, the TCPI of a project should be compared to the CPI of the project to-date. Since the CPI of a project rarely improves once the project is greater than 20% complete, the TCPI should be very similar to the CPI achieved to date.

A TCPI that is greater than the CPI shows an improvement in performance and means that the forecast is not probable. Senior management should have confidence in a forecast where the TCPI is close to the value of the CPI.

"Nearly 77% of companies will spend more on IT, business process change, corporate governance and consulting this year as a direct result of SOX compliance. While most companies reported they would spend an average of 0.03% of total revenue on SOX-related activities in the next 12 months, conglomerates with widely different and independent business units have budgeted for up to 0.1% to 0.2% of total revenue. For a \$5 billion company, that equates to \$5M to \$10M in incremental spending," according to AMR Research¹.

The Department of Defense's experience in more than 400 programmes since 1977 indicates that, without exception, the cumulative CPI does not significantly improve during the period between 15% and 85% of contract performance; in fact, it tends to decline.²

In fact, results show that the average EAC based on the cumulative CPI was the lower end of the average [actual] cost at completion.³

Studies show that EACs based on both the CPI and the SPI tend to be significantly higher and are generally more accurate.⁴

CONCLUSION

No methodology or process will make projects profitable overnight. Combining EVMS principles and performance indicators provides you early warning signals, which allow you to apply effective corrective action. EVMS helps you reduce risk in a project's outcome. It may not bring the project in on time, but you can identify what issue caused poor performance early enough to have the opportunity to change the outcome.

You can standardise the way projects are managed and reduce the likelihood of inaccurate information by using EVMS software. Removing the formulas from Excel spreadsheets and preventing each project from being managed as an island, you can transform your project management office from a cost centre into a competitive advantage!

RESOURCES

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4. Christensen, David S., Ph.D. Project Advocacy and the Estimate at Completion Problem. Journal of Cost Analysis Spring 1996.
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What is the Health of my Project?

The Use and Benefits of Earned Value

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HOW'S MY PROJECT DOING?

We all know about the three monkeys: See No Evil, Hear No Evil and Speak No Evil. As project managers, our goals are to control our projects, be sure they come in on budget, and avoid any cost overruns. In order to do this, we must ignore the advice of the three monkeys. We need to see the potential for cost overruns, hear about the risks and speak about the likelihood of failure BEFORE it actually occurs or we run out of budget.

Budget versus actual costs. Project ahead of schedule versus project behind schedule. Being told not to worry versus spending sleepless nights worrying. These factors have been used to manage projects in the past, yet can they alone describe the real health of a project? In a word, no. An earned value management tool is a valuable partner when determining the answers to these and many other questions about the ongoing state of a project. Earned value fills the need when project success and the success of the company hang in the balance in this fast-paced, budget conscious 21st century.

In a Standish Group study of software projects in both the public and private sectors, nearly 90% of the studied projects failed due to cost and time overruns. In addition, more than 33% were cancelled before they ever came to completion. Nearly one third of the small, medium and large companies studied experienced cost overruns of 150-200%, with project costs coming in with an average overrun of 189% of the original cost estimate. Likewise, time overruns experienced similar

difficulties. Over one third of all the companies in the study reported time overruns of 200-300%, with the average overrun being 222% of the original time estimate (Chaos 1995).

Failure records like these can be interpreted to mean that project management tools and techniques are not being effectively used and applied. Overall, failed and challenged projects alone cost US companies and government agencies an estimated \$145 billion per year.

NEED A SOLUTION? EARNED VALUE TO THE RESCUE!

When faced with a new project, we want it to be successful. We've heard all the horror stories about cost overruns, and we want an early warning system to let us know when problems arise before it is too late to resolve the problem. We certainly don't want history to repeat itself, so we're in search of a solution that can help.

Who Uses Earned Value Management?

Earned Value Management (EVM) is a methodology that has been in use since the 1960s when the US Department of Defense adopted it as a standard method of measuring project performance. Its principles were set down as Cost/Schedule Control Systems Criteria in the DoD's financial management orders in 1967. However, the idea has actually been in existence since the 1800s when industrial engineers wanted a way to measure performance on the factory floor.

In August of 1999, Dr. Jack Gansler, USD (A&T), signed a memorandum announcing that the Department of Defense had adopted the ANSI EVMS Standard for use on defence acquisitions. The EVMS guidelines incorporate best business practices for programme management systems that have proven to provide strong benefits for programme or enterprise planning and control. The processes include integration of programme scope, schedule and cost objectives, establishment of a baseline plan for accomplishment of programme objectives and use of earned value techniques for performance measurement during the execution of a program. The system provides a sound basis for problem identification, corrective actions, and management replanning that may be required (Gansler 1999).

Why Use Earned Value?

Have you ever asked yourself any of these questions?

- My actual costs are less than my budget. Is my project doing well, or is it behind schedule?

- My project's actual costs are now higher than budgeted, and the project is only halfway complete. What's it likely to cost at completion?
- My project manager or engineer keeps telling me not to worry about the cost overruns.
- The rest of the work will cost less than budgeted. Is this probable?
- Do I have the necessary staff for this new contract?
- Will labour rate and currency exchange rate fluctuations affect my project's costs?
- How will funding cuts affect my cash flow?
- Is price or usage causing my cost variance?

If you've asked yourself these questions, then earned value is a tool you should seriously consider using to determine your project's health.

Failed and challenged projects alone cost US companies and government agencies an estimated \$145 billion per year.

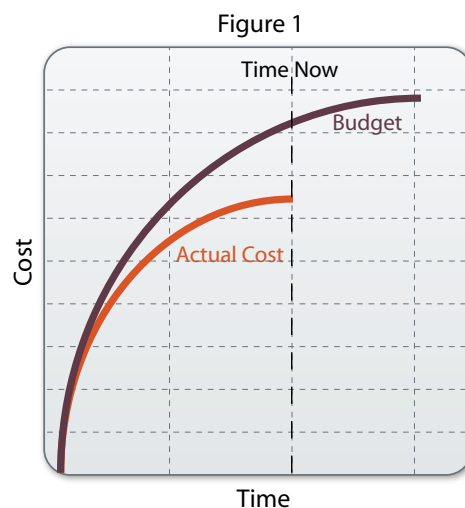


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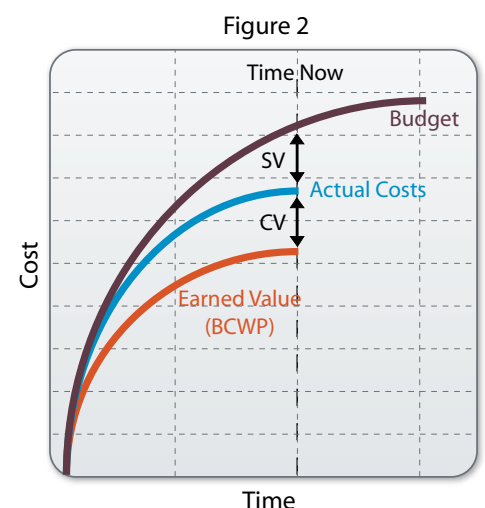


Figure 2 shows the Schedule Variance (SV) – the difference between the earned value and the budget – and the Cost Variance (CV) – the difference between the earned value and the actual costs.

