



Project Services Pty Ltd

EARNED VALUE BUSINESS MANAGEMENT

By

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ABSTRACT

Earned Value Business Management:

Managers working in a business environment where key processes have been outsourced are battling to retain control over projects they are responsible for delivering/funding. The key issue they confront is their lack of direct authority to control the destiny of the project. This is caused in part by their lack of visibility of many key commercial processes and in part by the outsourcing model itself.

Many levers previously used by project managers to control vendors working on their projects (eg hiring/firing authority, options for future work, payment provisions, knowledge of contracted rates, etc) have been taken away from the project managers working within the 'client business' and subsumed into an overall 'outsource' agreement.

To succeed in this environment, project managers need to use new techniques to regain effective control of their projects. One of the most effective is to harness the power of Earned Value Analysis to create a high level of visibility (particularly early in the project) and to use the persuasive power created by the regular reporting processes to regain control.

This process must be implemented with a blend of psychology and technology to obtain the maximum benefit and should focus on helping the vendors become effective and profitable. In an outsourced environment, the clients project managers can only achieve success by making their outsourcing partner successful.

INTRODUCTION

There are a number of established processes and techniques drawn together in this paper, none of which are particularly new. What is relatively new is the bringing together of these techniques in a structured way to assist with the management of projects in the relatively new and complex environment created by the outsourcing of core business processes.

- The first part of the paper sets the scene by critically analysing the new outsourcing process and comparing it with more traditional outsourcing and subcontracting processes.
- The second part of the paper looks at control and reporting techniques that can add significant insight to the project management process, (the paper assumes a relatively high level of prior knowledge of Earned Value techniques).
- The final section discusses how the power of the planning and monitoring processes can be utilised to regain (or maintain) control of outsourced projects.

THE OUTSOURCE PROJECT ENVIRONMENT

This overview of the outsourcing process presents the ‘worst case’ scenario. Whilst it is acknowledged that very few outsource situations encompass all of the issues discussed below, I would suggest that many of the elements are present (at least in part) in almost all outsourced environments and contribute significantly to the difficulty of successfully delivering projects.

Outsourcing of peripheral activities

Many businesses and departments initially sought enhanced operating efficiencies by outsourcing significant sections of their business to other organisations. Most of these outsourced areas were processes peripheral to the businesses main function, eg transportation and warehousing in the retail industries and office cleaning in most businesses. Typically these contracts have been relatively successful and any changes made in the business and/or the outsource operation had little direct impact on the other half of the partnership. Typical examples are: -

- Receiving, storing and shipping pallets of one type of breakfast cereal is much the same as another. Therefore changes in the products retailed by a grocery chain have little direct impact on the logistics company.
- Changes in the outsourced warehouse’s conveyor system do not impact on the retail shops (as long as the goods are still being shipped on schedule).

Both sides of the outsource agreement rely heavily on the efficient performance of the other for their own success but their internal processes are largely independent of each other.

Subcontracting of activities -v- outsourcing

Outsourcing differs significantly from traditional subcontracting and cannot rely on translating learned experience from ‘subcontracting’ industries directly into an outsource model. Traditional

subcontracting industries (eg construction) hire or contract subcontractors for specific jobs. Compared to most outsourcing contracts, subcontracts are: -

- For a much shorter period (months -v- years).
- For a much more clearly defined scope of works, usually for a single trade on a single project -v- a complete service for an entire business.
- Rely on the main contractor for most of the subcontract coordination and on-site management -v- the outsourcing of a complete service including its management

In the subcontracting world, it is relatively easy to replace a poorly performing contractor and the incentives of winning the next contract act as a powerful incentive for the subcontractor to perform. However, it must also be noted, the courts are full of disputes between subcontractors and main contractors; suggesting management processes in these industries are still far from perfect.

Outsourcing of complex core activities

A more recent trend has been towards the outsourcing of complex, core internal processes that are central to, and closely integrated with, the performance of the business unit. Whilst IT is not the only sector that falls into this category, the outsourcing of a business's IT functions is typical of this type of outsourcing and will be the focus of this paper. However, whilst IT is used as the prime example in this paper, the solutions proposed should be applied generally.

The outsourcing of complex processes such as IT can appear very attractive to the owner and/or senior managers of a business. Most businesses that have adopted outsourcing have found internal control and management of their IT requirements (and budgets) to be very difficult. They looked to outsourcing as a way to buy in expertise and minimise their exposure to risks they did not fully understand and could not effectively control. Most organisations also sought, and appeared to gain, significant cost savings as a result of their outsourcing processes. Recent studies have suggested many of the expected savings have failed to eventuate (Ref. KPMG/Nolan Norton Institute survey and others - this is a separate topic not covered by this paper).

