

# **Using Cultural Change to Introduce Earned Value Performance Management into a SME Rural Construction Company.**

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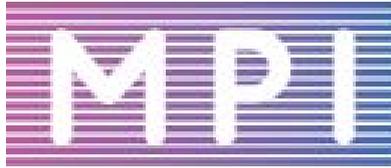
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## **Using Cultural Change to Introduce Earned Value Performance Management into a SME Rural Construction Company.**

**By**

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### **Abstract:**

Some major construction companies have been used to adopting new management and construction methodologies over the years as a way of successfully gaining new projects and maintaining their market share.

Existing margins in the construction industry have been under considerable pressure for many years and the way that some organisations have survived is by successfully changing their corporate culture. This was usually achieved by using the traditional change management methodologies using major consultancies. While the process yielded quite good results, it was usually rather expensive, and many boards did not see value for money. Also, many projects did not perform as expected even using these new techniques and changed culture.

The small to medium enterprises in the construction industry for the most part either did not see the value or have the cash flow and staff to implement changes in the traditional business methods that they were used to. But declining margins and overseas competitive pressures are biting into the Small to Medium Enterprise's in the construction industry and some are beginning to see the need for change.

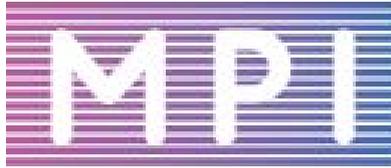
To maximise margins in the current economic environment and increasingly changing market place requires superior productivity as well as superior knowledge of how the company's projects are performing.

To improve productivity as well as knowledge is about: -

- Identifying what to the current practices are
- Identifying what to change through better performance measurement, analysis and reporting
- Applying a systematic approach for changing existing operating and business processes
- Understanding the existing culture in the organisation and developing appropriate methodologies to change it

In other words, changing staff's attitudes and behavioural patterns in order to build an improved culture and a can-do attitude.

When attempting to introduce a new system or management methodology, for example "Earned Value Performance Management", the traditional construction company management hopes



that the change it is seeking can be easily implemented by sending staff onto specific training courses or having a tailored course delivered to staff by an accredited / recognised training organisation. The view is to send a few people to a training course and the change will filter its way through the company. Most believe that staff attitudes drive the way staff perform their daily functions in a behavioural way, so by providing training, behaviour can be modified. (Don't forget Pavlov)

Unfortunately, when observing the empirical rather than the anecdotal evidence, staff attitudes do not drive the way they perform. Rather it is the gaining of knowledge through experiencing change that cause staff to make changes to their behaviour. Then other's behaviour is affected by various attitudes some staff members may take about changes. So, if management changes staff behaviour patterns, only then will they be successful in implementing cultural changes.

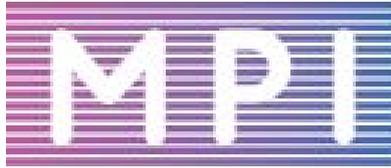
It has often been said that "systems" drive behaviour; we all know that passive insolence to management demands as often stated by staff "it's the system, not me".

Thus, if management wants to improved margins, bottom lines and productivity it needs to introduce better systems. It is the authors belief that the improvements management wants to make to project delivery is by having a superior performance system in house. Such a system is "Earned Value Performance Management".

The paper will show how cultural change was introduced into an East Gippsland based small to medium Construction Company, through the introduction of Earned Value Performance Management to manage an ever-increasing workload and tight market conditions as well as resources. And by market standards at a low cost.

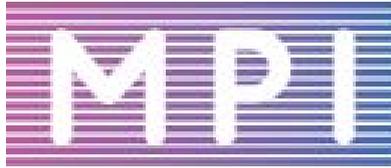
The board, senior management, project managers and staff worked in harmony in order to create a win-win situation to ensure that the new culture for managing projects was practiced in the work environment. That means that: -

- Staff were clear as to the goals of the company
- Staff were involved and that their views are valued and sought as input to the various decision-making processes that abound
- The work environment is friendly and inviting with staff actively enjoying participation in projects
- Project communication is clear, timely and relevant
- That the projects do get the resources and support that is needed to successfully complete it
- That management recognises staff and respects them for their part in the project
- That staff are kept fully informed about what is going on with their project as well as other company projects
- That staff are accountable for their own job and part in the project and take responsibility for mistakes



- That team and individual effort is recognised and rewarded
- That opportunities exist to improve project knowledge and career advancement for the staff
- Appreciating that the staff are the most important resource to the project
- That good project culture and governance is a practice not a statement.

The presentation will include examples of the Earned Value Performance Measurement Inputs and Outputs. It will illustrate how good management support changes the way staff performed and improved project delivery and better margins. As well the importance of implementing proper and professional project plans plus Strategic Plans for implementing the cultural changes necessary for providing best practice management systems, superior productivity, reduced costs, improved safety and higher margins.



## Introduction

The construction industry is probably one of the oldest in the world and some cynics would say that it has not changed much in all that time. The construction process has for the most part been viewed as a temporary endeavour, because each project is said to be unique. The general rule is having tendered and won a project, the construction entity puts a team together of various people on site consisting of known and unknown managers, tradesmen, suppliers, various subcontractors etc. Negotiate the contract, create a plan of some sort or another and build it and try to ensure it gets completed on time and budget.

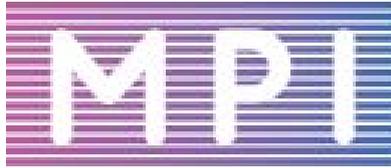
In this paper we are going to concentrate on the establishment of project management and its associated technology in a construction project. The larger type and size of project will often have some project management clauses contained in the contract. These clauses will generally cause a project planner or programmer to be engaged as a member of the team. Because of margins and wage structures we know that the large construction companies can draw on a larger pool of skilled project management savvy people to engage, regardless of location of the project. Indeed, the sheer size of some projects will often see the establishment of a project office to oversee the work, manage the risk, quality control and delivery on time and budget.

The rural small construction company generally does not have the breadth of management resources to neither do this nor do the in-depth skills necessarily reside locally or is there sufficient margin allowed in the bid to engage a dedicated project planner. Generally rural builders tend to build smaller scale projects that can be comfortably controlled by manual methods, or perhaps a Microsoft project produced Gantt chart on a couple of pieces of A4 paper.

They develop simple management processes which are generally informal, but well understood by the various players, have a minimal information technology capability and a good accountant! This results in many rural construction companies tending to stay within their comfort zone but continually they are successfully completing their projects within the stated time and a small profit is made.

However, the marketplace is changing and since the year 1999, new regulations have been increasing and getting tougher, changes to the way construction processes are carried out are creating new problems to the managers of rural constructors. Changes in director's responsibilities regarding financial information under CLERP 9 now must be taken into account. Estimating the profit of a project on the back of the proverbial envelope is no longer legal. There are other demands as well which require a more formal management culture to be developed as well as the inevitable business processes that go with that.

Over the past ten years or so the larger construction organisations have invested in developing corporate standards, methods, policies and protocols to deal with these new regulations and corporate law changes, in other words business process re-engineering. In many cases formal Project Support Offices have been set up using more information technology than before. It was



felt by Newton and Sharpe (1994) <sup>1</sup> that the principles of business process reengineering were primarily based on innovative use of information technology. In 1999 observing the effectiveness of IT driven process re-engineering Love, MacSporran and Tucker<sup>2</sup>, said it will probably fail, inasmuch as IT is used as the driving force of change without any consideration to other key enablers. This is quite evident in the number of recent major projects that do not deliver the benefits expected of them. Either in just simple terms of time and budget, or in a more complex scenario, the actual business benefits initially touted are not or will not be delivered.

The simple view of these failures is that management got it wrong, failed to use the right tools, or depended too much on software tools rather than good people knowledge, or just plain simply people don't like change and will often sub consciously sabotage the desired changes. It's a cultural thing and often the only way to make things work according to Love, MacSporran and Tucker (1999) is by applying effective change management to adjust the culture of the organisation.

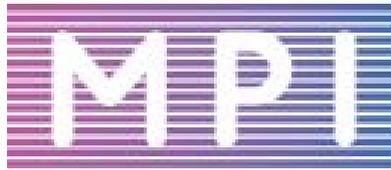
It is our belief that unless management (and by that we mean at board level) plays a proactive throughout the company, then of course the failures will continue. Culture is what drives a company, we all have it and either love or hate it, but it is there all the same. The number of my project management colleagues who have taken on major projects which have an impact on the bottom line are told that you have manage the project in x, y or z method because that is what we do here, is legion and the inevitable occurs and whoops "there goes another project failure"

To try and change a company's culture, which has been set by beliefs, assumptions, values and patterns of behaviour that go towards the creation of the project management work environment, is not an easy task. The board must decide whether it wants to continue in the old ways or to try and encourage the company to change the way it does things to ensure continued survival, or at the very least the directors are exercising their fiduciary responsibilities under CLERP 9. So, the board must develop processes and methods that will change the mindset of people throughout the company as well as those externally who deal with it.

New ways of thinking and working must be devised, that will enable the company to go about its projects in an effective efficient and competitive way. In addition, it can be quite educational to include regularly used sub-contractors, as these sub-contractors' way of doing things often gets mixed into the company. How then does a small rural company go about influencing and shaping its new project management corporate culture (which, by the way can be the existing one with some pertinent changes)? By developing a Corporate Culture Change Model; which may be implemented in four stages; -

## **Stage 1 – Culture Assessment**

ACME Builders was established in 1964 as a small residential home builder. It is a rural SME Over the years it has built many homes either singly or in small estates.



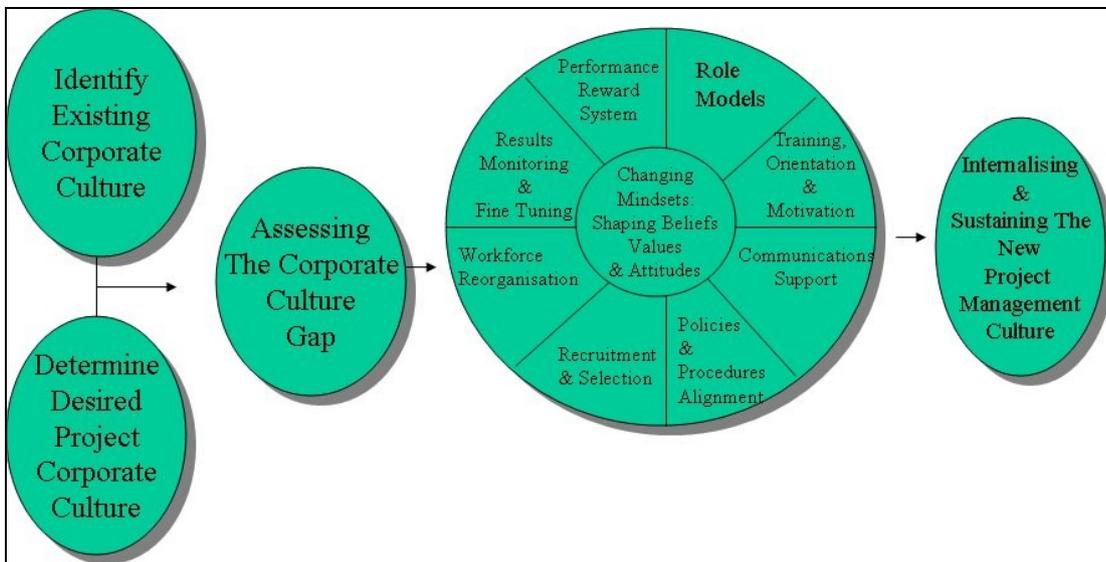
The business has grown from an initial turnover of \$1million to currently \$14 million; this has been by developing new clients in the industrial construction and commercial buildings. Over the past three years we have specialised in the construction of Aged Care facilities.