MY ACTUAL COSTS ARE LESS THAN MY BUDGET. IS MY PROJECT DOING WELL, OR IS IT BEHIND SCHEDULE?

Earned value is a means of placing a monetary value on project status. This allows you to compare budget versus actual costs versus project status in monetary amounts.

Proper analysis of a project requires four major items: budget, earned value, actual costs and forecasts. All four are needed to obtain a true picture of the project's health. If you analyse only the budget versus actual costs, an incorrect representation often results. For example, if the project spending is 10% under budget, this might appear as if the project is doing very well. However, when the project status or earned value is added to the analysis, it may then show that only half of the originally planned work has been performed. If so, we have a project that is behind schedule, and the completed work costs much more than originally planned!

How is Earned Value calculated?

Earned value may be defined as the sum of the budgets for the work that is complete. Therefore, earned value for completed activities is equal to the total budget. For activities not yet begun, the earned value is zero. In order to measure the performance of activities in progress, you must come up with a system of measurement that includes objective judgments. The Earned Value Management System (EVMS) guidelines give a number of alternative methods for measuring the earned value of an activity in progress. These methods are often called earned value methodologies or performance measurement techniques (PMT). The basic theory behind all of the methodologies is to multiply the budget by a percentage complete to get the earned value.

Most projects contain at least some work that is regarded as inherently immeasurable. An example of this is the work performed by a project manager or a quality control inspector. This type of task is sometimes referred to as "level of effort" since its earned value is assumed to be the same as the amount budgeted. Basically, as long as the task is performed, then the value is earned.

MY PROJECT'S ACTUAL COSTS ARE NOW HIGHER THAN BUDGETED, AND THE PROJECT IS ONLY HALFWAY COMPLETE. WHAT'S IT LIKELY TO COST AT COMPLETION?

There are a number of methods that you can use to arrive at an answer to this question:

- Re-evaluating the remaining work
- Using the remaining budget
- Using statistical forecasts

The most accurate method is to thoroughly reevaluate the remaining work in the schedule to determine a new estimate-to-complete for the remaining work. However, this method is often too labour-intensive to be justified.

Simply using the remaining budget may be misleading. If project costs to date are higher than budgeted, using the baseline plan from the current time to completion will be misleading as it would represent improved performance. Unless there is an appropriate explanation as to how this improved performance can be achieved, a performance factor should be applied to the remaining work in order to properly project the final cost.

The Department of Defense's experience in more than 400 programs since 1977 indicates that without exception the cumulative cost performance index (CPI) does not significantly improve during the period between the 15% and the 85% of contract performance; in fact, it tends to decline (Beach 1990).

Average performance-to-date is calculated by dividing the cumulative earned value by the cumulative actual costs. The resulting value is called the CPI. A CPI that is less than one reflects unfavourable performance. For example, a CPI of 0.85 means that for every pound being spent, only 0.85 pounds worth of work is being done. Dividing the remaining budget by the CPI of 0.85 provides a cost estimate that reflects a condition where the performance-to-date is assumed to continue to the end of the project.

Statistical forecasts (forecasts that are created using such indices as the cost performance index) can give early warning signs of project overruns and can be used to evaluate the accuracy of a manually entered estimate at complete.

ETC = 1/CPI x (BAC-EV)

In fact, results show that the average EAC based on the cumulative CPI was the lower end of the average cost at completion (Christensen 1996). Other common index-based EACs that are found to be higher are more accurate. In particular, studies show EACs based on both the CPI and the schedule performance index (SPI) tend to be significantly higher and are generally more accurate (Christensen 1996).

Using indicators such as the CPI and SPI, you can develop forecasts that are very accurate because they take into account both project status and past cost performance.

The following are the typical forecasts that should be maintained for an accurate, detailed forecast:

- A set of optimistic, pessimistic and most likely forecasts for client reporting.
- Internal forecasts that are used by the project managers to manage the contract and report internally. These may be the same set as above, or they may be more optimistic as an incentive towards more rigorous management.
- Several different statistical forecasts to increase confidence in the manually entered forecasts.
- Multiple forecasts based on the effects of future rate changes.

Multiple forecasts facilitate efficient project management because they provide an early warning of probable project overruns.

Statistical forecasts (forecasts that are created using such indices as the cost performance index) can give early warning signs of project overruns and can be used to evaluate the accuracy of a manually entered estimate at complete.

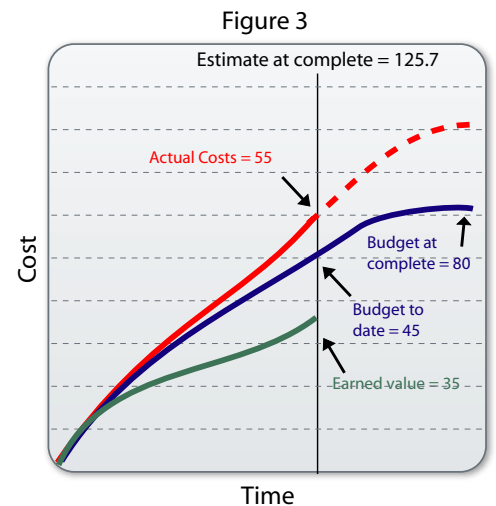


Figure 3 The “to-go effort” or estimate-to-complete (ETC) is multiplied by 1/CPI.

$$\text{ETC} = 80 - 35 = \$45\text{k}$$

$$\text{CPI} = \text{earned value} / \text{actual cost} \\ = 35 / 55 = 0.636$$

$$\text{ETC} = 1 / 0.636 \times 45 = \$70.7$$

Therefore, the total estimate at complete (EAC) is \$125.7k

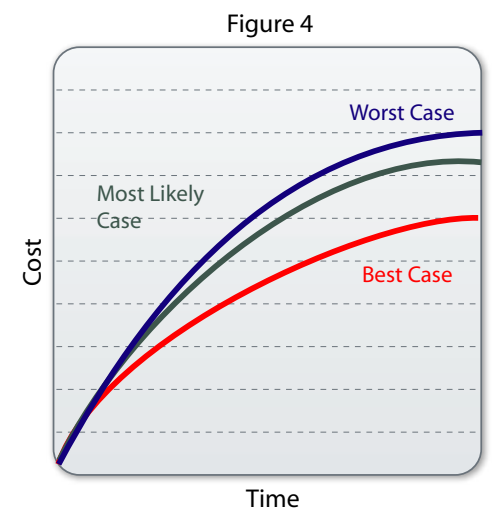


Figure 4 shows the optimistic, pessimistic and most likely forecasts plotted on a single graph.