Senior management also appears to be starting to recognise that the outsourcing of complex, core processes create a unique set of challenges that are significantly more complex than either the subcontracting or peripheral outsourcing models discussed above. This increase in complexity carries with it a correspondingly higher risk profile where project failure can directly impact the capability of a business to function effectively. Leading organisations are combating this increased risk profile by redeploying their staff as internal 'project managers' to manage (or overview) projects being undertaken by their outsourced contractors.

Any significant change in the functions or process undertaken by most businesses (both government and private) requires a corresponding change in its IT infrastructure. Similarly, any shortcomings in the functioning of the IT system as a whole impacts on the functioning of the business. Whilst this statement may appear simplistic, it is at the centre of many of the problems being encountered in outsourced environments. The situation is compounded by the problem that IT tends to be an area many senior managers do not fully understand. Engineers run engineering businesses, accountants and financiers run banks and career bureaucrats run departments. Very few top managers and directors of businesses and departments (outside of the IT industry) have an IT background.

For these managers and their businesses, the attraction of outsourcing included: -

- The appearance of better controls and predictability over expenditure and budgets.

- The import of a layer of IT management skills from the outsourcer presumed to be missing from their business.
- The promise of better project delivery (time / cost / quality).
- A promised reduction in costs with long term savings.
- The removal of a difficult HR area from the business with high staff turnovers, high wage costs and general skills shortages. This was particularly significant during the Y2K/GST period but may not be as important an issue now.

As mentioned above, most surveys of IT outsourcing to date suggest the process has failed to deliver on its promises. The primary reasons can be summarised as follows: -

- The tendering and contracting processes were flawed (see below).
- The management effort required to manage the outsource contractor was grossly underestimated (see below).
- The contractors tendering for the work being outsourced did not fully understand the business of the client.
- All parties *chose* to underestimate the requirements for on-going change in the IT systems and infrastructure and the need to introduce totally new technologies and processes to meet changing business needs.
- The competing loyalties of middle and lower management working for the outsourcer. When the chips are down do they do the right thing by their client or the right thing by their employer?

Issues caused by the outsourcing contract process

During the tender and contracting phase of many outsourcing contracts, the people driving the process from the clients end were briefed to achieve the best (lowest) cost outcomes and to achieve a signed contract by some predetermined date. The teams generally consisted of contract and legal experts; they were not the users of the service being outsourced. On the other side, the bidders needed as much certainty as possible to allow their price to be dropped as low as possible to win the bid in a competitive environment. **AND** both parties want a long-term, stable and predictable outcome to justify their involvement in the process.

Contrast these requirements with the ‘problems’ the in-house IT department was dealing with: -

- A user base who were used to changing their specifications and requirements on a regular basis.
- Senior management who do not understand the intricacies and complexities of IT.
- Long term and short term business objectives in a constant state of flux (to stand still in today’s world is to go backwards).
- A business and technological environment where the rate of change is increasing all of the time.

The consequences of the mismatch between the outsourcing objectives being ‘achieved’ by the outsourcing team and the business objectives the In-house IT department was meeting (or attempting to meet) are still to wash through the business community. But it is within this complex environment that managers are required to deliver new IT projects. Many of these projects are essential for the efficient operation and/or survival of their business unit.

Issues caused by retaining insufficient In-house management

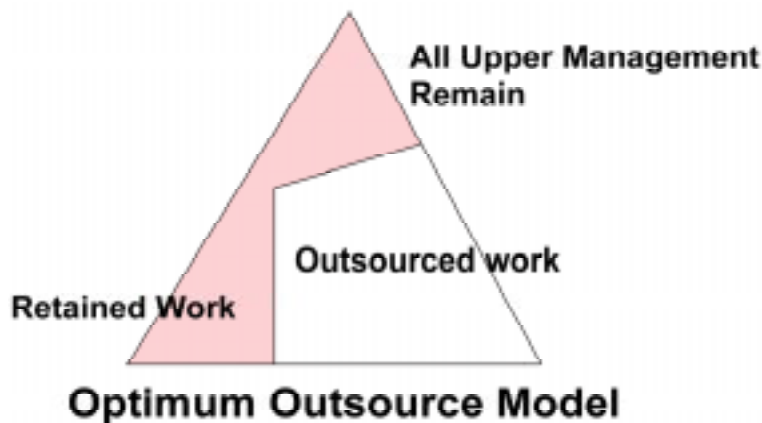
Many businesses have made major cuts in their technical and middle management as a consequence of the outsourcing contract. This reduction in capability can only be justified on the assumption that the outsourcer's management will place the interests of their client ahead of the interests of their own employer. Whilst this assumption may prove to be the case in the short term (particularly during the 'honeymoon' period) it contradicts the experience of most other industries.

A good client sets out to proactively manage the environment in which its contractors operate to ensure the maximum return on the monies being invested by both parties. The client's knowledge of the process being contracted should be close to that of the contractor and the client's ability to provide its contractors with effective instruction and guidance is essential. The analogy from general management is that a person can delegate authority to more junior staff, but not responsibility.