The first stage of assessing the existing culture consists of two major deliverables: -

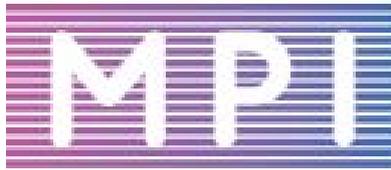
- Assessing and documenting the current culture in the company
- Determine and develop the new project management corporate culture

How to do this? We found the simplest way was to initially carry out individual interviews of a selected group of personnel, at the same time ensuring that the group truly represents the diversity, which is bound to exist. It was sensible to use an external facilitator, who helped to establish the real picture of the culture within the company; the next major task was to hold focussed group workshops (with a well-prepared agenda). This will allow the facilitator to assess the existing culture impacts on the delivery of projects as well as to help develop the new desired culture of establishing a corporate project office. The next thing to do in addition to interviews, is that corporate culture surveys should be developed and then given to another representative selected group of staff members.

**Figure 1 – Cultural Change Model**



Obviously to ensure that the data being collected is truly representative of the current corporate culture, all the staff that respond to the survey, do so on an anonymous basis as well as strict security of the data. The development of the new or changed project management culture not only encompasses the board and staff desires but the expectations of all the external participants. These may be defined as the shareholders, sub-contractors, clients, competitors and the other



stakeholders who enable the company to successfully compete in its market space. The model for undertaking a Cultural Change program is shown in Figure 1.

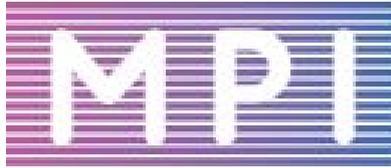
## **Stage 2 – Culture Gap Analysis**

Simply put, this stage was about analysing the gaps between the existing corporate culture and the new or changed project management one. The analysis investigated the people involved, company policies and procedures, the corporate IT strategy, company project structure, the corporate mission and goals. Analysing what currently makes the company successful and what hurdles get in the way to prevent it from achieving the defined corporate goals does this. In addition, there will be missing links that need to be identified, for example the right resources, the right type of management and leadership style. Staff needs to be trained in the new ways of project management and be available in order to achieve the benefits that the new culture will bestow. The gap analysis results will provide proper input to develop the change programs necessary to shape, develop and influence the new corporate culture

## **Stage 3 – Changing the Mindset; Influencing Cultural Change**

The most difficult thing in changing corporate culture is the existing mindsets of the staff and other people involved. It is not unusual for a client to stop doing business with a company because of changes that the company has invoked. It is essential that all parties are fully involved with the new policies, new ways of doing business and projects that evolve, new working practices and changes to established relationships. Strategic alliances are becoming more evident and this will necessitate cultural change in the company. There are various ways in which a company can go about this challenge, but the best we have found is to have “Change Agents”. People who make good change agents can be found at all levels of the company and as such they become “role models” for all the other people involved. It is their attitudes and regular behaviour implementing the changes in the working environment, which will reflect the desires of the board in making the new culture successful.

It goes without saying that the new / changed project management culture will have an impact on existing corporate policies, procedures and practices. It is therefore essential as all the change programs that are being developed and implemented that the old documents are updated not only to reflect the changes but also to be in alignment with the boards’ desires. Using emails, a local intranet, the company can quickly promulgate the new project cultural thinking and thus ensure that widest possible communications take place. Training of staff in the new core values and ways of working must be carried out as quickly as possible and not to take months, otherwise people will lose faith and quickly revert to the old and comfortable working ways of the past. Even in 2004 there are still several small sub-contractors who still do not have any information technology (other than a mobile phone) in their business. This makes communications relatively difficult and when changing cultural habits creates unease amongst the parties and slows down the process. We have planned a twelve-month program to create the necessary infrastructure and production of all the material required to deliver the cultural change.



In my experience of implementing cultural change programs, there is a continuous process in ensuring that the changes take place and regular departmental meetings are good forums for getting feedback on how staff is taking to the changes. In addition, company managers meeting are also effective barometers and ensure the widest publicity for the changes.

It is inevitable that not everybody will embrace the new corporate project culture with open arms and generally there are a few casualties. While this can be viewed as a negative, it is really a positive as it allows those people to be replaced by fresh blood from outside the company. Thus, it can be argued that recruitment is also another way of implementing changes to corporate culture. The potential recruit can be screened for the similar values and behaviour patterns that will easily fit into the new project culture. Many companies undergo total organisational and structural changes in order to reinforce the desire to create a new project culture; staff that has the same beliefs as the new culture are promoted into positions that will speed up the change. Others who cannot make the change (or do not want to) may be re-allocated positions that do not have an impact on the change.

Implementing a new or changed project corporate culture takes strong management and constant monitoring as well as fine-tuning of the ways and methods. A practical way of ensuring the company meets the new goals and operates successfully under the new culture is to reward those individuals or teams who contribute to the success. Performance awards, promotions that recognise, encourage and reinforce the practice of the new culture, can achieve this.

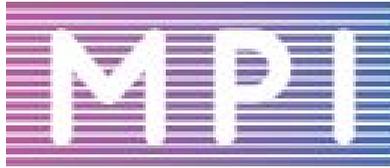
## **Stage 4 – Maintaining the New Culture**

How to maintain the new project culture requires constant effort in moulding, shaping, reinforcing and influencing the actual behaviour of the staff when implementing projects. Therefore there is a constant flow of new ideas and suggestions to reinforce and promote the new way of managing projects; it is essential that the staff completely accept the new project methodology values and beliefs in getting things done on time and on budget.

There is a need to link the positive and hopefully improved project performance results with the new corporate project culture. Once staff sees that the benefits of the new projects culture are truly delivered for the company and not just for themselves, they will want to continue with the successful ways.

The board, senior management, project managers and staff must work in harmony in order to create a win-win situation to ensure that the new culture for managing projects is practiced in the work environment. This means that: -

- Staff are clear as to the goals of the company
- Staff are involved and that their views are valued and sort as input to the various decision-making processes that abound
- The work environment is a friendly and inviting with staff actively enjoying participation in projects



- Project communication is clear, timely and relevant
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- That staff are accountable for their own job and part in the project and take responsibility for mistakes
- That team and individual effort is recognised and rewarded
- That opportunities exist to improve project knowledge and career advancement for the staff
- Appreciating that the staff are the most important resource to the project ☐ That good project governance is a practice not a statement.

## Who we are and what we do

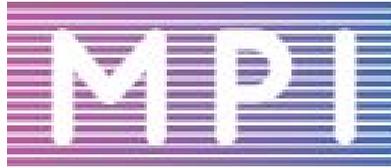
ACME Builders was established in 1964 as a small residential home builder. It is a rural construction SME located in Eastern Gippsland, where it has built many homes either singly or in small estates.

The business has grown from an initial turnover of \$1million to currently \$14 million; this has been by developing new clients in the industrial construction and commercial buildings. Over the past three years we have specialised in the construction of Aged Care facilities and moved into bigger projects located over a more geographically dispersed area.

In the construction industry, companies are responsible for managing the construction process and completing the project on time and to budget, including:

- organising the site, machines, materials, labour and subcontractors
- planning and carrying out the work in the right sequence
- managing project finance and costs
- maintaining the legal requirements in respect of:
  - construction health and safety
  - business and property transactions
  - building standards; and of course obtaining future work for the company to ensure its survival promoting the good name and image of the company and the industry. As the company logo says “We built our Reputation”

However, like most SME builders very little utilisation of any major Information Technology solutions was used to ensure that the above requirements were met. Up until 2002, ACME still managed by traditional methods of being on site to manage the building process. As the projects being won became bigger the number of tasks and the processing of information were too great for the traditional manual ways and consequently action was needed to maintain success. Those builders who do not embrace new technology inevitably go to the wall. This causes great stress



to the work force and has over the years created the environment for severe industrial disputation in the construction industry.

It was Acme's belief that changes are necessary in the industry for it to survive into the 21<sup>st</sup> century and that it must modernise using technologies and business processes other industries take for granted.

Consequently, ACME has undertaken to make these changes through a program of cultural change and partnership and alliances with its staff, unions and other colleagues in the construction industry. These changes are being introduced by a workshop process; these are outlined in Appendix 1.

## **How did we start to create a Corporate Project Management Culture?**

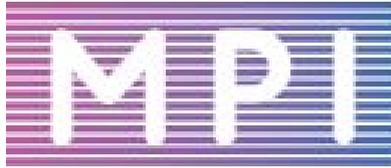
We knew that Project Management covers a wide area of skills and consists of a number of major elements as defined by the Project Managers Body of Knowledge, generally known as the PMBOK. These major elements are defined as: -

### Project Management Context

- PM Integration Process
- PM Scope Management & PM Time & Scheduling
- PM Cost/Accounting & Finance
- PM Methodology and Tools
- PM Quality Management
- PM HR Management
- PM Communications Management
- PM Risk Management
- PM Earned Value Performance Management

Being a small to medium construction company we knew that we could not put every element of the PMBOK into place as much as we would have liked. In order to see what could be put into place in a useful and economic way, senior management elected to develop a strategic plan which would see the company grow from a turnover of \$4 to 5 million per annum to \$50 million in a five year time frame. Existing business relationships and processes were examined, and it was decided that the most effective way to achieve the long-term goals of senior management was to develop a strategic alliance business approach. This approach was to be based on more formal project management techniques with an emphasis on Earned Value Performance Management and included our sub-contractors, the various unions, the consultants and the client all in an integrated project plan.

Then we examined the way that the company had traditionally gone about its business and listed the type of projects undertaken, their values and contracted price and delivery times and the



actual price and delivery time, all our sub-contractors and what relationship we had with them. In some cases, we found that because of the nature of the building and how well the documentation from the consultants had been produced, that we did have several projects which had caused some degree of pain. Construction is all about communication and information between a wide variety of people, who then translate what they think the objective and outcomes are and we know from experience that sometimes what the client wanted and what finally gets built doesn't occur.