MY PROJECT MANAGER OR ENGINEER KEEPS TELLING ME NOT TO WORRY ABOUT THE COST OVERRUNS. THE REST OF THE WORK WILL COST LESS THAN BUDGETED. IS THIS PROBABLE?

Despite the widely known fact that the recoveries from cost overruns on defence contracts are extremely rare, analysis of 64 completed contracts shows that the final cost overruns estimated by the contractor were less than the current cost overruns (Christensen 1993).

According to some authors, determining the most accurate estimate has never been the objective of the contractor (Fox 1974) (Mayer 1991). Instead, the objective has been to protect the project and the careers of its managers, even if that means understating the projected completion cost (Christensen 1996).

Upon reaching the 15% stage of completion, project performance seldom improves. As a matter of fact, after this point is reached, performance seldom exceeds the average performance-to-date and often deteriorates. The to complete performance index (TCPI) is the ratio of the remaining work to the remaining cost. It indicates the level of performance that you must achieve to reach a particular estimate at complete. The TCPI will help you examine the probability of the project costs matching a particular forecast.

To Complete Performance Index

The TCPI is an index used to rate the probability of a forecast. It is also known as the CPI to EAC index as it is the CPI that is required to meet a particular EAC.

$$\text{TCPI} = \frac{\text{budget} - \text{earned value}}{\text{estimate at complete} - \text{actual cost}}$$

The TCPI should be compared to the CPI of the project to date. Since the CPI of a project rarely improves once the project is greater than 20% complete, the TCPI should not be higher than the CPI. A TCPI that is greater than the CPI, shows an improvement in the performance and means that the EAC used in the formula is not probable.

DO I HAVE THE NECESSARY STAFF FOR THIS NEW CONTRACT?

Full Time Equivalents (FTE), or equivalent staffing units, are commonly used instead of hours to project staffing requirements.

$$\text{FTE} = \frac{\text{Hours required for a particular task}}{\text{\# of working hours in a particular month}}$$

The number of working hours per month should include a productivity factor to determine accurate staffing requirements. The productivity factor will be one if 100% of the working hours are billed to a specific project. On the other hand, if 20% of an employee's time is spent on non-billable activities like attending meetings and filling out time cards, only 80% of that person's time is actually spent on the project. In this case, an accurate FTE calculation should include a lower productivity factor.

The productivity factor might be different for various personnel, locations, and times of year. For example, a person with both resource management and project management responsibilities often spends a certain amount of time performing human resource activities and may, therefore, have a lower productivity rate. In addition, most countries have holidays during certain times of the year, and people are frequently less productive during those times.

Along with productivity factors based on the season and personnel, there are also efficiency factors dependent on past performance that can be applied to the staffing requirement for the remaining work. If the staffing requirements for a project have been overrunning to date, using the baseline plan from the current time to completion implies an expectation that staffing performance will improve. To countermand this expectation, the CPI expressed in hours or FTEs can be applied to the remaining work to predict a more probable staffing requirement for the remainder of the project.

When analysing staffing requirements you need to make sure that all activities, including level of effort activities, are considered. You need to provide for different productivity rates per resource and per month in order to determine an accurate staffing requirement based on the hours required to complete a project. Finally, make sure that your forecasts can be expressed in FTEs to show the projected staffing requirements.

WILL LABOUR RATE AND CURRENCY EXCHANGE RATE FLUCTUATIONS AFFECT MY PROJECT'S COST?

Rate fluctuations will affect the final project cost. You need to make sure that your forecast is not using the same rates used when the baseline was created. Your forecasted rates should change with the economy. This will ensure that your final project costs accurately reflect the current environment.

Since cost of living adjustments are difficult to predict, it is helpful to have all rate escalations defined in a single rate set. This way you can define all labour rates as today's rate and change the labour rate escalation for all resources in a single place. This type of rate analysis can also be beneficial when dealing with currency exchange rates.

By using multiple "what-if" scenarios, a good EVM software package can easily and effectively allow you to analyse the effects of all types of challenges presented to today's project managers. It will allow you to use different sets of rates for each of your forecasts and to calculate foreign currencies as well. With the ability to report on multiple forecasts simultaneously, you will be able to analyse the effects of expected changes by setting up different forecasts using the various labour rates or exchange rates.

HOW WILL FUNDING CUTS AFFECT MY CASH FLOW?

When analysing a project, it is important that you are able to compare budget, actual costs and funding. Today's competitive market requires that you manage challenges such as funding cuts. If your funding is reduced, your contract may not allow you to change the baseline; however, you will need to modify your spending. If your contract requires you to earn value

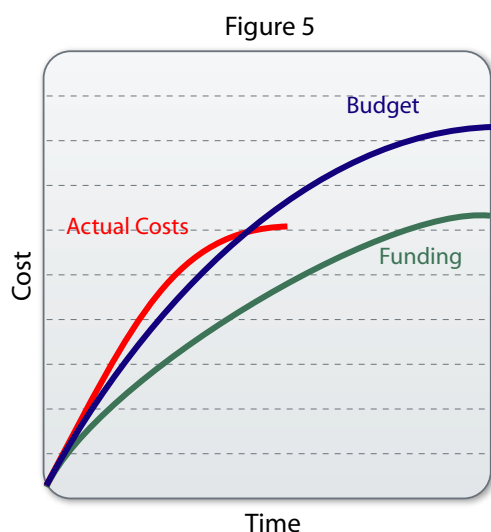


Figure 5 shows how the actual costs reflect the funding.

based on the original baseline – not the funding – you need to copy the budget and globally factor costs using pricing functions. The final outcome is the ability to store and report on both the original baseline and the funding. You can then produce reports that show the baseline, the actual costs and the funding. You are trying to make your actual costs and associated funding curves match.

WHAT IS CAUSING MY COST VARIANCE?

Many conditions cause cost variances. You need to ask yourself if your project is taking more resources to do the work than you originally planned or if the resources are more expensive than planned. To accomplish this analysis, you compare the earned rate to the actual rate and the budgeted hours to the actual hours.

The derived costs associated with earned value are not calculated using a rate file but by earning the budget hours and associated derived costs. Therefore, the earned value rate and the budgeted rate are most likely the same. However, when you examine variances, you should be analysing earned versus actual as opposed to budgeted versus actual.

For example, you might earn 100 hours and there are 100 actual hours. If your actual cost is much higher than the earned value, then you have a rate variance as opposed to an efficiency variance. The rate variance is calculated using the following formula:

$$\text{Rate variance} = (\text{Earned rate} - \text{Actual rate}) \times \text{Actual hours}$$

To calculate an earned rate, the following formula is used:

$$\text{Earned rate} = \text{EV pounds} / \text{EV hours}$$

An actual rate is calculated by looking at the posted quantities:

$$\text{Actual rate} = \text{Actual pounds} / \text{Actual hours}$$

A positive rate variance indicates that the actual rate is less than the earned rate. Rate variances are compensated for in a forecast by changing the to-go labour rate for your forecast.