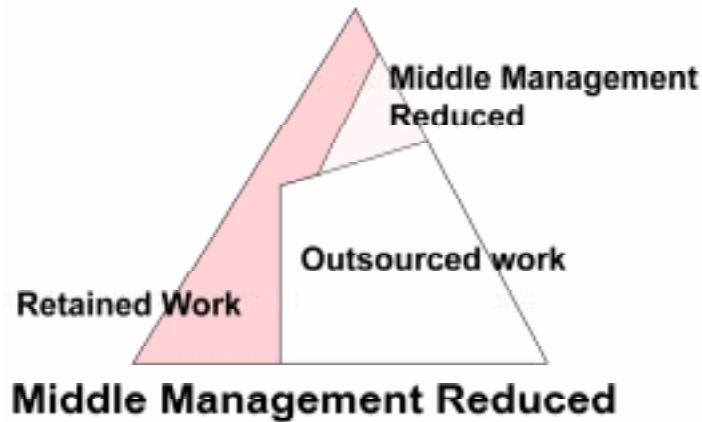
Experience from a range of industries (eg construction) suggests the numbers of managers required to deal effectively with an outsourced or subcontracted workforce are similar (or possibly greater) than those required to manage a similar number of direct employees. There are typically a number of changes in the management profile within the client organisation: -

- The type of management discipline changes (ie fewer HR Managers, more Contract Managers).
- The overall number of managers and support staff remain steady. BUT:
- The required skill sets are different and there is often the need for a higher level of knowledge and experience required to deal with the outsourcing issues.

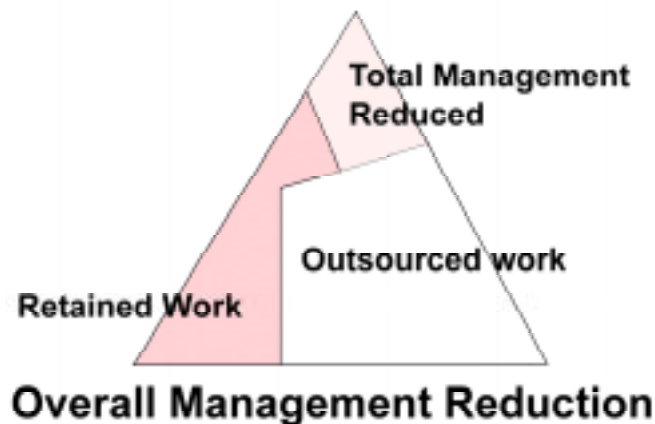
This distribution of effort can be visualised in a typical management hierarchy as the 'Optimum Outsource Model' below: -



Unfortunately, to achieve the mandated savings many outsource models have been justified on the basis of a major reduction in middle management. The effect (or impossibility) of this reduction usually becomes apparent after the outsource contract has been running a few months. The client organisation progressively loses visibility, knowledge and control of the outsource contract as its own management structure diminishes. This situation may be acceptable as long as the outsource contract contained an accurate statement of all of the requirements of the client organisation and nothing changes. As soon as circumstances change and/or shortcomings in the contract are identified, the lack of capability in the client organisation places both parties to the outsource agreement at a significant disadvantage and drives up costs all round.



The worst scenario is to attempt to achieve cost savings in the client organisation by an across-the-board reduction in all levels of management. These reductions are often driven by a standard hierarchical ratio based the reduced number of staff remaining within the client organisation (eg the removal of 70 non management staff means 10 supervisors are removed therefore 2 middle managers are removed, etc). This scenario is uncommon when the functions being outsourced are corporation wide or head office processes, but is surprisingly common where the outsourced function is a process controlled or managed by departments, sections or branches. The consequence of this strategy is to promote relatively junior staff into line management positions that are significantly beyond their levels of experience. This places the client's staff at a significant disadvantage compared with the outsource organisation. Again the long-term consequence is to drive up costs for all parties to the agreement as decisions are delayed and control and direction are lost.



The risks associated with the reduction of internal management capabilities are a major problem for both sides of the outsourcing agreement. Whilst it is an important issue, it is not the prime focus of this paper, apart from noting the inevitable impact on the organisation's ability to deliver new projects through the outsourced arrangements.

Outsourcing summary

Many organisations are responding to the issues identified above by employing 'project managers' under many different names and guises to coordinate the interface between the outsource contractor and their internal business units in an attempt to regain both visibility and control over their own

destiny and to provide the outsource contractor with the information, decisions and support needed to deliver the required projects on time and within budget.

This new breed of IT Project Manager is operating in a far more complex environment than was previously the case when IT was an internal function. In particular, the constraints imposed by the outsourcing agreement effectively prevent the use of many of the traditional tools and techniques previously used in the IT industry (eg hiring/firing authority, options for future work, accelerated or delayed payment provisions, knowledge of contracted rates, etc). The purpose of this paper is to suggest one method to regain a degree of effective control.