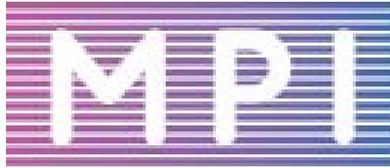
ACME's basic business culture was to ensure that the client was delivered a quality product with all the small things they wanted but had been omitted from the specifications, scope creep in many small things was endangering the profitability of a project. With the philosophy, you start as a client, but finish as a friend was very much part of the rural way of life. After all you very often get to see the client walking down the main street each day and thus you need to maintain good relationships.

Having established that the company operated on an informal business basis with few major management systems and processes and was indeed a very traditional constructor, our management knew that it had to change and having decided on the new strategy of using more formal project management, decided to go ahead.

Thus, business changes, processes, policies (especially risk management, quality management, OHS&E), and training programs had to be developed in order to successfully put these requirements into place to create the new project culture. It must be remembered that all this work has to be undertaken in an industry that is not known for rapid acceptance of changes unless new regulations are brought in, and then there is increased pressure on management to comply. There are specific major concerns in construction which may not exist in other industries. For example, working at heights is now regulated with the introduction of safety harnesses; increased awareness of family friendly working hours (or as it was recently put in an industry meeting, the "humanization of the building industry") is becoming the norm.

For us to develop these programs to change the way we did things we needed to know what are the linkages between the culture, humanization, risk, safety and quality relating to Project Management in the company? Which way should we go: optimization of Project Management or humanization of Project Management? What is the role and importance of humanities in Project Management; after all we are a family business?

The various learned bodies in Project Management have been very busy over the past few years in introducing competency-based training, which to our way of thinking is based on hard factors, but what about the soft factors? For example, what social competences are needed in a Project Management environment? How can a project manager improve his/her social competence? Because if our project managers who are good at their job do not get on with the other stakeholders in our alliance, what do we do about it, management saw it as a cultural thing!



In looking at the market place to learn from others in the industry, we could not find too many role models. From the data that we gleaned many medium to big construction companies (\$75 million to \$150 million turnover) do not see their business at the ground roots level as anything other than a small core of permanent management with an ever changing group of tradesmen, sub-contractors and the like on a project by project basis. It was interesting to learn that when talking to quite senior construction managers, on our proposal to explore the use of cultural change to improve our productivity and delivery, they felt it was a waste of time and especially money. The general consensus seemed to be margins are too tight; it is only for the truly big and long-established contractors.

## **Partnership at Work**

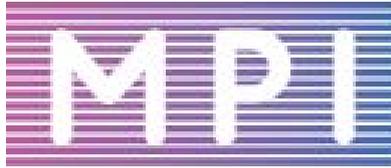
During the course of establishing a relationship with stakeholders, sub-contractors and funding plans of our own (in March 2004) based on worked done in other types of industry, the Department of Industry, Innovation and Regional Development of the Victorian State Government announce a round of funding for a “Partners at Work” initiative. This program was aimed at encouraging small to medium enterprises to get together in a more structured and inclusive way and through developing various key indicators, such as

- Cultural Change,
- Sustaining Partnership with Key Stakeholders
- Consultation, communication and participation
- Business literacy and continuous improvement
- Innovative approach to diversity at work or workplace flexibility

To become more efficient, to ensure that the level of industrial disputation was reduced and that productivity and delivery were improved. The idea really is to be become more inclusive with all the participants working to the common good, rather than the existing warring clans’ scenario we are all so familiar with.

As with most government funding the initiative was on a dollar for dollar basis and on examining the requirements needed to get funding found that these matched what we were trying to do. The program would up to half the costs of implementing the Partners at Work scheme to a maximum funding of \$50,000.00.

In examining the criteria of the Partners at Work initiative in conjunction with the major sub-contractors (mechanical, electrical, plastering, plumbing and our own staff) it was felt that by utilizing those principles of the Partners at Work initiative we would be well on the road to achieving our aims of better processes and project management outcomes, in fact commencing the very cultural change we desired.



## Aims and Objectives

Our aims and objectives are to provide a focus for the consideration of improved building processes and management as well as delivery

- To develop a culture of performing tasks on time and budget, through the use of Earned Value Performance Measurement and Project Management techniques as per the PMBOK
- To provide a focus for Information Technology matters and the ability to integrate the various partners (sub-contractors) IT systems
- To create a strategic alliance culture between our clients, ourselves and our sub-contractors to reduce or remove misunderstandings, omissions and
- To provide informed comment and opinion for the benefit of our clients, staff, sub-contractors and our suppliers, to produce improved outcomes for all parties
- To provide a forum at which knowledgeable and informed individuals can exchange information
- To act as a catalyst for constructive development and cultural change in how we build our clients projects
- To ensure a safe work environment
- To deliver a quality product that meets or exceeds the client's expectations
- To win bigger project
- To grow the business profitably

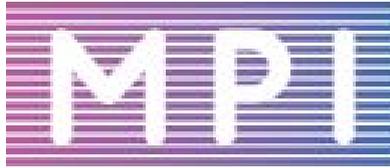
In order to triumph in this new millennium, it is necessary to create a new culture of shared information, not only within the company but outside of it as well.

The aim of the project is to develop and improve the use of information technology and appropriate management methodologies and software products in conjunction with our own employees as well as our sub-contractors This is to improve communications between all parties and to ensure the delivery of a quality product built as the client expected, on time and on budget without any disputation.

By developing a supportive climate, ACME Builders is creating a culture of innovation so important to success. Current economic conditions in the construction industry require businesses to use the creative skills of its employees and sub-contractors to become more competitive in the market. However, understanding the nature of creativity provides merely a first step. To encourage a culture of innovation, ACME has developed a supportive climate where staff members feel free to contribute to improvements in the workplace, better industrial relations and a safer working environment.

### **Developing the workplace partnership involving all parties**

The Partners at Work project through formal and informal training sessions will be inclusive of our own staff and that of our major sub-contractors as our partners in the change. Sub-contractors play a pivotal role in ensuring the success of the project and it is very rare for outside



people of an organisation to be seen to be included in the success of a project, in which they may well have played a major role. It is through strategic alliances (in other words a Partnership) with our sub-contractors as well as our clients that we will be able to offer a better service and product to the marketplace. This also includes making more use of Information technology between all the parties involved in a construction project than is the current practice in small to medium builders

ACME will work with its' staff and its' sub-contractors on a more formal basis in the form of strategic partnering and as such it needs to investigate the cultural, business and technical barriers to implement Information Technology integration between all parties in support of process improvements. Surprisingly, the various managers interviewed by ACME to date were unanimous in their opinion that there should be no technology barriers and they would embrace improved inter-business information processes. These managers came from sub-contractors, architects, quantity surveyors and suppliers, all looking for improvements in communications and business dealings. It was viewed however, that to do this, it was outside the capability of a small to medium rural enterprise in remote areas with the existing telecoms infrastructure.

It was stated that even large firms experience problems grappling with the amount of technology being pushed at them and sifting through the options; this would then incur larger cost penalties for an SME in the rural environment. Thus, it is important for us to only establish ideas, methodologies and processes which can be successfully handled by small groups:

- Those that focus on the effort and motivation of workers and work groups and suggest that people work harder.
- Those that focus on changes in the structure of organizations that produce improvements in productivity and efficiency.

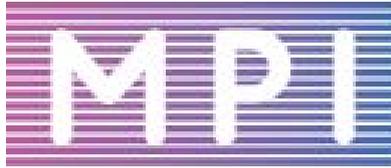
In the first group, the emphasis may be:

### ***Working harder***

- People may work harder if they find elements of a job to be interesting or enjoyable, and this may come from rewards or feedback. They are also less likely to resent aspects of the job if have contributed to its design.

### ***Working smarter***

- Innovative work practices can lead to improved efficiency. Staff and or the sub-contractor can suggest improved work practices because they have a more intimate knowledge of the job than managers or external consultants. Moreover, open discussion allows employees to modify their own work processes to fit more effectively with sub-contractors as they become aware of the 'bigger picture. Thus providing the basic background which will allow for the introduction of earned value performance measurement techniques.



It could be said that the second group may emphasize innovative work practices and processes which can also lead to improvements in organizational structure that are independent of motivational effects.

- Cross-training and flexible job assignment may reduce the costs of absenteeism.
- Delegating decision-making to self-directed teams can reduce the number of supervisors or foremen and improve communication.
- Training in problem-solving, statistical process control and computer skills may enhance the benefits of information technology.
- Involving workers and unions in decision-making can reduce grievances and other sources of conflict.

Such changes associated with employee involvement are complex and culturally challenging and make it 'difficult to isolate any single causal mechanism that produces their effects on economic performance.' Nevertheless Ichniowski *et al*<sup>3</sup> in his book **The American Workplace: Skills, Compensation, and Employee Involvement** conclude that the companies which adopt such practices 'should enjoy higher productivity and quality (...), leading to lower costs and higher product demand, all else being equal.'

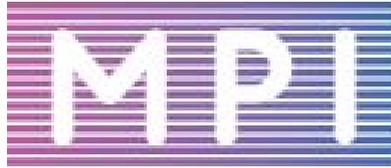
But this comes at a cost because employee involvement programmes can be expensive due to extra meetings and related activities. Which would also include the time lost on the project when staff is on the training program and not on site?

However, the improved outcomes in better quality, better performance and the meeting of completion dates and better workplace relations using partnering will most likely prove cost effective in the long run. As well as some financial relief through the funding aspects of the Partners at Work Initiative

## **Providing an adequate social and/or economic return to the workplace?**

It is our belief that by introducing new practices, processes through cultural change throughout the projects will provide benefits both economic as well as social, because of:-

- The focus on construction worker safety and health issues will provide a means to assess and encourage improvement in working conditions and safety. Thus, reducing compliance costs, and loss of life. This in turn should reduce insurance premiums.
- Our goals are to produce and disseminate useful knowledge about aspects of the construction industry and labour market, the work place and its organization and bring about an improvement in the quality of life for workers and their families.
- By promoting the standards, techniques and methods of earned value performance management in construction; in order to contain time and cost overruns, which will reduce pressures on finishing trades.



- To foster and improve relations with industry and among members of the building trades, general contractors, labour and representatives of labour. Thereby reducing or removing the need for industrial disputation.
- Through the integration of tasks and improved work practices

In addition the construction industry has longed been plagued by high turnover of staff as well as absenteeism, one of the goals major benefits of an alliance with all parties involved in the construction process, is to provide a happy, safe working environment, where everybody knows what they should be doing and when. Thus removing the usual conflicts and unhappiness that occurs and are the cause of high turnover etc. basically staff as well as sub-contractors like to have the knowledge of the tasks that they are expected to be doing and when and for how long. Knowing that work can be achieved in the time frame allocated and not having to work excessive overtime to catch up delays will create a worker – family friendly environment and relationships.