If you are given an estimate to complete (ETC), the to-go labour rate is compared with the budgeted rate by calculating the to-go labour rate as follows:

$$\text{To-go labour rate} = \text{ETC (labour pounds)} / \text{ETC (hours)}$$

In addition to rate variance, there is an efficiency variance. An example of an efficiency variance is when you budget and earn 100 hours, but there are 120 actual hours. An efficiency variance is compensated for in a forecast by using statistical forecast methods based on previous performance. Multiplying the remaining effort by $1/(CPI \times SPI)$ is a good means of projecting the final cost.

Efficiency variance is calculated as follows:

$$\text{Eff. Variance} = (\text{Earned quantity} - \text{Actual quantity}) \times \text{Earned price}$$

Any time that a cost variance is incurred during a project, it is important to determine what is causing the variance. Is it a rate variance or an efficiency variance? In addition to simply changing the final project cost, the work being performed should be investigated to see if there are any means of improving the situation. Earned value gives you the early warning you need to solve problems while the work is in progress before the actual costs are above the total budget.

CONCLUSION

In today's competitive marketplace, the ability to deliver a project on time and within the agreed upon budget is imperative. Whether the contract is several months or several years in length, there is no time for games. We don't want to monkey around keeping our eyes, ears and mouths covered about problems such as cost overruns and schedule delays that can – and do – inevitably rear their ugly heads. We want to be prepared for all eventualities, and earned value gives us the early warning signs needed to accomplish our goals.

Budget versus actual cost is not enough information to properly analyse project performance. Earned value places schedule status in pound amounts for proper project analysis. It is much easier to compare budgeted pounds to earned pounds than to compare budgeted pounds to a subjective percent complete of the entire project. It is this comparison that gives early warning signs to the project's health before the actual costs are above the total budget. Therefore, an earned value management software system is the best place to retrieve valuable information needed for reliable analysis of your project's health.

We continue to work at a breakneck pace in order to satisfy our customers and remain competitive. Our companies undoubtedly live and die by the success and failure of the projects we so carefully nurture. By using earned value throughout our projects, we can identify, address and resolve problems early. This way, we can continue to work towards the improved management of those projects and greater business success as we move through the 21st century.

TEN BENEFITS OF EVMS

David Christensen's The Cost and Benefits of the Earned Value Management Process is an interesting paper that weighs the cost of implementing earned value versus the benefits. The following is the list of benefits for using an earned value management system:

- It is a single management control system that provides reliable data.
- It integrates work, schedule and cost into a work breakdown structure.
- The associated database of completed projects is useful for comparative analysis.
- The cumulative cost performance index (CPI) provides an early warning signal.
- The schedule performance index provides an early warning signal.
- The CPI is a predictor of the final cost of the project.
- EVMS uses an index-based method to forecast the final cost of the project.
- The "to-complete" performance index allows evaluation of the forecasted final cost.
- The periodic (e.g. weekly or monthly) CPI is a benchmark.
- The "management by exception" principle can reduce information overload.

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EVALUATING AN EVMS

When evaluating earned value management software, you want to make sure that the software product contains the functionality required to answer the questions outlined in this paper. Make sure you ask the vendor the following questions:

- Does this software integrate with my scheduling software?
- Does this software support multiple performance measurement techniques that allow me to objectively measure performance on my activities?
- Is there a clear distinction between a baseline and a forecast in the system?
- Can I maintain and report on multiple, time-phased forecasts?
- Can each forecast use a separate set of rates to perform "what-if" analysis?
- Can I calculate foreign currencies?
- Can rate escalation be stored separately from the base rate, and can it be adjusted for all resources in a single place?
- Does this software calculate statistical forecasts based on past performance?
- Does this software support different productivity rates per resource and per month when calculating FTE?
- Does this software calculate forecasted FTE based on past performance?
- Does this software allow me to enter and report on funding?
- Does this software contain pricing functions that allow me to globally adjust costs?

- Are earned and actual hours stored in the system in a manner that allows me to calculate price and usage variances?
- Is the result of the earned value calculations stored time-phased? This will keep my earned value in previous periods from changing if the budget changes.

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How Deltek Cobra™ Helps Satisfy the Requirements of the ANSI EIA-748 Standard on EVMS

Deltek Cobra is designed to simplify the EVMS process throughout a programme's lifecycle.

INTRODUCTION

Earned Value Management System (EVMS) guidelines incorporate best business practices that have proven to provide strong benefits for programme or enterprise planning and control. The process guide contained in this standard includes project scope definition, schedule and cost objectives. It also calls for the establishment of a baseline plan to accomplish programme objectives and use of earned value techniques to measure performance during project execution. The system described in the standard provides a sound basis for problem identification, corrective actions and change control. Cobra is designed to be the application that supports the EVMS process.

EVMS PROCESS DISCUSSION

Cobra is designed to simplify the EVMS process throughout a programme's lifecycle. This process discussion of the ANSI standard provides further information on how to apply guidelines in the ANSI standard on EVMS, taking you through each project phase in simple, step-by-step instructions. The Cobra user's guide follows these steps and offers best practice advice on each of the major processes throughout the project lifecycle.

Programme Definition

Cobra lets you structure programme data in a way that is both easy to maintain and compliant with the standard.

Scope Definition – Cobra supports the two main components of scope definition through all of the components of a WBS Dictionary – the Statement of Work (SOW) and the Work Breakdown Structure (WBS).

Programme Organization – Cobra supports the traditional control account definition of

the intersection of WBS and Organisational Breakdown Structure (OBS). Codes on the control account let you identify items such as a Cost Account Manager (CAM) or a customer WBS. The Integration Wizard lets you easily create your budget and update status from your schedule without dual data entry.

Budgeting – Resources are assigned to the activities in the schedule. Using batch processing, Cobra can automatically load labour and burden rates to maintain accuracy and consistency with your financial systems. These rates, and the calculations that define how they are applied, are secured in Cobra and applied when hours from the schedule are loaded to a cost or budget for the programme. The Cobra user's guide offers best practice tips and examples for defining resources, rates, management reserve, work authorisation, planning accounts and much more.

A work package is simply a task – A point where work is planned, progress is measured and earned value is calculated. In order to calculate earned value, work packages are defined and an earned value technique is assigned to each work package. All the earned value techniques described in the ANSI standard are available as well as many more requested by Cobra customers. Cobra also supports different implementations of the work package definition by allowing you to load one or many schedule activities into a work package and by allowing you to collect actual costs at either the control account or work package level. These options let you define how you want to implement the standard based on your company's requirements.

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Cobra's performance measurement baseline consists of time-phased control account, work package and planning package budget as well as any undistributed budget. Cobra provides an easy, flexible way to control and automatically log changes to the baseline.