THE NEED FOR EARLY VISIBILITY

One of the major issue confronting project managers trying to control a project being undertaken by an outsource contractor is the lack of visibility of actual progress during the critical early stages of the project (and of each project phase). Delays and slippages become obvious later in the project/phase when key dates for deliverables are missed but by then, the opportunity to make good the losses has often been missed.

Research in the USA during the first part of the 1990s on major defence contracts indicates that trends established early in a project are very unlikely to change later. D. S. Christensen & S. Heise (1993) sampled 155 defence projects that were using C/SCSC for reporting progress (cost performance) to the Department of Defense. Their report found that the 'Cost Performance Index (CPI)' on these projects did not change by more than 10% from the net cumulative value measured at the 20% completion point through to the completion of the project. When the CPI did change, it usually got worse.

The options to reverse negative project trends are limited. Project audits and reviews simply consume more time and resources. Adding more people seldom helps; to quote 'Brooks Law' - 'Adding more resources to a bad project will make matters worse' (ref. Brooks – The Mythical Man Month). Changing the project team simply recreates all of the initial 'Start Up' issues discussed in Mosaic's paper entitled: 'The Project Start-Up Conundrum' (P. Weaver & L. Bourne 2001).

One thing is certain, however, reversing a negative trend becomes progressively more difficult the longer it is allowed to develop. This is caused in part by the setting of expectations in the minds of the project team as to what is 'normal' in respect of progress and achievement. The other cause is the degree of change required to alter the outcome. Weaver & Bourne have described this second issue as 'The Mathematics of Losing'.

The 'Mathematics of Losing'

The reason negative trends persist is demonstrated by the 'Mathematics of Losing'. Most managers are not too worried if a project is 'only' losing a day or so per week during its early stages, however, the increase in productivity needed to stop and reverse this trend is very significant as is demonstrated below. The example uses the Schedule Performance Index (SPI) as its measure of progress: -

- The current Project Status shows an SPI of 0.8, this translates to a production rate of 80% or in colloquial terms, the project is losing 1 day per week (based on a 5 day week).
- To simply stop losing time, the SPI on all future work has to be increased to 1.0, this represents an increase in the SPI of 0.2 which is the same as saying: -

- The rate of production must increase by 25% (0.2 / 0.8)
- Every worker on the project needs to produce an additional 1.25 days worth of production each week
- To recover the losses incurred to date (ie to bring the project back onto schedule) in the same timeframe (from now) as it took to incur the losses the project needs to reverse the loss and achieve an equivalent amount of gain. This means the SPI needs to increase to 1.2, (an increase of 0.2 (to stop losing more time) plus another 0.2 to recover existing losses) which represents an increase in the SPI of 0.4 from its current base. This is the same as saying: -
 - The rate of production must increase by 50% (0.4 / 0.8)
 - Every worker on the project needs to produce an additional 2.5 days worth of production each week (or a total of 7.5 days of production per week!)
- To recover the losses incurred to date in the half the timeframe it took to incur the losses (eg the project has been running for 8 weeks and we will 'catch up' this month!?) the SPI needs to increase to 1.4. This represents an increase in the SPI of 0.6 which is the same as saying:-
 - The rate of production must increase by 75% (0.6 / 0.8)
 - Every worker on the project needs to produce a total of 8.75 days of production per week!
 - Under most circumstances this is patently impossible!!

As noted above, reversing a project trend is not easy: -

- Simply adding more resources to the project will usually make matters worse (ref. Brooks – The Mythical Man Month).
- Replacing the under performing team with a new one simply regenerates the whole 'Start-Up' Conundrum.
- Audits and reviews initially cause more delay.
- Doing nothing is not an option ('If you keep doing what you have previously done, you will keep getting what you have previously got!').
- And - reversing a negative trend becomes progressively more difficult the longer it is allowed to develop.

Trend reversals need time, skill, knowledge and motivational input to the project team, it is not possible to simply increase performance by 25% or 50% overnight. If the SPI is 0.8 at the end of the first month, it is possible to recover the losses in the next month but it will probably take 2 or three months to change the project team's performance sufficient to achieve a 50% increase in productivity and claw back the lost time.

If the SPI is 0.8 at the end of the six months, it will take at least another six months (and probably significantly longer) to achieve the recovery, if (and only if) the battle to change the established expectations of the project team is successful. The good news is that the new trend can, with proper care and management, continue after the project has caught up its losses and can continue on to contribute to the delivery of a successful project ahead of schedule.