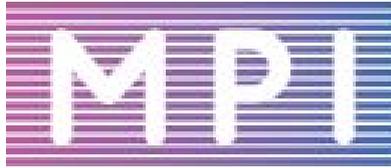
## **Workplace performance/productivity and the quality of working life for workers**

Everyone in the construction industry who struggles to meet the demands of work and personal life responsibilities knows how tough it is to do so. These struggles often manifest themselves as poor work ethics, disputation and conflict between trades and management. As well as good site managers and workers leaving the industry because of excessive overtime hours interfering with family life.

By implementing earned value performance management ACME expect to remove the deeply engrained separation of work and personal life that has limited our ability to deal effectively with the conflict between them. Knowing when you need to work, what the task is, what is expected of you and for how long in order to meet the expected client deadlines, makes for a better informed and happy worker.

It is by using a cultural change to the way work is organised in the existing traditional manner means that methods of integrating rather than separating personal-life considerations from the workplace can achieve positive outcomes, not only for workers but also for the project work. Establishing a change culture process offers a way of looking deeply into the work culture to find inequitable and ineffective work practices that are so embedded and routine that no one thinks to question them.

The existing practices are just the way things get done now. Once identified, these work practices will be changed to achieve what ACME's call an Alliance Agenda: a more equitable workplace where both men and women can achieve their full potential and a more effective workplace where the needs of the work, rather than gender driven and out of date assumptions, determine what gets done, how and when.



## Establishing the framework for implementing Earned Value Performance Management

To establish the implementation of Earned Value Performance Management techniques within the alliance project it is expected that the time frame necessary for the development of the protocols, practices, processes, workshops, training sessions and the subsequent delivery will be approximately twelve to fifteen months

ACME Builders and its alliance partners will provide enough resources dedicated to the project in order to deliver the expected outcomes of establishing of an Earned Value culture both within ACME Builders and its partner sub-contractors. As a builder that has commenced the specialisation in providing information technology-based project management planning has to date been successful in maintaining its projects on time and on budget.

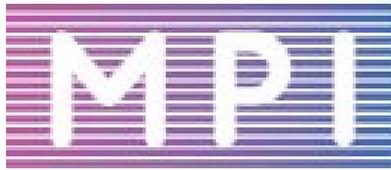
To ensure the success of cultural change within the alliance organisations a detail project plan will be produced as a result of a series of workshops, which will be both timed and fully resourced to provide the necessary schedule information for all the partners taking part in the project. The workshop tasks that we expect to carry out to produce the data required are fully detailed in Appendix 1.

## Identifying and Managing Risk

Managing risk is an inherent part of ACME's management role and as such is a crucial aspect of every project. It is common for Project Managers to often assume risks without ever formally assessing the risks or attempting to mitigate the risks. Risk management is a method by which the project team attempts to predict future outcomes based on current knowledge that may have an adverse effect on scheduled project deliverables. However, it is possible to reduce the impact of risks from occurring by using a process approach to risk management, and this will be operated by utilising the Australian Standard AS-4360 <sup>4</sup>

The major categories or types of project risk identified:

- Business risks,
- Building risks
- Safety Hazards
- Technical risks,
  - Design
  - Materials
  - Insufficient detail in specifications
- Reluctance by unions to take part
- Schedule risks,
- Application and Information Technology Systems Integration risks,
- Sub-contractor and vendor risks, ☐ Implementation risks, ☐ Training risks.



### ***Analysis and Management of Risks***

To analyse the risks effectively, the alliance project team will estimate both the probability of occurrence and the likely impact of each identified risk. Each risk will be analysed both from a qualitative (subjective) and a quantitative (objective) viewpoint, where possible and practical.

The assessment of each risk will be carried out individually on a worst-case, best-case and most probable basis. Having analysed each of the various risks, the project team in conjunction with ACME management will prioritise them for mitigation. Appendix 2 shows the Risk Profile that has been established, which will allow a management and mitigation plan to be developed.

The establishment of a cultural change within ACME's and its Partners is a medium risk. It was felt that by establishing a small project office it would be a lot easier to develop and manage the cultural change.

Our analysis of the risks we faced is shown in Appendix 2

### **Establishing the Project Office**

The project office has been established to provide a key support and communication role in the effective running of the cultural change project. Project procedures are assigned to and executed by the project office. While the overall responsibility for project management rests with the Project Director and the Construction Superintendent, Simon manages the responsibilities assigned to the project office, as Managing Director.

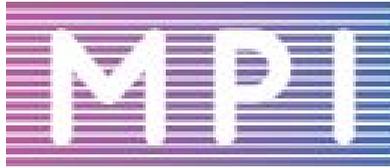
The responsibilities assigned to the Project Office are to support the site project teams by providing administrative and planning services. The project office also facilitates the procedures outlined in the management plan by providing a centralised coordination point.

The goals of the Project Office are to:

- Provide a central coordination point for all project-related information. For example, project documents, such as the Omeo Hospital Project Management Plan, are stored in the project office;
- Provide a working environment where consultants, sub-contractors, and project team members can work;
- Provide administrative support for the project;
- Facilitate communication and provide visibility of the project;
- Serve as a single point of contact, home base, for the project.

Significant benefits are attained through the effective implementation of a project office. These include:

- Centralised repository for critical project documents and deliverable's;
- Ability to consolidate project data from many sources;



- Consistent enforcement of critical project management standards; ☑ Centralised channel for all project change requests and issues; ☑ Consistent analysis and interpretation of project status data.

## **Project Control and Reporting Process**

A clear and objective picture of all the Project's current status, measured against the approved management and functional implementation plans, is available through the systematic and timely collection of measurable, meaningful and accurate information. The collected data is matched and compared against the management and implementation plans. Reporting and analysing the data enables the early identification of potential problems which helps the appropriate team respond pro-actively to support project participants.

On-line maintenance of reports, documentation and other relevant data always makes the information accessible. Appropriate dissemination keeps the site teams, project sponsors and sub-contractor community well informed and facilitates the timely launching of pro-active strategies when things don't go according to plan, which can minimise significant deviation from the implementation plans.

## **Project Control and Reporting Process Summary**

ACME's Executive, with oversight and direction from the Project Office are responsible for facilitating the project control and reporting function. This is an iterative process that continually measures the current position and future direction of the Cultural Change and other projects against the Management Plan and provides the basis for formal project communication. This is of course managed by using Earned Value Management Techniques according to AS4817-2003<sup>5</sup>.

## **Establishing our EVPM System**

The project office set up our EVPM system by implementing Micro Planning International's X-Pert for Windows product. Each site project manager was tasked to develop their own project plans in consultation with the major sub-contractors. The initial setting up of the project plan developed the work breakdown structure to ensure the major deliverables were captured. Once this was established the normal logic of the construction process was identified with the various sub trades and drawn in the traditional critical path form of a precedence diagram. Each plan was resourced and costed, and the data entered into X-Pert and processed. Each project was analysed and had its own files and each site project manager was then provided with the various reports as requested. Basically Gantt Charts, the actual Critical path network diagram (which enjoys a lot of support from the sub trades as they like to follow the schedule logic), progressing Gantt charts, Milestone Variation, Cost Status, Cost profiles and Cost pies are all produced as well as summary reports for management.

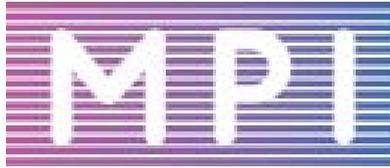
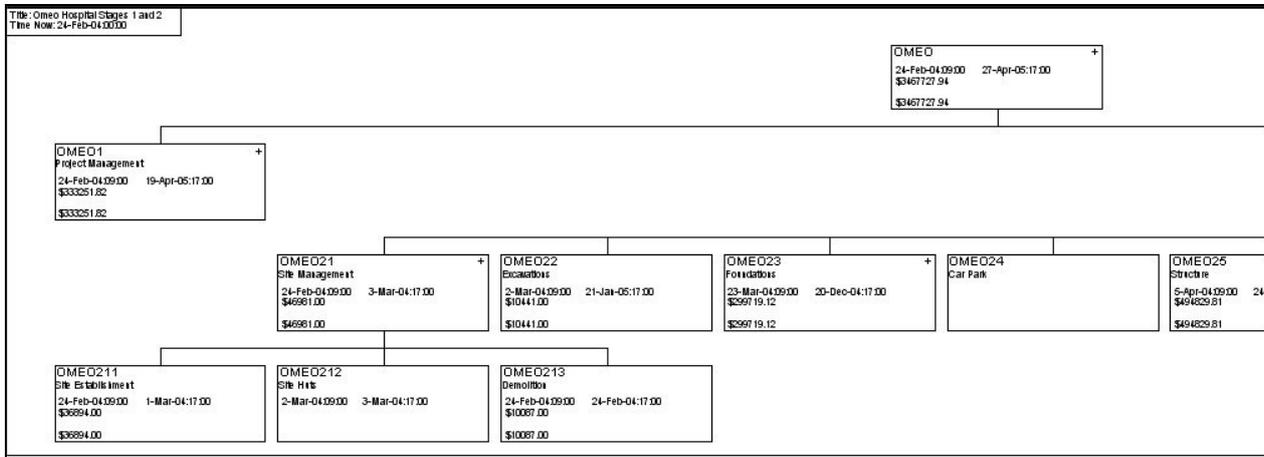


Figure 2 –Typical Project Work Breakdown Structure (Part thereof)



The Work Breakdown Structure (WBS) is used to segregate the work scope requirements of the project into definable product elements and related services and data for not only ACME as head contractor, but for each of the major Sub contractor trades. The WBS is a direct representation of the work scope defined in the tender documents and specifications, and breaks that work scope into appropriate elements for cost accounting and work authorisation. It is a multi-level hierarchical breakdown that shows how project costs are summarised from the lower elements to the total program level. The extent of decomposition and levels in the WBS generally depends on the value of the project and is also determined by program management needs and contractual arrangements. We build our WBS as defined in AS 4817- 2003 <sup>5</sup>, part of one is shown in Figure 2.