PERFORMANCE MEASUREMENT

Earned value directly measures the quantity of work completed and does not reflect the quality or technical content. It is used to determine the "health" of your project. Critical path analysis and budget versus actual costs comparison do not always provide a clear picture of this concept. Earned value analysis lets you compare the budgeted value of completed work to the actual costs. Cobra provides a broad selection of reports to analyse the different metrics used in performance measurement.

Schedule Performance – Cobra stores all data time-phased, which means the budget for a period can be compared to the earned value for the same period to determine the schedule variance. It represents the value of the work that is ahead or behind schedule.

Cost Performance – To calculate the cost variance, you compare the actual cost with the earned value for a particular period. This is a measure of the costs incurred to perform the work accomplished. Cobra provides reports which isolate rate variances versus hourly variances. Is something costing more because it took longer than planned, or is it because the labour rate is higher?

Price/Usage Analysis – Similar to the rate analysis on labour, analysis of planned units versus material usage is important for projects with ongoing production requirements. This analysis lets you generate statistical forecasts based on past performance or change the forecasted rate to generate an Estimate at Complete (EAC).

Performance Analysis/Exception Reports – Earned value analysis helps you identify problems early in the project, making it possible to apply corrective action.

Cobra supports management by exception, which is an efficient way to manage a contract. This method allows you to quickly identify and direct energy to portions of the project that are experiencing difficulties. Using earned value, you can identify problem areas very early and take steps to resolve the situation or modify your forecast to reflect the outcome more accurately.

ESTIMATES AT COMPLETION

Cobra has the most powerful and flexible forecasting functions on the market. You can maintain both customer forecasts and multiple internal forecasts at the same time. This lets you update customer EAC values in a controlled method while conducting statistical forecast and giving control account managers a logical place to perform bottom-up forecasts.

REVISIONS AND DATA MAINTENANCE

Change control is critical to baseline management. The performance measurement baseline must reflect the current project objectives, and only authorised changes may be introduced. Cobra provides an efficient means of loading proposed baseline changes from the schedule. Once in Cobra, you can produce reports showing the affects of multiple changes in the system at one time and continue to produce customer reports with only the approved baseline. When you have approval for a particular change, you simply mark that particular budget data part of the baseline, and your changes are automatically logged for CPR 3 (changes to the baseline) reporting.

SYSTEM DOCUMENTATION

Once your company has established a method for proper earned value analysis, you should document your policies and procedures so the processes may be implemented and applied effectively throughout your company. Cobra is the earned value system used in the system description for many large defence contractors.

Case Studies

BAE Systems – UK Eurofighter

BAE SYSTEMS

“Open Plan and Cobra helped us to promote a cultural change on the Eurofighter Typhoon project.”

David Chard, Project Planning Release Manager with BAE Systems

BAE Systems flies high with Deltek Open Plan™ and Deltek Cobra™

Deltek enhanced its ability to provide critical earned value management (EVM) offerings to its broad project-focused customer base with the acquisition of Welcom in March 2006.

OVERVIEW

BAE Systems needed a suite of products that would help them with earned value management, scheduling, and reporting for the development and manufacture of the Eurofighter Typhoon. Cobra and Open Plan were chosen to provide BAE Systems with a consistent approach across all phases of the project including design, development, manufacture and support. These products brought about a much more efficient and effective way of working for BAE Systems.

THE NEED

In November 1988, the then British Aerospace Military Aircraft Division, as part of a four nation consortium, was awarded a multi-billion pound contract to design and develop the Eurofighter Typhoon. In 2002, the highly advanced, Mach 2-capable, multi-purpose combat aircraft became a reality as the first of 620 planned aircraft rolled off the production lines. Designed to meet the requirements of four European partner nations – the United Kingdom, Germany, Italy and Spain – the Eurofighter Typhoon has been used in both beyond-visual range and close range combat scenarios including air-to-surface attack.

Central to the successful development and manufacture of the Eurofighter Typhoon has been the use of Open Plan and Cobra project management tools, which are used to coordinate the project's schedules, budgets and resources. In its drive for operational efficiency, BAE Systems defined a need for a world-class project planning capability that was based on Earned Value Management (EVM) principles and supported by software tools. Open Plan and Cobra give BAE Systems earned value management and project-wide project scheduling and reporting.

THE RESULTS

David Chard, project planning release manager with BAE Systems, says, “Welcom’s Open Plan and Cobra provide us with a consistent approach across all phases of the project, including design, development, manufacture and support.”

Stats at a glance

Company Name

BAE Systems

Headquarters

Locations on five continents

Employees

100,000+

Primary Business

BAE Systems is the premier transatlantic defence and aerospace company delivering a full range of products and services for air, land and naval forces, as well as advanced electronics, information technology solutions and customer support services. With more than 100,000 employees worldwide, BAE Systems' sales exceeded GB £15.4 billion (US \$28 billion) in 2005.

URL

www.baesystems.com

Chard says, "The use of Cobra's embedded earned value management techniques means that project management best practice is used throughout the project. The integrated cost and schedule management system allows us to monitor and manage the costs and the progress of the project."

"However," Chard continues, "as with any project, problems still occur, but with Open Plan and Cobra, they are identified early on, enabling us to assess the impact and begin planning corrective actions."

"The project management software and associated embedded business processes – particularly EVM – have brought about more informed and accurate decision making amongst the project managers," says Chard.

"Open Plan and Cobra help us to more accurately predict the final costs and delivery dates of the project. Before, there was always a certain amount of skepticism regarding the data collected; you could never be sure how accurate it was and this made planning difficult."

"Cobra, combined with Open Plan, gives us greater confidence in the data and we can rely on it to be more indicative of what will happen in the future. Controlling the elements of risk is critical to BAE, especially if we are to keep our stakeholders fully informed at every stage," says Chard.

"Using Open Plan and Cobra helped to promote a cultural change on the Eurofighter Typhoon project," continues Chard.

"Open Plan and Cobra provide us with a consistent approach across all phases of the project, including design, development, manufacture and support," says Chard.

"The project management software and associated embedded business processes – particularly EVM – have brought about more informed and accurate decision making amongst the project managers. They now have timely access to the facts and are able to use these to predict future performance!"

Chard says, "In my experience as a project manager, EVM has always been viewed as a mystical art, when in fact it is just plain project management good sense. Over 170 staff have now received detailed process and tool set training, with a further 700 receiving awareness training."

BAE Systems uses the Baan Enterprise Resource Planning System for purchasing, finance and manufacturing, and its integration with Open Plan and Cobra was key.

Activities such as designing, tooling and manufacturing are planned in Open Plan and then passed to Cobra where the budget and baseline are defined. Finally, this information is sent to Baan to authorise work and capture actual costs. In effect, the project management solution drives Baan. Automated costs and progress data from Baan is sent back to Cobra in order to calculate the earned value element needed to perform forecasting, as well as cost and schedule variance analysis. Open Plan and Cobra are crucial to what happens on the shop floor.

Based on the successful implementation of a number of change projects, including Open Plan and Cobra on the Eurofighter Typhoon project, BAE Systems has developed a change management framework that provides a phased and structured approach to the management of change. This covers not only the IT elements but also the more difficult "softer" issues such as sponsorship, communications and leadership.