Based on the above, it becomes obvious that the earlier negative trends in performance are identified and corrected, the easier the change and recovery process are. Earned Value progress reporting has the capability to pick up negative trends very early in a project but unfortunately, the

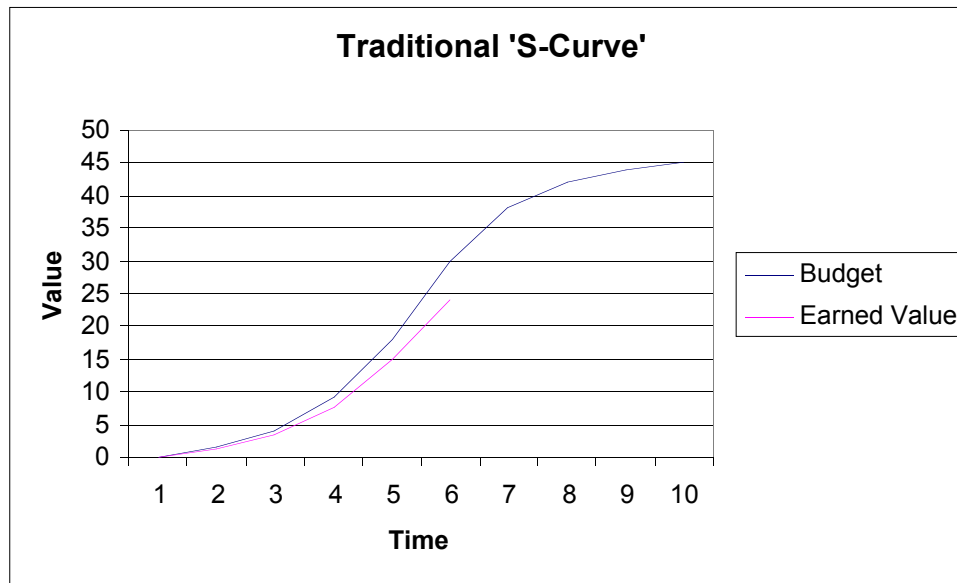
standard methods of presenting the data are not designed to highlight small negative variances. However, this need not be the case!

Graphing the Trends for maximum visibility

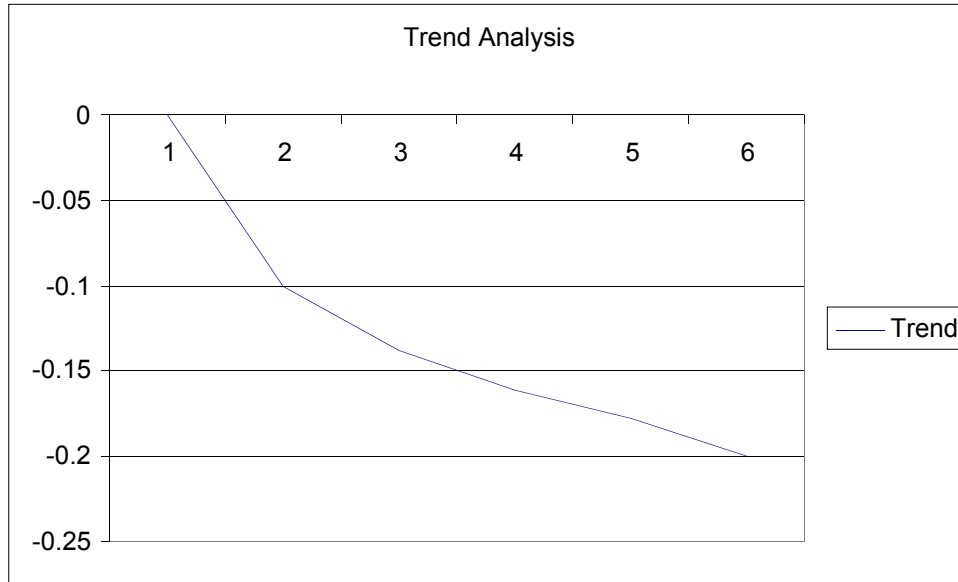
The only reason for preparing and presenting a progress report on any project should be to provide timely, accurate data that will help management identify areas requiring attention (to consolidate gains and mitigate losses). There may be many secondary uses for the data (contractual, legal, archival, etc) but none of these will have any major relevance if the project is an outstanding success. The prime purpose of any planning and control process (including C/SCSC or EVPM) must be directed towards assisting management to manage the project in a proactive way.

Gary E. Christle (Lessons in the Power of ~~Monitoring~~ Insight - 1997) has been advocating for a number of years the use of trend graphs to supplement the standard 'S-Curves' used to display Cost Performance data. This simple addition to the reporting process highlights the trends in a way that is difficult to ignore. The following example simply plots Earned Value against Baseline for two scenarios on the same project. The SPI for both projects is 0.8 at the final status, however the trend graph shows a significantly different story.

Scenario 1. The 'S-Curve' does not look too bad (maybe?), the project is behind but the 'Earned Value' curve appears to be heading in the right direction and on a 'straight line' projection will catch up with the (blue) budget line well before the scheduled completion.