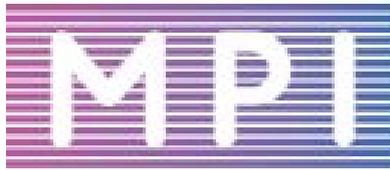
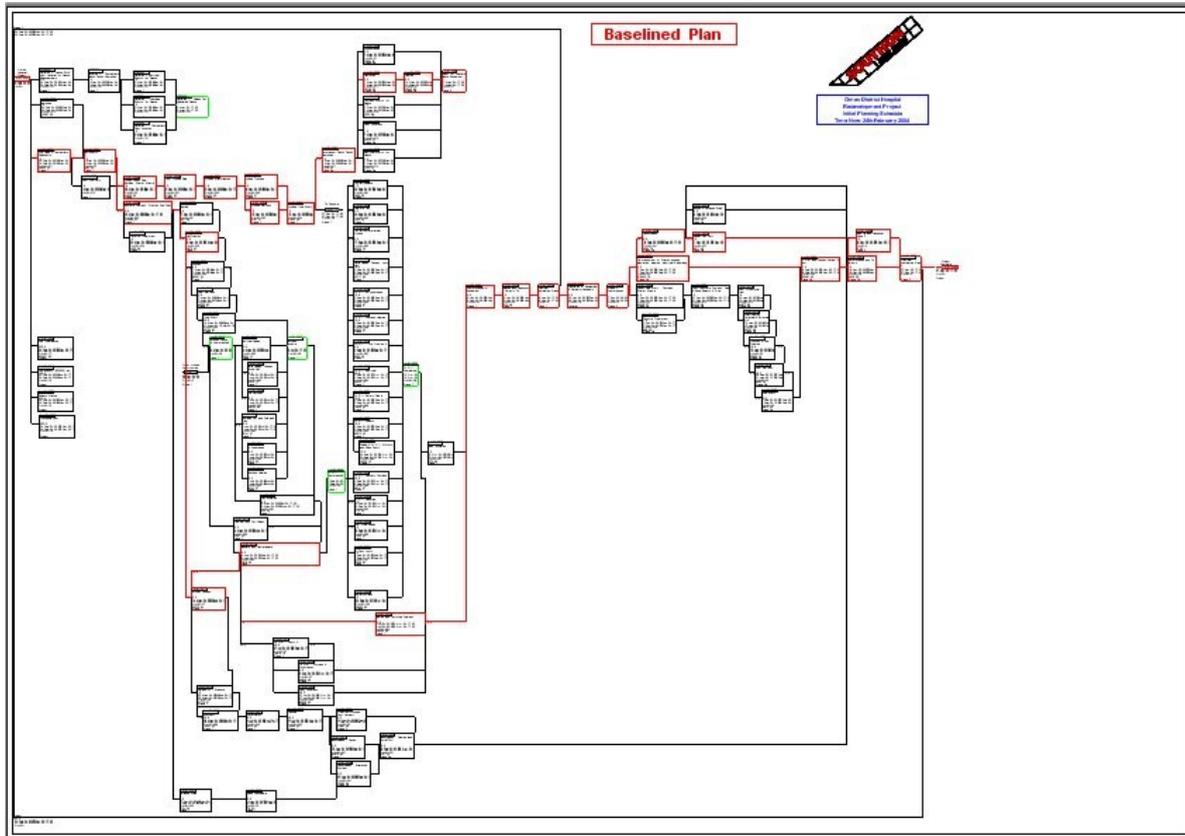


Figure 3: Typical Critical Path Network

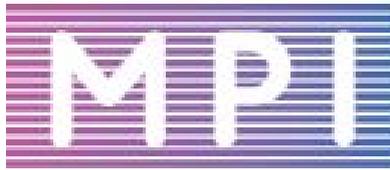


Each project has a critical path network developed in conjunction with the site Project Manager, the major sub-contractors and the project office. Many of the projects have sufficient similarity that quite often a previously created network can be quickly re-engineered to reflect the current project. This has great benefits as the look and feel of the network diagrams is maintained, which makes it easier to use on site by the various tradesmen. Plus, the fact that there is a cost saving in establishing the project as well as reusing data. Figure 3 illustrates a typical critical path project plan.

Having entered the durations, resource requirements and various labels for each task, the project is resourced, and cost scheduled to calculate the Planned Value of work for each task as well as to produce the various cost plans and resource usage histograms.

The resource profile for each of the major trades is checked against existing projects resource requirements and where there is a shortfall; action is taken to rectify the situation. This could be anything from hiring more resources, changing lead and lag times where overlapping has been defined to perhaps changing logic.

Having agreed that the project plan will work, we then baseline it and from that moment on, all progress is reported against the baseline. The Budget at Completion (BAC) is thus agreed and

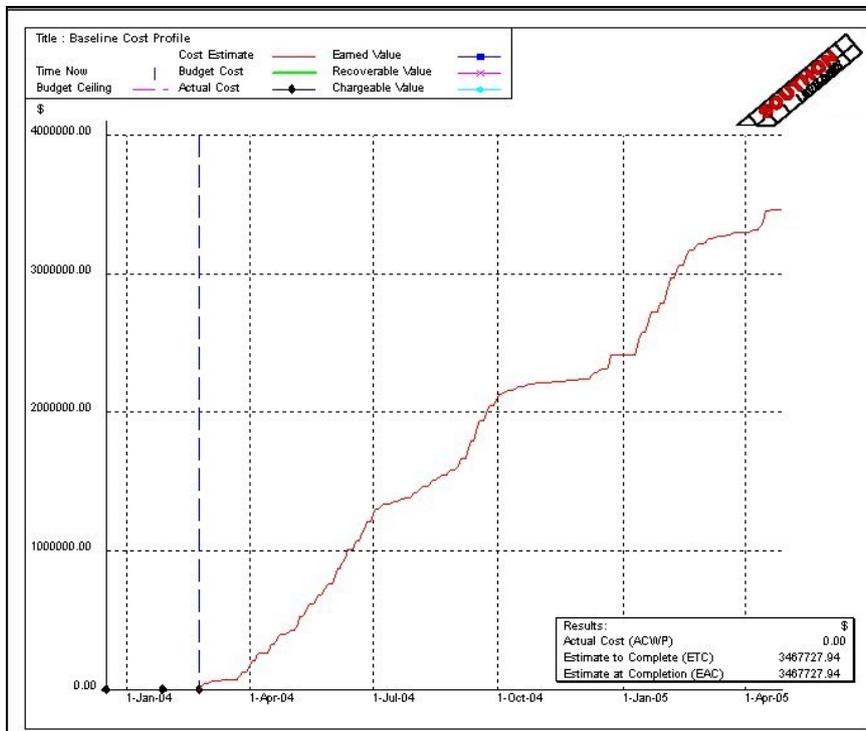


frozen as the ceiling. Of course, the construction industry wouldn't be the construction industry if we didn't almost immediately get a variation to contract.

When this occurs, the variation is planned into the project plan and a budget adjustment (up or down) is made and so the Adjusted Budget at Completion becomes the Recoverable budget ceiling.

The critical path network is printed out in A1 format and laminated and mounted in the site project manager's hut.

**Figure 4 Baseline Cost Profile**



The agreed baseline cost profile is the accumulation of costs against time; two major elements of data are shown in the box, i.e. The ETC (Estimate to Complete) and EAC (Estimate at Completion). The blue vertical line shows the current Time Now (Data Date).

As the project progresses through time for each report, time now is moved forward, and the data is reanalysed.

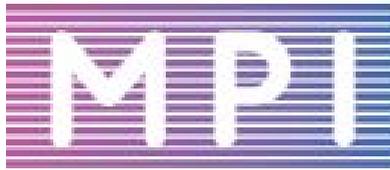
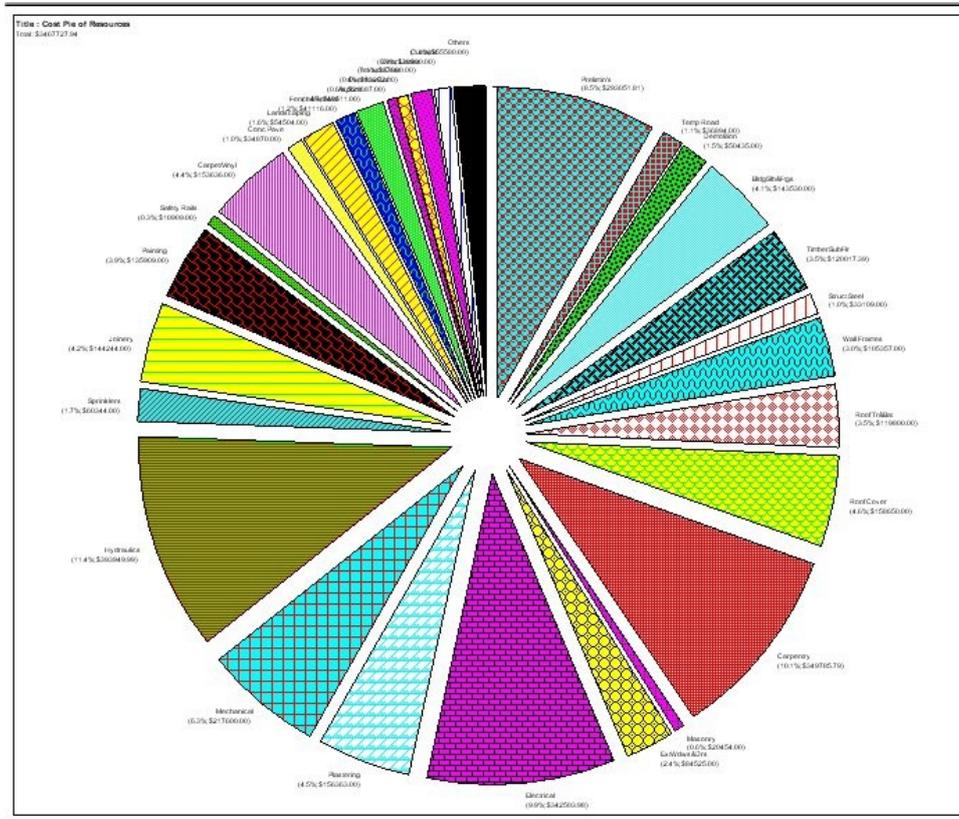


Figure 5 Trade Breakdowns by Sub Contractor Costs



The Trade Based Breakdown Pie Chart as shown in Figure 5 is extremely useful in indicating the proportion of the total contract budget each trade represents. As progress is made and if a trade is lagging in performance be it schedule or worked completed, the slice portion increases, and the project office is able to tell that delays are occurring. If at a specific date a trade costs represents say 2.4% of the remaining costs and then at a subsequent update the remaining costs have become greater, then it often indicates work is not being achieved. The project office then investigates as to the reason and where necessary corrective action is taken to maintain the project performance baseline.

Figure 6 below shows the management Cost Status report for the project, which in this case has been broken down in to several stages. For each task the report shows the Budget Cost, The budget cash flow requirements are broken down across the next six months, and any remaining budget cash flow greater than the next six months is shown as a total as Future Costs. Cost accumulations are made both horizontally as well as vertically.