Future deployments of Deltek products will use this framework to ensure effective management through the lifecycle of the deployment.

THE CHALLENGE	THE SOLUTION	THE DELTEK ADVANTAGE
<p>BAE Systems needed a suite of products that would help them with earned value management, scheduling and reporting for the development and manufacture of the Eurofighter Typhoon.</p>	<p>Cobra and Open Plan were chosen to provide BAE Systems with a consistent approach across all phases of the project including design, development, manufacture and support.</p>	<ul style="list-style-type: none"> • Cobra and Open Plan have helped BAE Systems integrate their cost and schedule management systems • Open Plan and Cobra improve final cost predictions and delivery date accuracy for their projects • There is an improvement in cost and business awareness

“In summary, Welcom’s project management tools have provided the BAE Systems management of the Eurofighter Typhoon project with more than just a reporting mechanism,” says Chard.

“It has brought about a much more efficient and effective way of working. The data quality continues to improve, and EVM is firmly embedded into the Eurofighter Typhoon thinking. There has been an improvement in cost and business awareness, and everyone is now talking the same common project language.”

THE FUTURE

The future for BAE Systems in the UK may be Deltek’s web-based project collaboration tool, WelcomHome. BAE Systems Australia, long-time users of Open Plan and Cobra, has already chosen the next generation of Welcom’s project management tools for their project collaboration needs.

“This is the next step for us to consider,” concludes Chard.

“In my experience as a project manager, EVM (earned value management) has always been viewed as a mystical art, when in fact it is just plain project management good sense. Over 170 staff have now received detailed process and tool set training, with a further 700 receiving awareness training,” says Chard.

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ALSTOM Transport Ltd.



Deltek Open Plan™ and Deltek Cobra™ help ALSTOM Transport Ltd. stay on track

Deltek enhanced its ability to provide critical earned value management (EVM) offerings to its broad project-focused customer base with the acquisition of Welcom in March 2006.

OVERVIEW

ALSTOM Transport Ltd. needed a consolidated project management system that would help with the planning and production of trains, components and transport systems. Open Plan Professional, Open Plan Desktop and Cobra were chosen for their flexibility and more advanced reporting capabilities. ALSTOM has not only simplified its business with the use of Deltek's tools, but plans to roll out Open Plan across sister companies worldwide. With more than 1,000 power cars, 5,700 carriages, 1,600 light rail vehicles, 30,000 electric locomotives and 4,500 double-check train sets operating in seven countries, ALSTOM has chosen project management tools by Deltek to help them stay on track.

THE NEED

ALSTOM Transport Ltd. not only manufactures rolling stock, but also provides full rail transport signaling systems, sub-systems and equipment components. At ALSTOM's plant in Birmingham, United Kingdom, trains are assembled for customers worldwide. Currently it supplies trains for the Virgin Trains West Coast Main Line and London Underground's new Jubilee Line.

"Business has changed since the days of British Rail," says Matt Bowman, finance manager at ALSTOM Transport Ltd. "Today, customers are concerned with quick turnarounds, faster deliveries, higher train specifications and customised appearances."

Because each customer has specific design requirements in mind, it is impossible to build up a stock of trains. The Birmingham facility's main role is to assemble the trains with parts manufactured by ALSTOM's sister company in France and various third-party manufacturers.

With ALSTOM producing one in four trains operating in over 50 metropolitan cities worldwide, producing trains is no longer all about heavy machinery and manufacturing methods. More and more, planning is a key component.

"Open Plan has replaced all other planning tools in the organisations."

Matt Bowman,
Finance Manager
at ALSTOM

Stats at a glance

Company Name

ALSTOM Transport Ltd.

Headquarters

France

Employees

69,000

Primary Business

ALSTOM delivers systems, equipments and services that shape the future of electricity generation and rail infrastructure, and directly impact the living and working conditions of people across the world.

URL

www.alstom.com

ALSTOM's biggest production challenge is coordinating the activities involved so the trains can be assembled efficiently and delivered on time. To coordinate its activities, ALSTOM uses a matrix management system consisting of a functional axis and project axis.

"The functional axis consists of standard departments, including finance, human resources and engineering, while the project axis assigns team members from each department to the project," says Bowman.

This keeps the long-term traditional department structure and skills in place throughout relatively short-term projects.

The ALSTOM matrix system is complex enough to manage, but as Bowman has learned in the past, factoring different project management solutions into the equation at the same time can create a nightmare.

"Traditionally, departments had their own planning systems," explains Bowman. "Each department used a different project management tool. Consequently, the planners, engineers, sourcing people and operations personnel would have their own individual plans for the project, and all those plans never really dovetailed. The result was complete chaos."

THE BENEFIT

"Implementing a single project management package was the solution. After evaluating several project management packages, ALSTOM chose Welcom's Open Plan for its flexibility and reporting capabilities. Open Plan was more flexible," says Bowman. "More importantly, its reporting capabilities are more advanced than other software programs in its league."

"Open Plan has replaced all other planning tools in the organisation, giving the staff one system to use and allowing them to have a single plan that is accessible to everyone. Teams can still manage their part of the plan, but now that part is integrated into one global plan for the project."

THE FUTURE

ALSTOM selected a package made up of three Deltek products. Open Plan Professional (OPP) helps planners establish and manage whole projects, as well as resources across multiple projects. Open Plan Desktop (OPD) allows auxiliary staff to view the parts of the project in which they are involved, and to modify selected areas. Cobra integrates with Open Plan and is used for financial reporting and modeling projects.

Deltek products were also chosen for their integration capabilities with popular enterprise systems. "The other big system we use is Materials Requirement Planning (MRP)," says Bowman. "Baan is our MRP vendor, and we are very pleased that the Welcom and Baan systems work together."

To ALSTOM's surprise, Open Plan made the MRP system easier to use. "Baan MRP has a 'planning board,' which enables us to schedule deliveries so we can operate 'just in time' manufacturing if we need to," says Bowman. "But Baan's planning board can be difficult to use. As a result, much of our material delivery systems were rather inefficient. The good news is that Open Plan interfaces with MRP, making the Baan system much easier to update. This will greatly benefit our organisation in scheduling deliveries."

With the success of this implementation, Bowman looks forward to having Open Plan rolled out across ALSTOM's sister companies worldwide. ALSTOM Birmingham has already worked with another Open Plan user, Fiat, on the Virgin Trains rolling stock, and can see the enormous operational benefits of standardising across the company.

THE CHALLENGE	THE SOLUTION	THE DELTEK ADVANTAGE
<p>ALSTOM Transport Ltd. needed a consolidated project management system that would help with the planning and production of trains, components and transport systems.</p>	<p>ALSTOM has chosen project management tools by Deltek to help them stay on track.</p>	<ul style="list-style-type: none"> • Provides a single plan that is accessible to everyone by using one system • Reduces confusion and time management inefficiencies • Allows team members to manage individual parts of the plan with the integrated global plan for a project

“When we show how well the system is working here, other countries will be interested in its advantages,” he says. “By establishing the groundwork, designing the system correctly and understanding our business needs as well as the needs of the users, implementing Welcom’s products was simple. If only all things in life were that simple.”