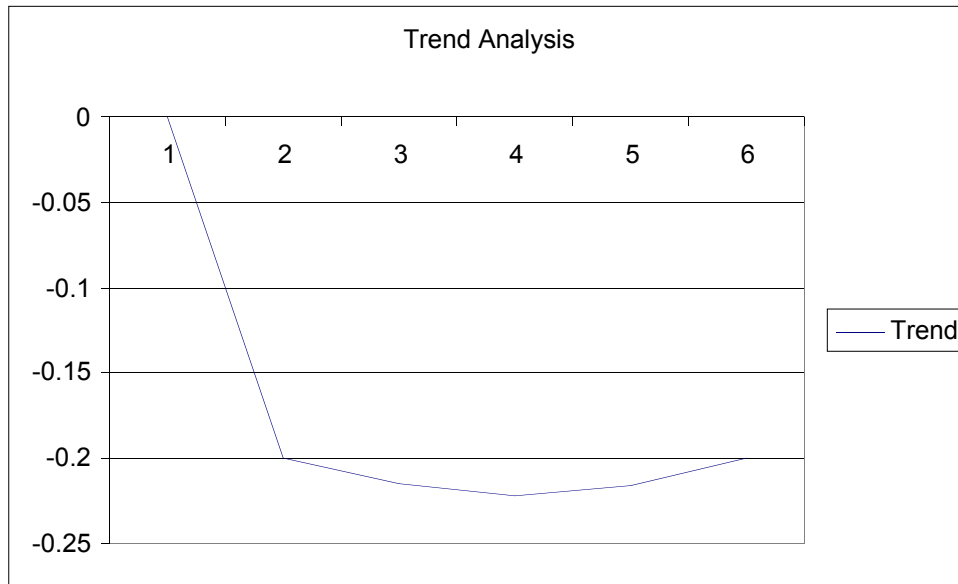
However, a review of the trend analysis (below) shows a totally different picture – the trend is steadily worsening. At every status report the SPI has slipped further behind the targeted rate of 1.0 (at report 6, the SPI Trend is $0.8 - 1.0 = -0.2$)



In Scenario 2 (below) the 'S-Curve' is a very similar shape to 'Scenario 1' and the SPI at report 6 is identical at 0.8 – a very careful analysis is required to notice the subtle differences in the shape of the curve.



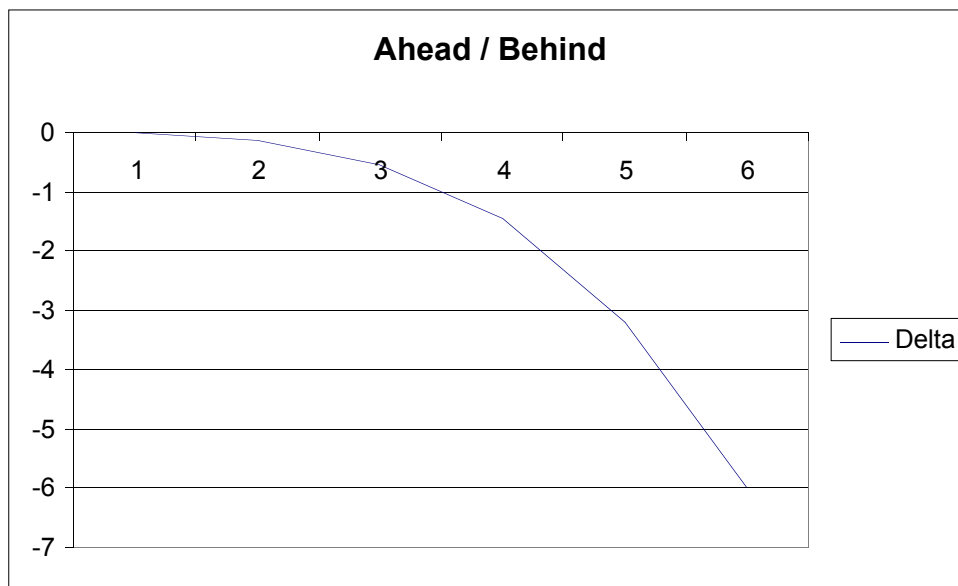
However, the trend analysis shows a potentially much better picture in this scenario compared to scenario 1, the first week of scenario 2 was a major problem but now the rate of loss has stabilised and a minor recovery is starting to occur.