In addition, the schedule dates when the tasks cost will occur is also indicated.

Once the project has started and progress reports are made the Actual Costs are also shown.

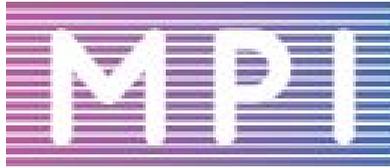
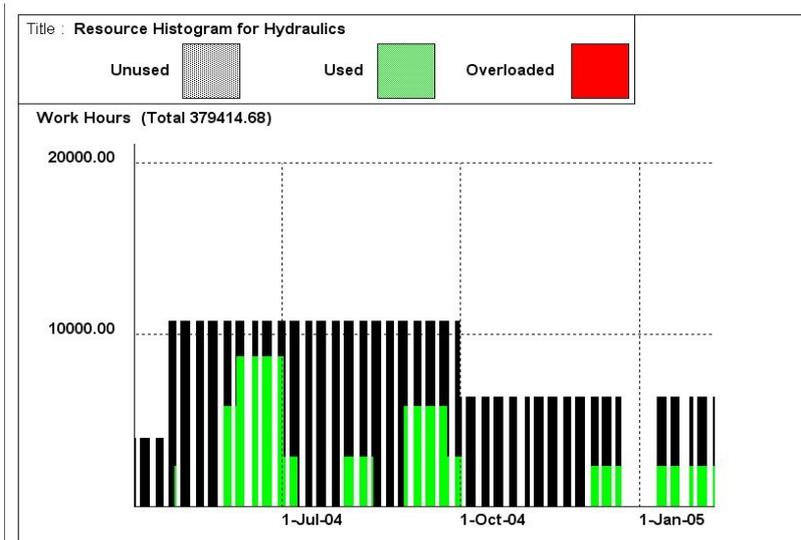


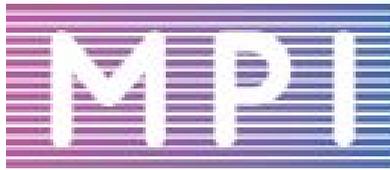
Figure 6 Cost Status Report

Task ID	Task Duration	Task Schedule Start	Task Schedule Finish	Budget Cost	Actual Cost	2004 Feb	Mar	Apr	May	Jun	Jul	Future Cost	Total Estimate	Total Cost	
ME00001	Stage 1 Duration	174 0	24-Feb-04 09:00	26-Nov-04 17:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ME00001	Project Duration	293 0	24-Feb-04 09:00	27-Apr-05 17:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>Stage 1</b>															
ME00002	Site Clean & Temporary Roadworks	5 0	24-Feb-04 09:00	1-Mar-04 17:00	3954 00	0.00	25515 20	7378 80	0.00	0.00	0.00	0.00	-0.00	3954 00	3954 00
ME00006	Demolition	1 0	24-Feb-04 09:00	24-Feb-04 17:00	10387 00	0.00	10387 00	0.00	0.00	0.00	0.00	0.00	10387 00	10387 00	
AP00001	Variation 2 - Liaison With Host Hospital for Dialysis Requirements	5 0	24-Feb-04 09:00	1-Mar-04 17:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ME00003	Erect Site Huts	2 0	2-Mar-04 09:00	3-Mar-04 17:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ME00005	Earthworks	4 0	2-Mar-04 09:00	5-Mar-04 17:00	9463 00	0.00	0.00	9463 00	0.00	0.00	0.00	0.00	9463 00	9463 00	
AP00002	Variation 2 - Temporary Dialysis Facility Demolition	1 0	2-Mar-04 09:00	2-Mar-04 17:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
AP00003	Variation 2 Electrical Works for Dialysis	1 0	3-Mar-04 09:00	3-Mar-04 17:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
AP00004	Variation 1 - Plumbing Works for Dialysis	1 0	3-Mar-04 09:00	3-Mar-04 17:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
AP00005	Variation 1 - Temporary Floor Covering	1 0	3-Mar-04 09:00	3-Mar-04 17:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ME00006	Concrete Footings, Slurps and Slab Floor	20 0	23-Mar-04 09:00	23-Apr-04 17:00	215999 30	0.00	0.00	76948 24	1427 08 15	0.00	0.00	0.00	215999 30	215999 30	
ME00009	Furnish Treatment	1 0	23-Mar-04 09:00	23-Mar-04 17:00	1559 00	0.00	0.00	1559 00	0.00	0.00	0.00	0.00	1559 00	1559 00	
ME00008	Kitchen Under Slab - Plumbing Water Waste	5 0	26-Mar-04 09:00	1-Apr-04 17:00	14035 32	0.00	0.00	11628 26	2367 06	0.00	0.00	0.00	14035 32	14035 32	
ME00004	Phar Kitchen Slab	1 0	2-Apr-04 09:00	2-Apr-04 17:00	11061 00	0.00	0.00	11061 00	0.00	0.00	0.00	0.00	11061 00	11061 00	
ME00017	Kitchen Wall Frames	1 0	5-Apr-04 09:00	5-Apr-04 17:00	14423 35	0.00	0.00	14423 35	0.00	0.00	0.00	0.00	14423 35	14423 35	
ME00017	Kitchen Frames	5 0	6-Apr-04 09:00	16-Apr-04 17:00	20050 21	0.00	0.00	0.00	20050 21	0.00	0.00	0.00	20050 21	20050 21	
ME00005	Kitchen Slaters	2 0	16-Apr-04 09:00	16-Apr-04 17:00	5181 21	0.00	0.00	0.00	5181 21	0.00	0.00	0.00	5181 21	5181 21	
ME00006	Kitchen Iron Work	6 0	16-Apr-04 09:00	27-Apr-04 17:00	27695 38	0.00	0.00	0.00	27695 38	0.00	0.00	0.00	27695 38	27695 38	
ME00007	Flashing	4 0	27-Apr-04 09:00	30-Apr-04 17:00	4821 68	0.00	0.00	0.00	4821 68	0.00	0.00	0.00	4821 68	4821 68	
ME00008	Wall Frames	16 0	26-Apr-04 09:00	21-May-04 17:00	86870 23	0.00	0.00	11662 70	77887 53	0.00	0.00	0.00	86870 23	86870 23	
ME00009	Frames	20 0	7-May-04 09:00	7-Jun-04 17:00	82001 54	0.00	0.00	60151 45	20391 48	0.00	-0.00	0.00	82001 54	82001 54	
ME00010	Roof Slaters	16 0	7-May-04 09:00	7-Jun-04 16:12	40069 62	0.00	0.00	0.00	26272 72	13826 50	0.00	-0.00	40069 62	40069 62	
ME00017	Services Riggers	20 0	14-May-04 09:00	23-Jun-04 17:00	26279 04	0.00	0.00	0.00	11711 62	17967 42	0.00	0.00	26279 04	26279 04	
ME00011	Iron Work	20 0	21-May-04 12:12	1-Jul-04 16:12	52184 62	0.00	0.00	0.00	13627 69	6408 62	-4148 31	-0.00	52184 62	52184 62	
ME00013	Roof Slaters For Gables	16 0	24-May-04 09:00	16-Jun-04 17:00	17967 42	0.00	0.00	0.00	5865 81	-11711 61	0.00	-0.00	17967 42	17967 42	
ME00016	Wall Insulation	20 0	24-May-04 09:00	23-Jun-04 17:00	9560 40	0.00	0.00	0.00	1272 60	3817 80	0.00	0.00	9560 40	9560 40	
ME00041	Electrical Cabling	20 0	24-May-04 09:00	23-Jun-04 17:00	92234 13	0.00	0.00	0.00	12698 53	37676 60	0.00	0.00	92234 13	92234 13	
ME00015	Capacity - Windows	5 0	26-May-04 09:00	21-Jun-04 17:00	41779 31	0.00	0.00	0.00	8265 86	33423 46	0.00	0.00	41779 31	41779 31	

Two types of Resource Histogram are used - Summary and Detailed. Summary Resource Histograms are designed to show, briefly, the workload for a particular resource. While

Figure 7 – Resource Histogram



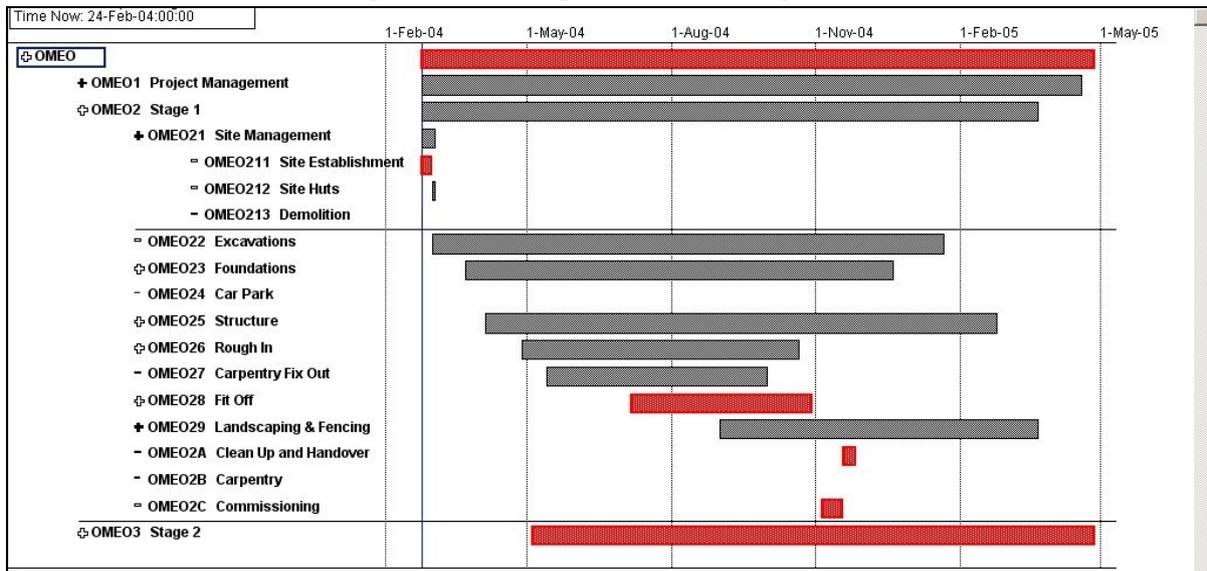


Detailed Resource Histograms show us exactly how many resources are being used at exactly what time or date?

A Summary histogram is produced for each resource and shows the distributed planned usage against time. Figure 7 is a summary histogram in months which shows a resource having been allocated during the Resource Analysis process against the amount available thus indicating what is required in order to meet the project schedule end date. Where an overload occurs, it is checked whether it is a major or minor problem. If minor i.e. under four hours over allocation on a day then overtime may be worked, and if greater than four hours then additional resources are requested. However, the request for additional resources has to be tempered by the fact that quite often our projects are in remote areas and it is not possible to get “another tradesman locally or send one quickly to site. In these cases, the project manager now has the responsibility to shuffle work around and solve the problem.