With high-speed rails on three continents, ALSTOM relies on tools, such as Open Plan and Cobra, to help keep life simple. After all, the ultimate goal is to keep approximately 70,000+ ALSTOM-built trains on track worldwide.

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Magneti Marelli

Project portal drives success at Italian Automotive Supplier

THE CHALLENGE

Cofap Automotive Suspension (C.A.S.) R&D division lacked a central project management system and found it a challenge to capture accurate actual costs for its many projects. With a typical time-to-market schedule of just 24 months, the division needed to optimise its project management activities and gain visibility into its complex project costs. C.A.S. decided to create just one system and data repository for the whole department that integrated all project and cost information.

C.A.S.'s R&D division in Italy has approximately 50 projects ongoing at any given time. Each project represents a particular car model and requires a combination of internal and external labour resources. With increasing pressure on C.A.S. from the carmakers to meet aggressive delivery schedules, keeping track of project status and costs is a must. "We typically plan our R&D projects starting from the end date and work backwards," explains Maurizio Catena, information technology solution consultant at Magneti Marelli. "The carmaker gives us the delivery date and we have to be sure that we meet that date."

When Catena and his team were brought in four years ago to improve project management in the R&D Division, they faced numerous challenges. First, there was no central project management office. "Project managers are heavily involved in the technical side of the projects and do not have a lot of time to spend on project management," states Catena. "But we needed to find a better solution because data was scattered in copies of Microsoft Project® and Excel®, which meant that the finance department did not have the same numbers as the project managers!"

Consistent status reporting was also a problem due to a lack of standardisation. "To get a departmental-level view of status, the R&D manager had to call each project manager for an update. He would receive lots of documents, each in a different format with different colours, graphs and scales," remembers Catena. There was a lot of guesswork involved in creating an overall, cross-project picture.

The same was true for capturing actual costs. "We have different types of projects, each with different classifications of work packages. About 50% of our resources are external making it more difficult to manage. Plus, we have different types of billing for different projects. So project organisation is complex

"We now have a good situation where the project managers each present the same type of report every month and the direction of their individual project is clear."

Maurizio Catena,
Information Technology
Solution Consultant with
Magneti Marelli

Stats at a glance

Company Name

Magneti Marelli

Headquarters

Corbetta, Milano, Italy

Primary Business

The Magneti Marelli Cofap Automotive Suspension Research and Development department develops and supplies Suspension Systems and Modules and Shock Absorbers to car makers worldwide. The R&D department participates in suspension design, calculation, vehicle dynamics simulation, prototyping, benchmarking, cost analysis and project management, and activities also include bench testing laboratories, on vehicle testing.

URL

www.magnetimarelli.com

and capturing accurate actual costs was a challenge," says Catena.

Catena and his team were given the goal of finding a solution that could be used to manage all projects, without exception. They set out to design and implement an integrated system that would deliver the data and reports needed by the R&D manager and financial controller, but would be as simple and time-efficient as possible for the busy project managers. Key objectives included the ability to control development costs, scheduling and resource allocation and to manage budgets, actual costs and forecasts.

They started by defining user requirements and mapping C.A.S.'s unique project organisational structures. "To get the right data, you must have an accurate model of the project organisation," explains Catena. "We wanted to create just one system, one data repository and a standardised approach to project organisation. We decided on a portal approach."

With this vision in mind, it became a question of finding the right tools. The project managers were already using Microsoft Project and this component had to stay. "We were asked not to change the scheduling system because everyone knew it. And so we needed to find tools that could integrate with Microsoft Project, help us solve our costing and timesheet problems and bring it all together in a common point of access."

THE SOLUTION

WelcomHome, Cobra and TimeControl® were chosen as the other three components of the solution named the Multi-Project Management (MPM) system.

"We chose Cobra as the engine to give us a consistent cost model of projects, cost accounts, cost classes and resource breakdown structures," says Catena. Cobra allows C.A.S. to load non-labour costs from its ERP system at a summary level, bring in actual hours from the MPM system

at a detailed level and then perform target costing and forecasting for all projects.

A portal approach was important to keep the system as simple as possible and to avoid users having to learn multiple tools. "We chose WelcomHome as the project management portal because it could provide a single point of access for all the people that work on R&D projects. We particularly appreciated the high level of customisation that it allowed and the general architecture of the system. It has allowed us to integrate different databases and create the reports that we need," says Catena.

THE BENEFITS

WelcomHome has become the core of the MPM system and is now used by the R&D manager, project managers and financial controller. It also acts as the front-end to the other three systems: using WelcomHome, project managers can set up the necessary charge accounts in Cobra, view project schedules from Microsoft Project and authorise actual hours logged in TimeControl. This single interface greatly simplified the system and improved user acceptance.

At the outset of the project, Catena and his team had worked with the R&D manager and financial controller to define a common methodology and standards for reporting. Now that the system is live, it is paying dividends.

"All our reports are in WelcomHome and have been customised to reflect the C.A.S. methodology," says Catena. "The important reports are the Actual Hours Report, Chart Reports – which monitor by work package – and Summary Reports by Project Type and Invoicing Type. This data comes from a combination of Microsoft Project, Cobra and TimeControl."

"We are seeing the biggest results in the monitoring and control of actual hours," he continues. "The key for us is standardisation. Project managers can check the hours billed

THE CHALLENGE	THE SOLUTION	THE DELTEK ADVANTAGE
<p>Magneti Marelli's Cofap Automotive Suspension (C.A.S.) R&D division lacked a central project management system and found it a challenge to capture accurate actual costs for its many projects.</p>	<p>Deltek WelcomHome and Deltek Cobra were two of the three components of the solution named the Multi-Project Management (MPM) system Magneti Marelli chose.</p>	<ul style="list-style-type: none"> • Deltek Cobra allowed Magneti Marelli to perform forecasting on all projects • Deltek WelcomHome helped Magneti Marelli integrate disparate databases and create custom reports • Magneti Marelli has consistent, accessible project information across the entire enterprise

against their projects and approve them. Now, 99% of the hours are billed correctly."

A particularly powerful report is the Chart Report, which graphs target budget against actual hours. This report makes it very easy for the project managers to see how they are performing and for the financial controller to monitor costs. Another report compares the commercial budget with the actual hours budget, allowing the R&D manager to track profit margins.

There is no longer guesswork when it comes to departmental-level status reporting. "We now have a good situation where the project managers each present the same type of report every month and the direction of their individual project is clear," says Catena. "Before we had this system, when the project people and the R&D controller spoke to each other, one would say 'budget' and the other would understand it as something else." Now everyone is speaking the same language.