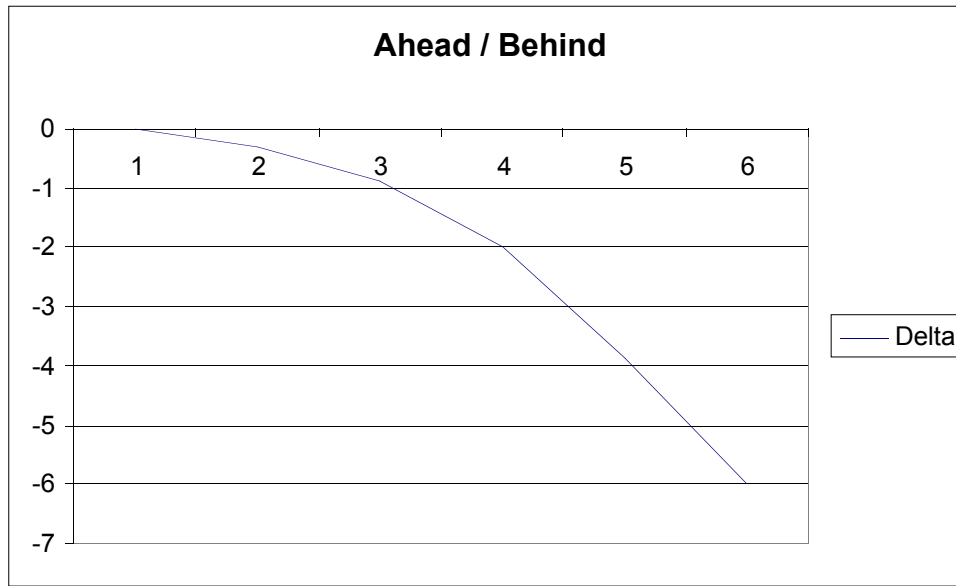
In both cases, productivity still needs to be increased by 25% to stop losing any more ground, but at least the trend shown in Scenario 2 is in the right direction. The major value of the trend graphs is the early warning of problems at the start of the project. In Scenario 2 above, alarm bells would be ringing as soon as the first status report was received.

The other form of chart required to highlight trends and problems is a 'variance' graph plotting the overall number of units (\$, Hrs, etc) the Earned Value is ahead or behind the budget. The graph is calculated by deducting the BCWS (Planned Value) from the BCWP (Earned Value). A positive value shows the project is ahead, a negative value behind. Again as with the overall 'S-Curves' this analysis shows very little difference between the two scenarios but clearly flags the need for urgent action in both situations.

Scenario 1 variance chart



Scenario 2 variance chart



In all projects, the benefit (in terms of improved insights to overall performance) derived from plotting and reporting on trends and variances as well as the basic 'S-Curves' is significant. The data is far more sensitive and will quickly highlight changes in performance, however, it is important that both the trend (SPI) and variance are viewed to gain a complete insight into the health of a project.

The examples shown here are based on the value of work performed (SPI). This is one key measure of performance. The other factor that must be tracked is the time-based performance of the project. Is the project maintaining its critical path?? Whilst it is generally true that projects with a negative critical path variance usually have a negative Earned Value variance this is not always the case.

- It is possible for a project to be maintaining progress on its critical path by ignoring work on sub critical activities (in which case the schedule will be showing the project ahead or on time but the SPI will show a negative variance).
- Alternatively, the project may have a favourable SPI because work is being focussed on 'easy' sub critical activities whilst the critical path is allowed to slip (in which case the SPI will be close to or above 1.0 but the completion date will be slipping).

The only way to have a complete view of a projects overall performance is to monitor both its critical path (time) performance and its Earned Value (production) performance. In both cases plot the trend and variance graphs as well as the overall charts for the best insights to the projects health.

It is vital that the data used for these reports and the analysis processes (particularly the schedule analysis) are accurate and the calculations correct – this is partly an information issue and partly a scheduling / EVPM software issue. Errors generated by inappropriate software calculations will quickly destroy the benefits (and credibility) of the overall process.

REGAINING AND/OR MAINTAINING CONTROL

This paper to date has focussed on monitoring techniques and the problems associated with outsourced contracts. The next step is to consider how these can be brought together to regain/maintain control of a project being run in an outsourced environment. The first step is to recognise what can and cannot be controlled.

Generally any issues associated with costs and profits are beyond the purview of the In-house project manager. So is the authority to dictate how the project should be tackled (in particular the schedule remains the responsibility of the outsource contractor). However, in most cases, it is reasonable to expect the contractor to have a proper schedule in place and to provide regular updates against their schedule. It is also reasonable to ask how many people are committed to each task and the total number of hours planned to be expended on each task.

By concentrating the control information on these two facets, a proper schedule and the planned effort allocated to each task visibility of both time and production can be gained by receiving a simple report on the percentage of each task completed each week.

The Earned Value graphs are simply based on a comparison of the cumulative number of hours planned (Budget) and the number of hours achieved (Earned Value). The costs of undertaking the work and the number of hours actually committed to the project are **NOT** measured – these remain the confidential information of the outsource contractor. They are irrelevant if the project manager's focus is on how well the project is progressing (as was demonstrated in the charts above). Time performance reports similarly focus on the achievement of milestones and the overall completion of the project based on the contractor's agreed schedule.