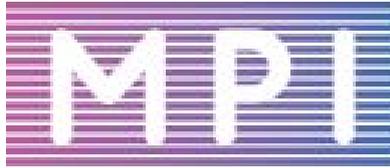
For our own Senior Management project meetings, the project office produces Management Summary Gantt charts for each project as shown in Figure 8. These Gantts are derived from the work breakdown structure and generally are produced for the third level breakdown.

Figure 8 – Management Summary Gantt



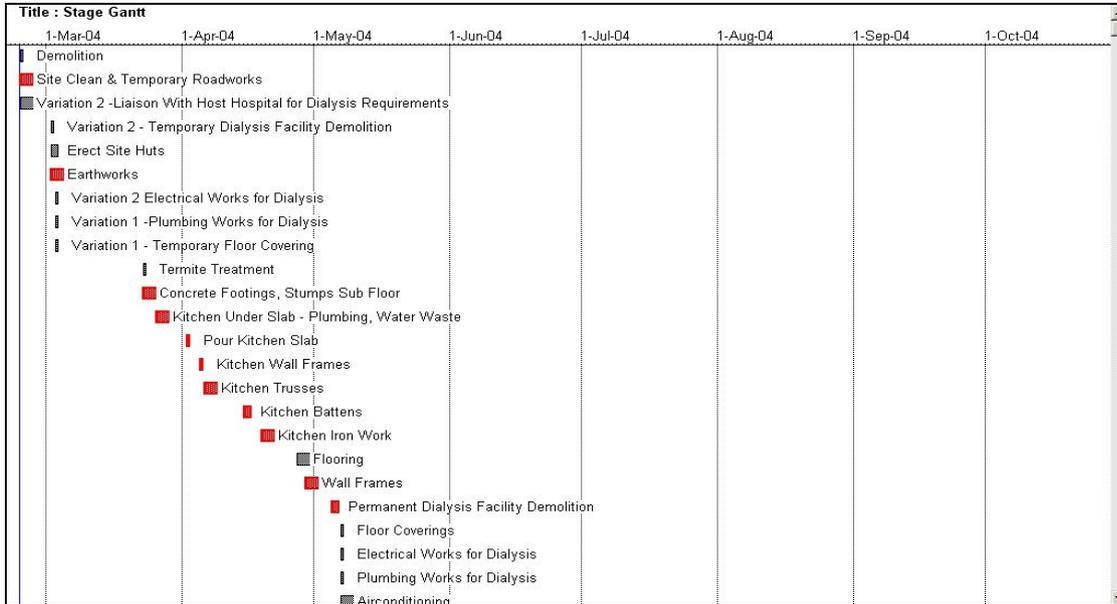
When necessary the summary Gantt can be expanded to show greater detail of any of the work breakdown structure elements to highlight any potential problems. The red bars indicate the fact that the tasks that make up that element are critical.

The site project manager in addition to the network diagram also has a laminated Gantt chart on the wall of the site hut. The Gantt chart shows all the tasks for the project duration, for each stage this is generally viewed and used by the various sub trades to maintain their work and to forecast their tradesmen requirements for the coming two weeks. Figure9 shows the typical Gantt used



As we previously mentioned we do many remote jobs and maintaining adequate resources is very important to the ensuring tasks are done on time as well as providing the tradesmen with a family friendly schedule of work.

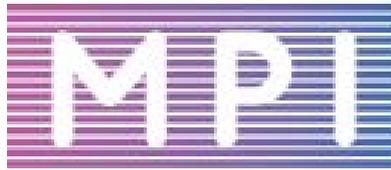
**Figure 9 Project Gantt for Site By Stage**



As the project progresses, each fortnight the project plan is updated with any variations which have been approved during the past fortnight and those tasks which have had work carried out on them, are progressed. The data is collected by sub trade using the report given to each sub contractor; this is shown in Figure 10, below. The actual progress is entered in to the appropriate cell and this report is then returned to the project office for entry into the Micro Planner X-Perit

**Figure 10 Trade Progress & Updating report**

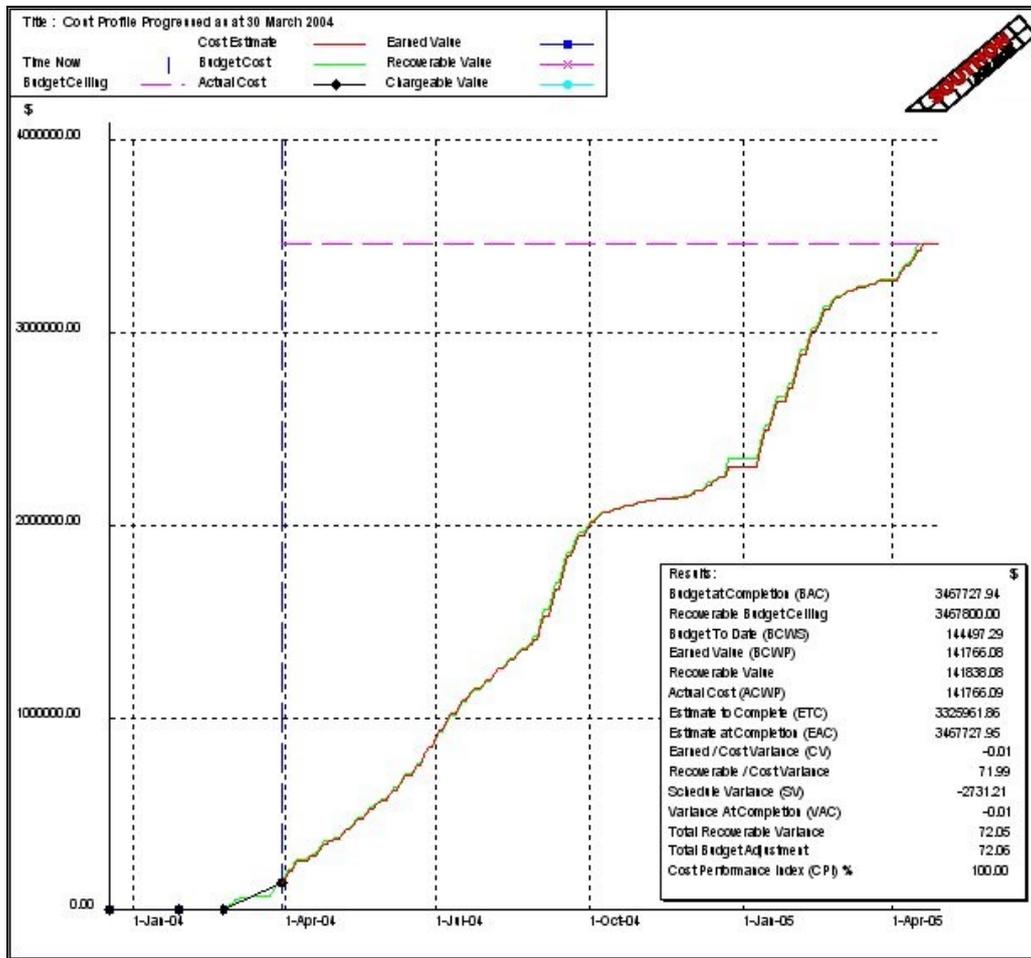
<b>OMEQ0054 Pour Kitchen Slab</b>		Budgetted \$:	11061.00
10 % of the Concrete Budget		Actual \$ to date:	0.00
<b>Stage 1</b>		Est. Rem. \$	11061.00
Scheduled dates:	2-Apr-04 2-Apr-04 Dur: 1	Balance from previous report:	1
Actual Progress	<input type="text"/>	Est. Remaining balance:	<input type="text"/>
<u>Planned Resource</u>	<u>Actual Resource + Rate</u>	<u>Hours spent to date:</u>	<u>Est. \$ to go:</u>
11061.00 <input type="checkbox"/> BldgSlb&Ftgs		11061.00	Hrs for this report: <input type="text"/>
Unplanned Resource (if any) <input type="text"/>			Hrs for unplanned resource for this report: <input type="text"/>
<b>OMEQ0071 Kitchen Wall Frames</b>		Budgetted \$:	14423.35
		Actual \$ to date:	0.00
		Est. Rem. \$	14423.35
Scheduled dates:	5-Apr-04 5-Apr-04 Dur: 1	Balance from previous report:	1
Actual Progress	<input type="text"/>	Est. Remaining balance:	<input type="text"/>
<u>Planned Resource</u>	<u>Actual Resource + Rate</u>	<u>Hours spent to date:</u>	<u>Est. \$ to go:</u>
4820.19 <input type="checkbox"/> Wall Frames		4820.19	Hrs for this report: <input type="text"/>
1171.16 <input type="checkbox"/> Carpentry		1171.16	Hrs for this report: <input type="text"/>
8432.00 <input type="checkbox"/> Struct Steel		8432.00	Hrs for this report: <input type="text"/>
Unplanned Resource (if any) <input type="text"/>			Hrs for unplanned resource for this report: <input type="text"/>
<b>Page Totals (Accumulative):</b>		Budgetted -	554196.88
		Actual -	85322.08
		Remaining -	468874.80



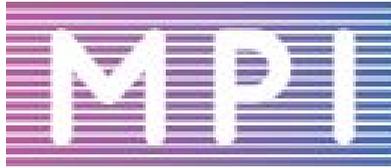
for Windows program. The data presented indicates whether the task has either started, and / or completed since the last progress update, if started and not finished then how many days are estimated to complete the task. In addition, the actual cost of the task is calculated and entered by the project office, which is later matched against the sub contractor's claim of work achieved and invoiced for.

Once all the progress data has been input, the project is reanalysed, and new reports produced. The first report which is examined is the Progressed Cost Profile as shown in Figure 11 below. The report shows two curves, the green line denotes the frozen budget performance baseline (the original baseline budget) and the red curve from Time Now forward shows the forecast cost to completion of the remaining work.

**Figure 11 Progressed Cost Profile**



A table is produced as well as the curves which indicate the various earned value ratios which indicate the health of the project. In addition, the budget adjustments that have taken place due to the variations which have been approved. Note that the Recoverable Budget Ceiling shows the Budget at Completion (BAC) plus the Total Budget Adjustment. The normal ratios of Planned Value (Budgeted Cost of Work Scheduled), Earned Value (Budgeted Cost of Work Performed) and



Actual Cost (Actual Cost of Work Performed) are examined and if they have varied from the performance baseline values then corrective action is taken.