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General Dynamics Land Systems (GDLS)

GENERAL DYNAMICS

Deltek puts GDLS on the Road to True Cost and Schedule Integration

Deltek enhanced its ability to provide critical earned value management (EVM) offerings to its broad project-focused customer base with the acquisition of Welcom in March 2006.

THE CHALLENGE

Manufacturing Light Armored Vehicles (LAV) for governments around the world is serious business that demands powerful scheduling and cost management software. Not many software packages would be up to the task, but the leading global producer of LAVs – General Dynamics Land Systems (GDLS) – chose Open Plan to manage its defense operations projects.

Since the early 1990s, GDLS has held several major defence contracts for manufacturing LAVs. Each has required considerable effort in the proposal development phase, and the existing tools – low-end scheduling and spreadsheet software – proved to be inadequate. A new, high-end pricing package that consolidated data into one database solved part of the problem, but GDLS had no system to develop a resource loaded schedule for baseline proposal data.

While searching for the scheduling solution, GDLS hired three new team members who had used Open Plan with a former employer. Their positive experiences with Open Plan became the basis for evaluating, and ultimately implementing the system. With its shared resource pools, calendars, code files and report templates as well as shared project and ancillary data housed on the network, Open Plan proved to be a highly integrated, comprehensive package fully capable of supporting the size and complexity of GDLS projects. The only problem was that the existing pricing package proved cumbersome when it came to transferring Open Plan baseline and status information. GDLS needed a powerful yet flexible pricing solution compatible with Open Plan.

Because of hardware limitations and complex interfaces with cost systems, GDLS used a homegrown cost reporting solution that relied upon a relational database to incorporate budget, status and actual cost data. That system proved adequate for a few years, but it required constant troubleshooting. Reporting was limited to work hours only, and the software lacked forecasting capability beyond manual estimates.

“Open Plan and Cobra have given us the tools to eventually achieve true cost/schedule integration,”

Janice Floody, Project Management Team Leader and GDLS Associate Administrator

Stats at a glance

Company Name

General Dynamics Land Systems (GDLS)

Headquarters

Sterling Heights, MI

Employees

72,700 worldwide

Primary Business

GDLS is a wholly owned subsidiary of General Dynamics Corporation. The company designs and builds armored vehicles and subsystems for the U.S. Army, U.S. Marine Corps and international customers, and is the defense industry's largest supplier of armored military vehicles.

URL

www.gdls.com

THE SOLUTION

GDLS began using Deltek Cobra for proposal pricing in the mid-1990s. In 1998, Cobra was the logical choice for its cost performance reporting solution for several reasons. The system had proven its ability to integrate proposal pricing, cost and schedule data as well as work, organisational and resource breakdown structures. In addition, the pricing team was familiar with it. Plus, like Open Plan, it supported high-end Earned Value Management Systems (EVMS) capabilities compliant with the U.S. government's requirements for cost and performance tracking.

Like Open Plan, Cobra supported high-end EVMS capabilities compliant with the U.S. government's requirements for cost and performance tracking.

The next step was to replace GDLS's "black box" method of loading baseline data from Open Plan with a direct link to Cobra. "At that time, we were using the homegrown approach because we weren't fully committed to a single person in the organisation being responsible for multiple cost account resources," explains Janice Floody, project management team leader and GDLS associate administrator in London, Ontario. "So we translated Open Plan data to separate the cost accounts before loading them into Cobra. Now with a true matrix structure and single cost account manager, we can use the direct load approach."

THE BENEFITS

According to Floody, the standard Cobra reports have been well received by internal customers, and confidence in earned value calculations has soared. Previously, these figures were the result of a complex set of manual steps.

As the system works now, Cobra is installed on the pricing and programme analysis group server with executable files loaded on each workstation. Once the work breakdown structure and cost class breakouts are defined according to programme requirements, GDLS loads a skeleton into its Basis of estimate Input Device (BID) system, which collects labour, travel and other direct cost estimates.

"Using the system's global editing capability, we can then filter and manipulate the data into formats suitable for distribution to various team members and management." Gary Caryn senior scheduler/coordinator, Diesel Division General Dynamics Land Systems.

When the basis of estimates are complete and reviewed, travel and other direct cost information is loaded into Cobra. Labour estimates are also taken from the BID system and fed into the schedule, which can be modeled in parallel with BID entries. Then the pricing team inputs elements such as manufacturing, labour and bill of material estimates.

"When the resulting histograms are approved, pricing links to the data," says Steve Toll, GDLS senior scheduler/coordinator and one of the three employees who originally recommended Open Plan. "At this point, we form our baseline for budgeted cost of work scheduled and establish a price for review."

Sometimes the process involves several phases of corrections and negotiations, but eventually a baseline budgeted cost of work scheduled is established. The programme analysis team uses these numbers during the performance phase. Then, the scheduling group feeds the monthly budgeted cost of work performed from the updates provided, and individuals charge the associated work orders to arrive at actual costs of work performed.

THE CHALLENGE	THE SOLUTION	THE DELTEK ADVANTAGE
<p>General Dynamics Land Systems (GDLS) needed a highly integrated, comprehensive software package that was fully capable of supporting the size and complexity of its defence operations projects.</p>	<p>Deltek Open Plan and Deltek Cobra were chosen so General Dynamics Land Systems could achieve the goal of automating their entire project management system.</p>	<p>Deltek's products gave General Dynamics Land Systems the tools it needed to eventually achieve true cost and schedule integration.</p>

“Being able to compare budgeted cost of work scheduled, budgeted cost of work performed and actual costs allows the programme analysis team to generate cost/schedule status reports at the programme and enterprise levels,” explains Gary Caryn, GDLS senior scheduler/coordinator. “Using the system’s global editing capability, we can then filter and manipulate the data into formats suitable for distribution to various team members and management.”

But when it comes to fully automating complex defence projects in an environment with the depth and breadth of GDLS, software is only part of the story. Real cost/schedule integration is an

ongoing process that also requires collaboration and coordination between engineering, project management and finance.

“Open Plan and Cobra have given us the tools to eventually achieve true cost/schedule integration, but our ongoing challenge is to set up a process that supports it,” concludes Floody. GDLS intends to automate their entire project management system.

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Third Party Documents

THIRD PARTY DOCUMENTS

The following links are provided to help you understand new regulations.

UK

MOD Acquisition Management Services (AMS) Earned Value Website

<http://www.ams.mod.uk/ams/content/docs/evm/index.htm>

DPA Earned Value Mandating Strategy

<http://www.ams.mod.uk/ams/content/docs/evm4/strat.pdf>

USA

The National Defense Industrial Association (NDIA) ANSI EIA-748 Intent Guide

<https://acc.dau.mil/CommunityBrowser.aspx?id=19533>

Final FAR Ruling

<http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/06-5966.htm>

News Article: Acquisition councils finalize EVM rule

http://www.gcn.com/online/vol1_no1/41240-1.html

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