The control sequence

The processes and steps needed to make this system work effectively can be summarised as follows: -

- Achieve agreement to participate

The only time the outsource contractor can be expected to agree to participate in this process is at (or before) the beginning of the project. The information being requested is 'reasonable' and most projects start in a spirit of enthusiastic optimism. Trying to retrofit control measures into a project that is already in trouble is doomed to failure.

- Ownership of the schedule data

The total ownership of the schedule and all of its estimates **MUST** remain with the outsource contractor. Any attempt to dictate how the schedule should 'be' or how the work will be accomplished transfers ownership to the 'In-house' project manager and negates the effectiveness of the overall process. Great interpersonal skills are required to achieve changes required in the schedule without transferring ownership.

- Base-lining the schedule

The final schedule should be agreed and formally signed off by all parties – the objective is to make the schedule (including the EV charts) an important document.

- Updating the schedule (weekly)

The update information should be provided by the contractor on a regular basis and checked by the project manager. It is vital that the contractor provides every estimate of

percentage complete – it must be their data, not the project managers. However, the project manager must be seen to take a keen interest in all of the data provided (and be seen to comment on any anomalies).

- Analysing and reporting on the schedule

The analysis process and reporting/discussion of the outcomes must (particularly in the early stages) be undertaken with a positive and bipartisan attitude. Any slippages and issues identified are ‘opportunities to improve’ not points of blame. The power comes from making the analysis and discussion process visible and proactive every week.

- Keep working together

Remember, the ‘In-house’ team cannot do the project, they can only help the outsource contractor to achieve success. It is also imperative that the tracking processes do not invade contractual areas outside of the project manager’s authority (eg the profitability of the project for the outsourcer).

The major anomaly is that: had the skills, discipline and support required to make these processes work effectively been applied when projects were being managed In-house, the pressures to outsource the work in the first place would have been significantly reduced! It is to be hoped the more obvious cost pressures being created by the need to pay contract variations, etc, to the outsource contractors (when projects are managed ineffectively) will encourage senior management to provide their project managers with the level of support needed to make these processes work and as a consequence reap the full benefits of their outsourcing agreement.

The power of regular updates

- The power of this process comes from a number of sources: -
 - Most people and organisations will modify their behaviour to be ‘successful’ if their success is measured against a framework that is seen to be fair: -
 - By definition this process is excruciatingly ‘fair’. The contractor has provided all of the data being measured.
- The recognition of success/failure is immediate. Progress is reported weekly and the analysis should be completed within a day.
- The information being viewed is immediately relevant to the project and is a constructive part of the overall ‘partnering’ towards success.
- The process cuts both ways – delays caused by the client organisation are as visible as delays caused by the outsource contractor: -
 - A major effort is required to keep the information flows open and the attitudes of both parties positive when problems do occur.
 - The client organisation has to accept the pressures to perform created by the visibility of their deliverables in the agreed schedule.
- The lack of effective planning is one of the major causes of failure in IT projects (Gartner, et al). This process forces good planning into the centre of the project control systems.

CONCLUSION

Outsourcing is not a ‘Silver Bullet’. There are no silver bullets that will solve the complex issues surrounding the management of projects that directly impact on core business processes.

The outsourcing of specialist functions such as IT may allow businesses to concentrate on their core competencies. However, the process of outsourcing does not remove the imperative for businesses to manage the inevitable changes (projects) required to keep their systems efficient and competitive. If senior management continue to under-resource (and under-skill) their project management processes, the delivery of projects will continue to be less than satisfactory.

The processes outlined in this paper will provide project managers with tools that can deliver a significant measure of visibility and control over projects in an outsourced environment. All of the techniques described in this paper have been successfully implemented by staff working for Mosaic and have worked in a wide range of situations encompassing aircraft maintenance, regulatory enforcement and (of course) IT projects. However, tools cannot produce results without skilled people to use them.

My hope is this paper will be a catalyst that changes the way many managers view both project management and outsourcing to the betterment of Australian business.

Glossary

1. **Cost Performance Index** (CPI) is the cost efficiency ratio of **Earned Value** (EV) to **Actual Costs** (AC), ie, between the value of work achieved to date and the actual cost of accomplishing that work (or in CS² terms BCWP / ACWP).
2. **Schedule Performance Index** (SPI) is the schedule efficiency ratio of **Earned Value** (EV) to **Planned Value** (PV), ie, between the value of work achieved to date and the value of work scheduled to be achieved to date (or in CS² terms BCWP / BCWS).
3. **Earned Value** (EV) is the value of work achieved to date measured in the same units as the Budget (or in CS² terms BCWP).
4. **Planned Value** (PV), is the value of work scheduled to be achieved to date measured in the same units as the Budget (or in CS² terms BCWS).
5. **C/SCSC** (CS²) is the old term (Cost/Schedule Control Systems Criteria) for Earned Value Performance Management.