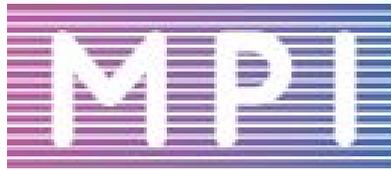
## **Conclusion**

By examining how the company normally managed projects and where we wanted to go in the future with strategic alliances, we found that changing our work habits and culture would enable ACME to take advantage of Earned Value Performance Management and closer client relationships. Better cost control and project delivery is beginning to make its mark. Through implementing the earned value process, management is able compare how much work has actually been completed against the amount of work planned to be accomplished. Earned Value requires our site project managers to be an integral part of the project office to plan, budget and schedule the authorised work scope in a time-phased plan. The time phased plan in the form of a critical path network is the incremental "planned value" culminating into the performance measurement baseline. As work on site is accomplished, it is "earned" using the same selected budget term. Earned Value compared with Planned Value provides a work accomplished against plan. A variance to the plan is noted as a schedule or cost deviation. Corrective action allows for early intervention and prevents costly overruns and non-performance of the project when variances occur.

Normally the established accounting system provides accumulation of actual cost for the project. The actual cost is compared with the earned value to indicate an over or under run condition.

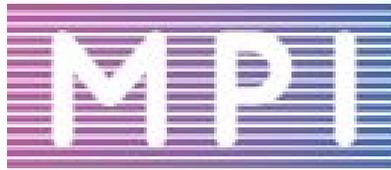
Planned Value, Earned Value, and Actual Cost data provides an objective measurement of performance, enabling trend analysis and evaluation of cost estimate at completion within multiple levels of the project.

Earned Value Performance Measurement is now being applied to every project where the owners of the final product wish to ensure that the expended resources were used efficiently. On major projects the application of good project management tools will aid us in the selection of the right course when we need to make financial and time and resource allocation decisions.

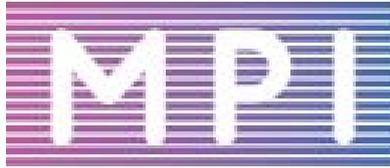


## Appendix 1: Task Plan Activities and Techniques to Introduce Earned Value Management and Project Management Techniques

Stage	Process	Typical activities	Typical questions	Typical techniques	Outputs/outcome s
Preworkshop	Preparatory planning	Prepare/review <i>Project Management Brief</i> (including <i>Project objectives/scope</i> ) Select participants Organise a venue Gather and distribute relevant information Prepare facilitation strategy and agenda Brief participants	What is the purpose of the <i>Project</i> ? What is to be delivered by the end of the <i>Project</i> ? Who needs to be there? What information needs to be gathered and distributed? Where is a suitable venue?	Organisational management and planning	<i>Project</i> approach agreed Scope, objectives and deliverables agreed. Background information documented Management and Sub contractor 'buy in' secured Agenda developed and circulated Workshop strategy is developed Workshop parameters agreed
Workshop	Workshop preliminaries	Confirm <i>Project objectives</i> Confirm <i>scope</i> Confirm agenda Describe workshop process Explain <i>Earned Value Management</i> principles	Are there any matters to be further clarified in terms of purpose, scope, agenda and process?	Group facilitation	Acceptance by the <i>Project Management and Earned Value</i> workshop group of the further objectives, <i>scope</i> agenda and approach
	Build knowledge	Define primary purpose(s) of the, process, system or service Identify and agree to what's important about the <i>Earned Value Management</i> , process, system or service Identify givens and constraints Describe current proposals (if any) Identify assumptions	What is the primary purpose of the <i>Earned Value Management</i> , process, system or service? What's important about it? What are the "givens" and "constraints"? What assumptions are being made? What, if any, are the current proposals?	Group facilitation Nominal group process	Shared understanding and documentation of: <ul style="list-style-type: none"> <li>– <i>Earned Value</i> related to the particular project</li> <li>– Overall requirements</li> <li>– Givens and constraints</li> <li>– Work already undertaken</li> <li>– Assumptions</li> </ul>

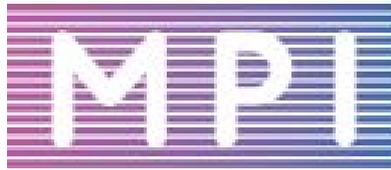


Stage	Process	Typical activities	Typical questions	Typical techniques	Outputs/outcome s
	Analyse <i>primary steps and related functions</i>	Prepare a <i>project plan</i> , develop <i>Work Breakdown Structure</i> , products/purpose ) Identify describe and analyse products, deliverables and <i>related functions</i> , their interrelationships and, resource requirements and costs	What are the means of fulfilling the project plan. What are the individual WBS elements ? Why do they do what they do? How do they do what they do? What is the cost of the various <i>functions/purposes/means</i> What are they <i>worth</i> ?	<i>Function</i> models <i>Function</i> hierarchies Purpose/ <i>mean</i> s models CPM. diagrams	Shared understanding of <i>functional</i> relationships and costs Key performance and specification requirements agreed to. Potential areas of <i>value</i> improvements identified
	Generate ideas	Generate multiple ideas for earned <i>value</i> adding or earned <i>value</i> improvement Promote lateral thinking Reserve judgement of ideas until subsequent stages of the <i>Project</i>	How else can the purposes be fulfilled, or <i>functions</i> performed? Where can value be added or improved?	Group facilitation Various creativity techniques such as brainstorming	A list of ideas for consideration in the next step of the <i>Project</i>
	Evaluate ideas	Assess all ideas against agreed criteria Select ideas for further development	What benefits are offered? What is the cost? How achievable are the proposals? What is the relative degree of importance in terms of the primary purpose of the product, process, system or service?	Group facilitation Option appraisal Paired comparison matrices	A list of ideas that demonstrate earned <i>value</i> improvements to the project, process, system or service and which have been set aside to be worked up into proposals
	Develop options and proposals	Sort and classify previously selected ideas Develop potential solutions	How can the various ideas be combined and developed into workable solutions	Classification techniques Planning and design techniques in drawing together ideas and converting them into proposals	Several potential workable solutions for consideration and final selection in the next step of the <i>Project</i>
Stage	Process	Typical activities	Typical questions	Typical techniques	Outputs/outcome s



	<p>Make recommendations and, where appropriate, take decisions.</p>	<p>Rank and weight competing potential solutions Reach agreement on recommendations and decisions Prepare an action and implementation plan</p>	<p>Which options are to be accepted/recommended? Which options should be discarded? Is further work required? What actions should be taken?</p>	<p>Group facilitation Evaluation matrices Comparison tables</p>	<p>One or more recommendations as to solutions that provide best <i>value</i></p>
	<p>Write and distribute <i>Project</i> report (post workshop)</p>	<p>Compile record of workshop process and outcomes (including action and implementation plan). Archive workshop material</p>	<p>What is the purpose of the report? What material needs to be reported on to fulfil that purpose?</p>	<p>Report writing Archiving</p>	<p><i>Project</i> report prepared and circulated.</p>

(Modified from Value Management Study )

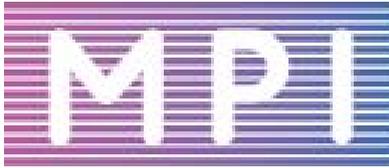


## Appendix 2 Risk Analysis Factors

Initial Assessment completed by ACME Builders Project Director and project team 31<sup>st</sup> May 2004

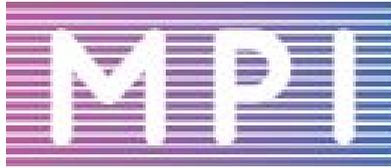
No.	Risk Factor	Low	Medium	High	Imp/Pro
1	Overall Project/Deliverables	☐ Simple	☐ Average	☐ Complex	I
2	Legal/Policy Impact	☐ None	☐Some	☐ Extensive	I
3	Strategic Impact	☐ None	☐ Some	☐ Extensive	I
4	Interface to Other Products/Systems	☐ Simple	☐ Average	☐ Complex	P
5	Intrinsic Complexity	☐ Simple	☐ Average	☐ Complex	P
6	User Procedures - Alterations	☐ None	☐ Some	☐ Extensive	I
7	Stability of User Requirements	☐ Stable	☐ Average	☐ Unstable	P
8	Performance/Quality Requirements	☐ Low	☐ Medium	☐High	I
9	Level of Innovation	☐ Simple	☐ Average	☐ Complex	P
10	Similarity to Other Project/Deliverables	☐ Similar	☐Some	☐ None	P
11	Intrinsic Project Team Skills	☐High	☐ Average	☐ Low	P
12	Relevant Skill Level (With Application)	☐ Extensive	☐Some	☐ None	P
13	Project Manager Experience	☐Extensive	☐ Some	☐ None	P
14	Project Staffing Level	☐ 1 - 5	☐5 - 10	☐ over 10	P
15	Use of Contractors/Part Time Members	☐ None	☐Some	☐ Extensive	P
16	Project Development Length	☐ 4 to 6 months	☐6 – 12 months	☐ Over 1 year	P
17	Schedule/Deadlines	☐ Flexible	☐Firm	☐ Fixed	I
18	Project Priority For Project Team	☐ High	☐ Medium	☐ Low	P
19	Project Team Experience with Project Type	☐Extensive	☐ Average	☐ Some	P
20	Project Team Environment	☐ Excellent	☐ Average	☐Poor	P
21	Level of Sub Contractor/User Support	☐ High	☐Medium	☐Low	P
22	ACME & Sub Contractor Experience With Applications/System	☐ Extensive	☐Some	☐ None	P
23	Own Professional Project Manager	☐ Full-Time	☐Part-Time	☐ None	P
24	ACME Own IT Team	☐ Moderate	☐ Some	☐None	P
25	ACME and Sub-contractors Participation	☐ Full-Time	☐Part-Time	☐ Ad-hoc	P
26	ACME & Sub Contractor Support Capability	☐ Moderate	☐ Some	☐None	P
27	ACME & Sub contractor User Skills	☐ Extensive	☐Average	☐ None	P
28	Impact on ACME/Server Environment	☐ Low	☐ Medium	☐High	I
29	Number of Key Stakeholders	☐ 1-3	☐3 -5	☐ over 5	P
	<b>Overall Project Risk</b>	☐ <b>LOW = 4</b>	☐ <b>MEDIUM = 17</b>	☐ <b>HIGH = 8</b>	

I = Impact and P = Probability. And I = 7 and P = 22



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2. The Application of Information Technology By Australian Contractors: Toward Process Re-engineering by Love, MacSporran and Tucker (1999) CSIRO Division of Building, Construction and Engineering
3. The American Workplace: Skills, Compensation, and Employee Involvement, Ichniowski *et al*
4. AS-4360 Risk Management
5. AS 4817-2003 Project performance measurement using Earned Value



## Appendix 4 - A short bibliography of useful EVPM Literature

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**Notes :- To find out more about EVPM methods and other useful links visit <http://www.microplanning.com.au>**

